

VIII Triple Helix International Conference on University, Industry and Government Linkages

BOOK OF ABSTRACTS

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P-051 Academic Entrepreneurship - Gendered Discourses and Ghettos

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Abstract

In this paper, based on texts on academic entrepreneurship as well as on interviews with teachers and researchers at two Swedish universities, we will explore how local discourses of academic entrepreneurship are constructed and gendered. We see this as an important basis when discussing how gender mainstreaming interventions can be introduced in the complex and elusive arena of academic entrepreneurship.

Swedish and international higher education is in the process of changing identity; from state-financed monopolies to more selffinanced institutions. In addition to competing for students and research funding, the universities are to contribute to economic growth by, for example, cooperating with industry and commercialize research results. It is a global discourse, providing 'rules' for ways of speaking and writing about academic entrepreneurship and it affects the way research and science is looked upon, both within and outside academia.

It also provides material for gendered practices and social constructions of women as entrepreneurs and as researchers. Our findings show for example that in texts promoting academic entrepreneurship pictures of men address both women and men, while pictures of women are only targeted to women, often found in 'entrepreneurial ghettos' at the university and conceptualized as in need of support, as less risk-willing and less willing to commercialize their research.

Notwithstanding that a discourse might be global, however, it is not always hegemonic, as it competes with alternative discourses and is translated and modified to adapt to local discourses and practices. This is particularly evident within academia, which is characterized by powerful and often contradictory discourses. Our findings show that the global entrepreneurial discourse is met by both counteracting and contributory discourses in academia. For example, it is true that academic entrepreneurship and other types of managerial ideas imposed on academia are seen as important, but also as jeopardizing the core values of academia, such as the idea of independent research and collegial decision making and autonomy.

At the same time, Swedish society, including academia, is subject to the discourse of gender equality. Universities have for example been pointed out by the government for not doing enough to increase the number of women professors and as a result, a number of gender mainstreaming measures and projects have been introduced at the universities. As a consequence also projects on for example academic entrepreneurship are to deal with the issue of gender equality and to present measures to - in this case - increase the number of women entrepreneurs. Notwithstanding that gender equality is seen an important goal, at least on a rhetorical level, such projects and interventions tend to ignore that both academia and discourses of gender equality, entrepreneurship, innovation, and triple helix are gendered. Our findings show that there is a clear risk that interventions aimed at supporting 'women entrepreneurs' instead of leading to fundamental organizational and cultural changes reproduce and reinforce the image of the successful male academic entrepreneur. One problem addressed in this paper is how to design gender mainstreaming interventions without reproducing stereotypes. We believe the solution is not gender neutrality, but to move back and forth between structural approaches and more critical constructionist approaches.

O-050 IMPLICATION OF FIRMS' LINKAGES ON INNOVATIVENESS: EVIDENCE FROM ICT FIRMS' SURVEY

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INTRODUCTION

Networking and innovative capability is one of the key factors for developing countries to achieve world leading positions in different industrial sectors.

STATE OF THE ART ABOUT THE TOPIC

A study by Lee et. al., (2001) revealed that external networks and partnership-based linkages of firms to sources of finance had a significant influence on performance. Furthermore, a study by Cooke and Wills (2004) showed that government used networking to enhance business, knowledge and innovation performance. Linkage capabilities are required to leverage on high transaction costs and to gain grounds in narrow and inefficient markets. While networking in firms is not sufficient to bring about innovative capability, it is a crucial factor to strengthening their innovative capability (Sher and Yang (2005). Thus, through internal development supplemented by external network linkage, competitive positions of firms change as a result of shifts in both exogenous (e.g. technology cooperation and acquisition) and endogenous (e.g. R&D expenditure and manpower) factors (Keizer et al., 2002).

RESEARCH FOCUS

This study attempted addressing the following questions: How does the networking activities of firm impact on their economic and innovation performances? What kind of networking or external linkage impact on the novelty of technological product and process innovation? And what type of ownership structure moderate the link between the use of specific external knowledge sources and firm performance?

METHODOLOGY

The study areas include Lagos, Port Harcourt, Kaduna and the Federal Capital Territory – Abuja in Nigeria. These cities were selected based on their predominant commercial activities, their age-long existence and the presence of most ICT firms involved in development/manufacturing, assemblage, repairs and maintenance of ICT hardware and software. This is because these firms have interrelated developmental activities which provide details on the nature of technological effort undertaken in the industry. The study employed the use of structured questionnaires and personal interviews to obtain primary data from purposively sampled 185 ICT firms involved in production, engineering, maintenance of ICT hardware and software with 85% response rate. A pilot test was conducted in Lagos, Nigeria with about 20 firms and three tertiary institutions. The result of the pre-test was used to validate the research instrument. The firms were asked to indicate the number of existing linkage/networking they have in the years 2003 to 2007 with government laboratories, universities or polytechnics, ICT regulatory body, competitors, suppliers, and financial resources. The parameter was also measured using the intensity of firms' collaborative efforts with sources of Information and Knowledge, Sources of Technology/Process, Human Resources, Financial Resources, Government laboratories, Universities or polytechnics on a five-scale rating of 5-Excellent, 4-Very Good, 3-Good, 2-Moderate, and 1-Poor. The data gathered were sorted, coded and analyzed using the Statistical Package for Social Science (SPSS) now known as the Predictive Analytic Software (PASW) and Excel.

FINDINGS

Among the 14 different types of linkages used by the firms, networking activity with competitors (correlation coefficient = 0.794) ranked highest. Evaluation of the impact of networking and linkage capability(NLC) on firms' performance revealed that while NLC does not impact on the annual profit (R= 0.286, > 0.05) and capital outlay (R= 0.317, > 0.05) of the firms; it impacts strongly and positively with number of patents granted to firms (R=0.776, < 0.05), novelty of the firm's product innovation (R = 0.623, < 0.05), and novelty of process technology (R = 0.500, < 0.05). Specific types of networking and linkages that impacts on novelty of process and product innovation respectively include: involvement in subcontracting (=0.000, B=-0.170; =0.006, B=-0.198), linkage with financial resources (=0.013, B=-0.574), universities/polytechnics (=0.012, B=-0.405), policy/regulatory institutions (=0.013, B= 2.477; =0.009, B=4.243), competitors (=0.004, B=-0.891; =0.000, B=-4.047), suppliers (=0.000, B=-2.790; =0.001, B=3.873), and engaging in innovation cooperation/acquisitions of rights to use patents (=0.000, B=-0.418; =0.000, B=-0.961). The negative Beta (B) values show the amount by which the respective linkage activities will decrease as more novel product or process innovation occur in the firms, and vice versa. Number of patents obtained by firms yearly while being impacted by all the above NLC plus collaboration with research laboratories is however, not influenced by engagement in subcontracting. Regression analysis carried out showed that ownership structure is not a predictor of knowledge sources used by firms and also performance.

CONTRIBUTIONS AND IMPLICATIONS

From the study, networking and linkages with competitors, sources of information, research laboratories and sources of technology are most important in other to achieve positive effects on sales and market share to changes in productivity and efficiency in firms. NLC was found to impact strongly and positively with number of patents granted to firms, novelty of the firm's process and product innovation. Furthermore, firms collaborative efforts with policy/regulatory institutions, competitors, suppliers, and subcontracting impact on the novelty of technological product and process innovation in firms. Also, collaborative efforts of the firms with University/Polytechnic were found to be significant in determining the number of patents granted to firms. The result suggests a strong link between conducting research and development (R&D) and generating patents. It also suggests that subcontracting does not favour or enhance the generation of patents by firms. Last but not the least; ownership structure is not a predictor of knowledge sources used by firms and also performance.

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Building Regional Competitive Advantage - The Sintra and Lisbon Metropolitan Area Case-Study

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1. Introduction

In an essay made with a colleague during my Geography and Regional Planning degree we attempted to ascertain the possibility of a Tourism Cluster localized in the region of Sintra, 30 kilometres west of Lisbon (based on Porters Report of Portuguese Competitiveness that indicated Tourism as a sector for clusterization). Having in mind the growing need for knowledge based economies as the best way to organize a society for innovation and Sustained Development, we attempted to describe the Region from the Triple Helix's point of view. Tourism, having the special characteristic of having, theoretically, no two equal products, and not having the traditional dichotomy of production/consumption (CUNHA, 2003), is in need of constant innovation. The Tourism market is highly dynamic but it does not tend to innovate. Instead it tends to mimic other products that the Tourism Agents think will do well in their region.

But this mimicry is not necessarily good for the region because each region has specificities and environmental needs and fragilities that may put in risk the future of the Tourism sector itself.

The Triple Helix has a potential to create new, specific, regional ways to sustainably guarantee the future of the sector identifying new regional products and their viability, for it is clear that a regional approach based on endogenous resources is the best way to assure a Sustainable Tourism. In fact, Etzkowitz (2003) states that "developing countries add regions have the possibility of making rapid progress by basing their development strategies on the construction of niche knowledge sources".

Nowadays Portuguese Tourism initiatives are not based on regional endogenous resources (and regional cargo capacities) but instead in transnational ideas of what is good for tourism. This paper is based on Etzkowitz's belief of the possibility of progress inherent to the Triple Helix and the reality of Tourism and its limitations.

2. Research Focus

The research focused mainly on ascertaining the degree of adaptability of Porter's Competitive Diamond and Ertzkowitz's Triple Helix to the region of Sintra, comparing the reality observed in loco with an idealized view of a knowledge-based Tourism Sector. It was especially focused on a study (AGRELA, ESTEVES, 2009) of the existing interactions, dynamics and infra-structures available and existing conditions for innovation available for the 3 sections of the Helix.

3. Methodology

The chosen methodology to ascertain the Reality and future possibilities of the Tourism Sector in Sintra was:

" Hypothesis on what the state of Tourism Reality should be, based on the Triple Helix and Porter's Diamond;

" Data collection: Statistical Information, Interviews with Tourism Agents (mainly tourism agencies, and Local and National Government agents (Vice-Director of Turismo de Portugal, Town Hall Vereador for Tourism and Culture;

" Calculation of several Regional Economic Indicators so as to understand the regional dynamics between Sintra, Lisbon and Cascais;

" Findings and comparison with the idealized Knowledge-Based Sector;

" Suggestions.

This methodology provided good results, even though we had no effective support from any Social Studies Laboratory or Government or Tourist Agents.

4. Findings

In the study it was found that clusters are not present and there is no Triple Helix in the region. In fact, Government severely limits Tourism endeavours in the Region, there are no Risk Taking initiatives or entrepreneurs (much on account of Portuguese recent History that resulted on a much to prudent entrepreneur class) and the new role of Universities in light of the Triple Helix is not present. Nonetheless, it is stated and affirmed that a Triple Helix is possible in the region for we identified local Tourism specialized universities that, associated with the right companies and government agents, might help in advancing a new model of Sustainable Tourism in the Region. It was also found that the Government Agents have the will and are open to dialogue with other agents to promote a better, endogenously specialised Tourism, supported and augmenting the Regions Competitive Advantage.

5. Contributions and implications

The future implications of a well established Triple Helix of Tourism related industries are clear (assuming that it is a true Triple Helix, that results in true innovations and not an Etatistic or Laissez-faire Model) in so much as Etzkowitz states that a Broad-Based research university should invest in research areas with economic potential. This research can also be traditionally problem oriented and in the case of Tourism, Universities have a yet badly understood part:

" Creation of new Tourism Products;

- " Creation and divulgation of a new paradigm of Sustainable Tourism;
- " New hypothesis for the identification of endogenous Tourism resources;
- " Cost reductions.

Madrid, October 20, 21 & 22 - 2010

Finally, in another point of view, I must point out that a significant part of the successful Tourism initiatives in Sintra may serve as a starting point to the validation or refutation of Brännback, Carsrud, Krueger, Jr., and Elfving (2005) article "Challenging the Triple Helix model of regional innovation systems.", because most of the true local innovation seems to take place by individual initiative or micro companies with no apparent link to Universities or industries. The DNA-like Double Helix of Entrepreneurial Assets, Innovation Assets and Bridging Assets may find a good testing ground in this region.

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O-082 Challenges for governmental roles and lessons learnt.

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What is missing when regional or national governments play an active role in fostering community expansion? What is really missing when governments correctly anticipate the necessity for merging of communities of innovation? In "challenges for governmental roles and lessons learnt" we investigate limitations and challenges within the existing concept of the Triple Helix. Taking-up the concept of boundary-role stress and role-attribution in a reality of networks and communities of practice quickly unveils the theoretical challenges when implementing government and public policy in the Triple Helix era. This investigation is here done from comparing three recent case studies where European national or regional governments have correctly anticipated 'where' and 'how' their local research organisations should join forces – with all the implementation problems in the pre-cooperation phase as well as all the consequences from a government becoming the innovation-leader or driver (too far) ahead of real-world-focussed industry and organisational inertia in research organisations.

For quite a while the Triple Helix community has shared the perception that in some parts of the world the university sector is not fully committed towards its third mission or sometimes the weakest strain in Triple Helix. But also for quite some time there was this shared feeling that esp. in Europe more often than not it is the governments who lack the full involvement in the Triple Helix. Some have attributed this governmental behaviour pattern to the management fad of "New Public Management" others from a more sociological perspective have blamed the separation of public governance from "implementation agencies" and "Research Programme Management bodies".

From a more abstract point of view we can reframe the issue of Triple Helix limitations and challenges in the "Development of Cities of Knowledge, Expanding Communities and Connecting Regions" as the problem of the three core pillars becoming networks or network-type of players themselves. Especially within weak-tie network relations it is even theoretically unclear how you can contribute towards a common development.

To illustrate the consequences for a regional government let us go into the nitty-gritty of European research and "cities of knowledge" realities.

When (regional) governments commission preparatory studies and even the entire design of technology-based stimulation programmes in order to help their cities to better prepare for the international competition for European and national research money information seems to be less an issue; good preparatory studies should not just retrieve or gather information but are rather expected to quasi establish strong ties between core actors in order to implement a competitive strategy or strategy element. However this easily overlooks the inherent nature of network relationships within European research organisations as well as within local industry boards. To give two rather drastic examples from the European context: a regional government in Europe identifies its international strength in transport research (research org A), logistics (research org B), communication technology (research org C). There are also an industry board of local truck operators (org D) and of large scale warehouse operators (org E). Why not just merge forces, and compete for the big European research grants by establishing an entirely new knowledge-node as a brand new competitor within the competition of "cities of knowledge"?

You would not expect that a top-ranked research institution in the field of transport research has not its established links to research partners in the field of public transport or logistics. The same holds true for links between this research centre and key innovators within industries. But more often than not your top partners are all over Europe and not within your own country or even the same city.

What are the consequences for regional governments from the fact of established networks of internationally-minded research primadonnas? How can you encourage critical mass and intense cooperation locally in your city when prestige, international visibility and prestigious large-scale research consortia are a thing of its own. When even international funding rules and review practices seem punish strong partners to cooperate with a second partner locally instead of a similar partner in a far away region?

This paper presents experiences from the design phases of four science-technology-based stimulation programmes in European contexts. Two programmes were on a national level in one of Europe's rich smaller countries, one on a European scale and the forth on a regional scale in one of the key target regions for structural capacity building and public co-funding in Europe. In terms of technologies these knowledge-based initiatives varied from assistive technologies for the Elderly, Embedded systems research and Innovative satellite navigation related services and applications.

Throughout the design processes the study team focused not only on the state of the art in technology programming but integrated Triple Helix frames into the design processes and into communication efforts with the three communities (researchers, industry and government).

The Triple Helix frame of reference was used in order to effectively speed up the transfer of these emerging technologies and application fields into later stages of technology commercialisation (Jolly).

Data for this comparison of four public stimulation activities is derived from an action-research approach and extensive qualitative interviewing prior to participant observation in several Open-Space-Technology events.

One common limiting factor for effective public designs seems to be rigidly overly simplistic interpretations of key concepts like Cities of Knowledge, Knowledge Society, Science Parks as well as the Third mission of Universities. As a consequence support in forming educated, realistic practice-based expectations seems to be a core bottleneck in designing effective public co-funding schemes.

Results show clear limits to a static concept of Triple-Helix-role models. But how can we integrate into the concept of Triple Helix the fact that today's governments might for some time have better long-term-oriented research executives than their best research institutions. Due to the longitudinal character of the action-research approach we can show where organizations learn faster to navigate the Triple-Helix-space.

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W-07 FAPERJ'S CHANGING ROLE IN SUPPORTING INNOVATION IN RIO DE JANEIRO, BRAZIL

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The CARLOS CHAGAS FILHO FOUNDATION FOR SUPPORT TO RESEARCH IN THE STATE OF RIO DE JANEIRO – FAPERJ is a public institution, linked to the Rio de Janeiro State Department for Science & Technology – SECT-RJ, for the purpose of promoting research and encouraging the scientific and technological activities necessary for the sociocultural development of the state of Rio de Janeiro. Since the late 1990s, FAPERJ has been broadening its activities and reach, in regard to the types of incentive programs it can provide and the diversity of the players involved in these actions.

The Technological Innovation Law No. 10.973/2004 was an important watershed as it established innovation incentive measures and situated scientific and technological research within a productive environment, seeking to create technological autonomy and industrial development in Brazil. This law aimed at encouraging strategic partnerships between universities, technological institutes and companies; stimulating the participation of science and technology institutes in the innovation process; and creating incentives for innovation within companies.

The aim of this work was to evaluate the evolution of Faperj's role, in terms of the public policies developed in support of innovation, and to analyze the transition from a policy of support to scientific and technological development to a policy that also includes support to innovation.

The study involved documentary analysis of FAPERJ's performance, in the context of the national public policies on incentives to technology and innovation, with reference to the types of programs and the diversity of the players involved in those activities. Moreover, evaluation was also done of the extent to which the policies and programs of support to innovation adhered to the Triple Helix model, which is used as a paradigm in analyzing the university-company-government relations in existing examples of innovation policies.

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P-053 Bridging Scientific Cultures in a Regional Healthcare Context

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INTRODUCTION

Embedded Intelligent Systems (EIS) is the joint research field of the four collaborating laboratories at the School of Information Science, Computer and Electrical Engineering (IDE) at Halmstad University. The research of the four labs is integrated into a strong concerted research environment within embedded systems (EIS) - with a perspective reaching from the enabling technology via new system solutions and intelligent applications to end user aspects and business models. It is an expanding research area with many applications, not least ones that exist in everyday life.

EIS is an important research environment contributing to the regional Triple Helix innovation system Healthcare Technology which the region has pointed out as a prioritised development sector. With its strong connections to both established and new, expanding firms hived off from the university, the research environment is active in the Healthcare Technology Alliance, a network of around sixty companies, counties and health care providers in south-western Sweden with the aim of developing the region into a leading arena for the development of health technology products and services. Several projects together with these participants concern both research and technology transfer.

An integrated gender and gender equality perspective in innovations within the health technology area is necessary in order to be able to meet the needs of an ageing population with quality innovations. The relevancy of a gender perspective is clear in relation to the fact that about 70% of all those older than 75 years are women. Older women are on average cared for in hospital twice as long as men, partly due to differing disease panoramas, but also because men are more often cared for in the home by a woman while the women who live longer more often live alone. With the expansion of home-help and home nursing new needs follow and it is likely that a gender perspective will become necessary for the development of products and services that can make daily life easier for the elderly. The gender perspective also has relevance from the point of view of care staff. New technology is developed for application within the health and care sector where the larger professional groups consist mainly of women. The technology, most often designed by men, is used by women. With this in mind it is clear that an important aspect of good innovations is that the end users are involved in the innovation process.

Based on an awareness of the need for a more articulated gender perspective within the research environment, in order to meet the needs expressed above, an application for a gender inclusive R&D project was handed in to the VINNOVA programme Applied Gender Research in Strong Research and Innovation Environments. The G-EIS project (Gender Perspective on Embedded Intelligent Systems - Application in Healthcare Technology) was approved and started in 2009. The project involves researchers from the EIS research environment as well as representatives from companies and the public sector.

The project participants are on the whole agreed on the need for a gender perspective in the R&I environment, but struggle with the meeting of two epistemologically opposed theories of science. The understanding within gender studies that research and production both create reality and are informed by it is not always accepted within the areas of natural science. Engineering and other technological sciences not only consider aspects of science to be separate from reality, but also seek positivistic proof in research, something not always possible in the more qualitative research of the social sciences. Researching how these two perspectives meet within this specific project is the topic of this paper.

STATE OF THE ART ABOUT THE TOPIC

We are inspired by the Technoscientific gender research (Trojer 2002), developed in Sweden and internationally, that studies the basis for classic engineering science with its indisputable classifications, standardisations and formalisations from a critical perspective. Technoscientific gender research challenges the epistemological foundation and represents a complex and extensive knowledge process of an interdisciplinary and transdisciplinary nature. Technoscientific gender research understands the production of technology and knowledge as contextualised processes, where there are no determined borders between universities, companies and other regional, national and international agents. Neither are there, from a technoscientific gender perspective, boundaries between science, technology, politics and society, nor between humans and non-humans, the processes of hybridisation between people and machines (Haraway 1991).

RESEARCH FOCUS

Technology is traditionally considered a male area of work and this is reflected in the sex distribution within the research environment EIS. Among the enrolled students at the department, the discrepancy is even larger than among the staff (which in fact has a better sex distribution than most other equivalent environments). A pilot study shows that there is a need to problematise the science of technology and its application in relation to gender and gender equality, and to carry out development work for a more gender equal and gender aware work and research environment. In addition, health care is an area concerned with both technology development and gender aspects - many elderly women live alone toward the end of their life and many care givers are women. Technology can be used to facilitate both being able to stay in one's own home and the often heavy and complex work of health care. The end users are regarded as possessing untapped knowledge that can help researchers produce more user-friendly products.

Research on intelligent products within the health technology area requires an understanding of the machine-human interaction. This can only be achieved in a meeting of perspectives from the natural sciences and the social sciences. Gender awareness may be used as a means to reaching a broader understanding of the complexities of the issues.

METHODOLOGY

The project has a qualitative and action research approach and is oriented toward development. With a relatively open approach we expect the project to be innovative regarding how a gender perspective can be applied and have an impact on a computer technological environment and on an innovation system based on the theme healthcare technology.

The aim is to integrate a gender and gender equality perspective not only in the research environment of EIS and its research partners, but also in the whole chain from the recruitment of students to the consumers of the innovation system's products and services. The project team is a combination of staff from EIS and gender researchers. Several Ph.D. students or younger researchers together with an entrepreneur and a regional civil servant function as "change agents" - they receive training in gender equality and research aspects of gender equality in their respective labs and organisations. Here we use the four dimensions of Joan Acker's (1992) theory of gendered organisations to structure both the learning process and the implementation of new knowledge.

CONTRIBUTIONS AND IMPLICATIONS

The intention is to follow the emergence of an understanding between the scientific perspectives and to attempt to develop a model for how to continue working with the issues after the completion of the project. How does one create an understanding between the sciences?

The paper intends to describe how we can bridge and create understanding between sciences and different epistemological cultures. How does one access the various arenas concerned? How can a gender perspective enrich engineering and computer sciences?

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O-018 FACULTY CONSULTING: QUANTITATIVE EVIDENCE ON A TRADITIONAL GOVERNMENT-INDUSTRY-UNIVERSITY LINKAGE

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Theoretical background and relevance: Most studies on relationships between government, industry and universities deal with collaborative research, research contracts, patents and university spin-off companies. Although significant, we do not know much about academic consulting, which is a form of knowledge and technology transfer largely under-documented and understudied (Bercovitz and Feldman 2006; Cohen et al., 2002). Perkmann and Walsh (2008:1884) suggest that "academic consulting is perhaps practiced in different forms and for different reasons". This paper addresses this issue in differentiating three forms of academic consulting: 1) revenue-driven consulting: consulting activities generating income opportunities; and two forms of learning-driven consulting activities; 2) consulting activities through providing expertise or technical support, without being paid, to help companies solve technical problems; 3) consulting activities through providing expertise or technical support, without being paid, to help government agencies solve technical problems.

Research questions: This paper addresses three questions: What is the extent of engagement of university researchers in natural sciences and engineering in these three forms of consulting activities with government and industry? Do academics simultaneously engage in these three forms of consulting activities? Are there differences in the determinants of these different forms of consulting activities?

Contribution in relation to prior studies: Much of the literature on academic consulting implicitly assumes that consulting is a discretionary behaviour involving faculty motivated by personal income opportunities (Boyer and Lewis, 1984; Rebne, 1989). The evidence of the extent of such a form of academic consulting and its determinants is still scanty. Moreover, recent studies (Perkmann and Walsh, 2008) argue that unpaid academic consulting, taking the form of informal advice, is motivated by the desire to learn about problems and challenges met by companies or government organizations. To the extent of our knowledge, there are no studies documenting the extent and determinants of informal academic consulting. This paper aims to shed new light on the extent of these three forms of academic consulting by focusing the attention on resources and other factors that are under the control of university researchers. It will also advance knowledge by testing some of the propositions formulated in the conceptual framework developed by Perkmann and Walsh (2008).

Hypotheses: Academic consulting may involve providing expert advice, resolving technical problems or testing and validating new concepts. We differentiate academic consulting generating additional personal income from consulting services provided without being paid, referred to as informal consulting. Furthermore, we subdivide informal consulting into consulting services provided to government organizations and consulting services provided to companies. Consulting services are usually provided by individual academics in response to different types of resources they have access to. We hypothesize that different types of consulting will be explained by the recourse to different types of resources. The conceptual framework and hypotheses developed in this paper are related to five categories of resources that are likely to influence engagement in different forms of academic consulting: 1) financial assets; 2) organizational assets; 3) knowledge assets; 4) relational assets; 5) IP rights ownership.

Methodology: This study is based on a 2007 survey of a representative sample of 2590 researchers in engineering and natural sciences funded by the Natural Sciences and Engineering Research Council of Canada (NSERC). To test the hypotheses developed in the conceptual framework, we will estimate three econometric models. First, in order to identify the determinants of consulting activities generating additional personal income, we will estimate a poisson regression model or a negative binomial regression model. Second, two ordered logit models will be estimated in order to identify the determinants of the other two forms on informal or unpaid consulting activities. The same explanatory variables will be used for all three models. As indicated earlier, the explanatory variables are regrouped in the following six categories: 1) financial assets; 2) organizational assets; 3) knowledge assets; 4) relational assets; 5) IP rights ownership; and 6) two control variables: academic ranks and research fields.

Expected results and implications: The descriptive results will show that academics simultaneously engage in different forms of consulting activities. We expect that the results of the econometric models will exhibit two patterns: some factors, such as financial resources, knowledge assets and relational (network) assets will positively explain the engagement in the three different forms of consulting activities; likewise, we also expect that organizational assets, IP rights and research fields will differently influence the engagement in the different forms of consulting activities. Practical implications of the results of the econometric models will be discussed in relation to the management of universities, and in reference to the formulation of knowledge and technology transfer policy.

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W-08 **Towards a Quantitative Model for Maturity Assessment in Technology Parks**

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The expression "maturity model" can be understood as a set of criteria used to analyze a social phenomenon and to define its levels of development. Maturity models give organizations a powerful tool for assessing their degree of development and facilitate planning the necessary steps to evolve toward a more mature level. They are based on the premise that people, processes, functional areas and organizations as a whole evolve through learning and may achieve more mature stages of development. They have been proposed over time and used to describe a wide variety of phenomena, both in overall organizational development as well as concerning particular management functions. A widespread example is the Capability Maturity Model Integration (CMMI) framework, established by the Software Engineering Institute in the 90s (Kezner, 2005). Maturity models differ in the number of levels, types of criteria and variables, as well as focus areas (Burn 1994, King & Teo, 1997 apud Rocha & Vasconcelos, 2004).

Da Poian (2008) is among the many authors (Luger & Goldstein, 1991; Cabral & Dahab, 1998; Longhi, 1999; Zouain, 2003; Nilsson, 2006) that identify critical success factors in deploying technology parks. In his approach, eleven essential technology park success factors are proposed: 1) time of deployment; 2) government support; 3) participation of the local community; 4) involvement of Universities and Research Centers; 5) support from financial institutions; 6) the presence of corporate and institutional anchor tenants; 7) appropriate urbanization and facilities, including transport and communication infrastructure; 8) competent, dynamic and creative management structure; 9) quality of leadership; 10) outreach / promotion / animation development and 11) quality of life and working environment.

This paper proposes the transformation Da Poian's eleven qualitative criteria in a quantitative evaluation scale, enabling the development of a metric for comparing Technology Parks and allowing their classification into different levels of maturity. To this end, each of the eleven criteria can be assessed in a range from 1 to 4, where 1 means "bad or unimportant criterion", 2 means "moderate or average importance", 3 means that the park "satisfactorily meets the criterion" and 4 means that the project is "very good or excellent" in the considered aspect.

After performing a few simulations, we concluded that it would be necessary to attribute weights to the eleven criteria, since they have different importance according to their environments. We chose to attribute 1 for minor, 2 for medium and 3 for major relevance. We determined that the sum of the weights would be 25 so that the multiplication of the evaluation scales times the weighting scale allows for a minimum of 25 points and a maximum of 100 points. Parks located in the range between 80 and 100 points can be considered to have a high degree of maturity; between 60 and 80 points would indicate an intermediate level of evolution; finally, parks below 60 points are thought to have a low level of maturity.

The pilot application of this model was carried out by comparing the Petropolis Technopolis project, in Rio de Janeiro, with its inspiration, the French Sophia Antipolis complex. The former scored 53 in our overall evaluation, which positions it in the upper limits of the lower levels of development, whereas Sophia Antipolis scored 86, thus positioned in the lower end of the well developed projects. Petropolis ranked highest in quality of life (9 points), with lower-average rankings (6 points) in local community involvement, financial support, presence of anchor tenants, facilities and outreach. All other criteria were ranked very low. Sophia was ranked excellent (12) in quality of life, facilities and government support, higher-average (8-9) in time of deployment, anchor tenants, leadership and outreach and lower-average or low in the remaining criteria.

In the concluding remarks, we found that the proposed maturity model approach needs yet to be developed further as there are significant discussions in the social sciences concerning the adaptation of qualitative assessments into quantitative scales. There must be a greater consensus on the key criteria for evaluating such projects, as well as the ideal weight to assign to each criterion in specific contexts. Moreover, in order to reduce the degree of subjectivity in the allocation of "notes" to each item by few analysts, such as was the case in this simulation, it is suggested that this tool is referred to the largest possible number of actors involved with the projects under assessment. Thus, one can statistically control the bias of each individual participant with measures of dispersion. Finally, it should be noted that the quantitative analysis of the proposal should not be used as a substitute but as a complement to the qualitative approach. It is suggested that the weaknesses identified are qualitatively discussed in forums of local development in order to facilitate the production of consensus among all stakeholders in the academic, business and government spheres of influence.

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Triple Helix VI) Conference Madrid, October 2010

W-30 Action Oriented Gender Research - At the intersection between practical equality work and gender research

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By using gender theory in joint learning processes in innovation systems, new perspectives can develop that creates new innovative possibilities in organizations. An action oriented gender research, with a focus both on creating new knowledge and on change processes, can create new patterns of actions and through those sustainable possibilities for gender mainstreaming.

To mainstream gender in the production of services and production, the life of the organization or the innovation system itself, need to be addressed. How the constructions and interaction of the organizations evolves, does affect what is possible to achieve in new innovations. Action oriented gender research gives a frame to make the organizational "culture" visible. By not only make it visible, but also focus desirable changes, can contribute to a sustainable growth with the assumption of inclusion of the whole society. The so called "Doing gender-perspective" helps to create awareness of gender as an impeded structure of the organizations goal.

In the R&D project called the Gender Network the approach Action oriented gender research has been developed. The project lasted from 2006 to 2008 and was performed within the regional innovation system Fiber Optic Valley. The network consisted of thirteen middle managers, both women and men, which came from twelve organisations. The aim of the project has been to analyse how middle managers from their power position do gender and how it can be changed from that position. The project was financed by Vinnova (The Swedish Governmental Agency for Innovation Systems).

Action Oriented Gender Research is placed at the intersection between practical equality work and gender research with the ambition not only to create a more sustainable, gender-aware organisation, but also to produce interesting new knowledge on how gender is constructed in organisations.

The paradox of doing gender in organisations is that while people often construct gender with great precision, they do not usually reflect upon this as a continuous activity (Martin 2003, 2006). In R&D work with the aim of creating gender-aware organisations an important first step is to make the doings of gender visible, which is a methodological challenge.

Revealing how gender is constructed can be systematised in different ways. Within the framework for earlier projects, a special model has been developed. During the development process, Joan Acker's (1992) theoretical work has served as the most important source of inspiration. Documentation of this development process can be found in Gunnarsson et al. (2003) and Gunnarsson et al. (2008) and Kvande (2003) (See also Mayerson & Colb 2000 article Beyond armchair feminism).

- The model contains four different processes as follows:
- 1. Gender division, i.e., vertical, horizontal division between women and men.
- 2. Symbols, images and discourses.
- 3. Interaction.
- 4. Internal mental work.

The model is both theoretical and methodological. Theoretical - as it brings together much of earlier feminist research on organisations, methodological - as it may be used as a tool for systematising an analysis of an organisation wherein each point may be studied individually.

Additional the model can help to anchor the practical equality work in gender research so that as well quantitative as qualitative aspects of the gendered organisational life become focused and subject to change, which we believe is important (Amundsdotter 2009; Andersson et. al 2009. Andersson 2009). Lastly, the model can be used to systematise the development of a new gender aware order which is an innovation in itself.

In the project Gender network co-analysis was performed both when the network had its meetings and when conducting participant observations in each of the middle managers workplaces. Different kinds of activating methods were used in both occasions, which was methods that encouraged discussion, reflection and learning between both researcher and practitioners and between practitioners. The focus of the discussions was on personal experiences, mutual analysis or organisational problems. Within these discussions the practitioners usually started to see their own workplaces from new perspectives which increased their motivation to go on working with the change process. Furthermore, it was in these discussions that we received a rich empirical material from which new interesting knowledge on how gender was constructed emerged. Methods used and research results that emerged in these discussions will be presented in the article.

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P-010 University incubators: open innovation model in university business incubators

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The Universidad Tecnologica de Bolivar private institution located in Cartagena de Indias (Colombia) aware of the rapid changes that are occurring in the economic and knowledge society demand greater openness from the University to the Company and feeling the need imperative to help lead this process has opted transforamacion be a Corporate University.

Within estragias to achieve this mission has been evolution in entrepreneurial training process launched in 1999. This document aims at describing the evolution of entrepreneurial training in the institution articulated with new administrative and management models based on the opportunity being presented with new business models from the Open Innovation.

The content design of Business Chair, who began to be taught from January 1999, was due to the main purpose of forming an entrepreneur with the seal of the Technological University of Bolivar, able to understand and act correctly to the conditions existing regional economic environment.

Among the factors that contributed to realize this effort are the Entrepreneurship Conference at that time organized by the ICESI, and the recommendations of the peer reviewers who participated in the process of quality accreditation to the various programs subject to the process, about the need to strengthen entrepreneurial training of students and the university's approach to the business sector.

The year 2003 is a crucial changes to the Universidad Tecnológica de Bolívar: a consolidation of lines and research groups are concentrated efforts to qualify the teachers, and includes the improvement of academic excellence at the university. It also initiates a process of strengthening the entrepreneurial vocation and social projection, from the creation of online business training based on a Center for Entrepreneurship. The efforts of this period were not free.

The university has improved its design experience in the process of consolidating its culture of entrepreneurship. Thus, the Strategic Development Plan and Prospective to 2014 Beyond the Goal!, Whose vision is to strengthen the Universidad Tecnológica de Bolívar as a research university to a knowledge society, defined between the strategic initiatives to promote entrepreneurship institutional general competence in all training programs offered through existing or new ones that are designed for this purpose.

This paper aims to present the What? And how? A university articulates the modern knowledge of open innovation (Chesbrought, 2003, 2007) and through university-industry-state articulates a model of incubation within the University taking into account regional production bets.

This paper presents the steps and the model needed to build a new corporate culture to improve the hatching process in an environment of academic university-industry-state.

Peter Drucker and Tom Peters are two authorities on the subject of the entrepreneur and the entrepreneur. Both authors agree on the nature of the entrepreneur and how to quit acting in an organization. Both argue that the entrepreneur sees the change (modification) as the norm and desirable and are often themselves who cause it. They are creators and makers, according to Drucker's what defines the entrepreneur and the entrepreneurial function: the entrepreneur always pursue the change, give an appropriate response to a need and operate as a source of opportunity.

The most important basic business skills desarrolldas in this model are: Self-confidence, position risk and the action, decision making process, analytical and critical thinking, creation of redes.Este model is based on divergent and convergent processes formcion, thought and action.

Open Inovation model of the Universidad Tecnologica de Bolivar unit through its University Entrepreneurship Center provides all those services required for the development of business initiatives that contribute to the Economic and Social Development of our Region. Articulated in each of the axes identified for development of entrepreneurship at the university.

Axis Business Education

This axis is responsible for coordinating the programs that aims to promote the culture of entrepreneurship among undergraduate and graduate students of the Universidad Tecnológica de Bolívar.

Axis Pre - incubation

It supports the process of gestation and development of business ideas resulting from the Chair in Business and grade work and projects and / or research students from both universities, as teachers assigned to research groups as well as individuals who have approached the center for counseling for the purpose.

It also coordinates outreach activities in the students towards entrepreneurship, the disclosure scenario generation of business ideas from students and the creation of spaces for interaction of business, governmental and nongovernmental entities to support the creation of enterprise.

Incubation Hub

This axis is responsible for coordinating the activities of advice to business projects of students and faculty of the University and the attainment of financing (in calls or funds to finance both domestic and international) and micro-entrepreneurs and young entrepreneurs of the region. To do so, with the participation of teachers that guide business professor and students in their final semesters of training, who act as advisers.

Research Axis

Coordinate research activities to update the syllabus of business professorships, development of publications resulting from the business Chair Rafael del Castillo and the articulation and interaction with Entrepreneurship networks, both nationally and internationally.



0-070

The Role of the University and its relationship University-Industry-State and Impact on Regional Innovation Projects: Case Study Universidad Tecnológica de Bolívar (Colombia)

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This paper presents an analysis and experience of University-Industry Committee-State of Cartagena in Colombia and its address from the university to impact on the generation of innovative knowledge in search and contribution to a regional knowledge-based society in Colombia.

The way research is the only explanatory case study (SES), we consider it appropriate to achieve the objectives set and respond to our research topic.

For the selection and development of this methodology, we rely on Bonache Perez (1999), and we consider the following: • Cases explains part of the fieldwork to induce hypotheses to explain organizational phenomena. In this study the research problem involves different areas, organizations and establishing its causes to explain their theoretical development. • It is being widely used in literature from the organization.

The way research is carried out for this work by applying the following steps CUE: Theoretical framework and / or preliminary theoretical model to establish the unit of analysis only, application of techniques of data collection, data analysis and model induced.

The theoretical framework is given by different changes that are happening in higher education ranging from: the bet on the generation of knowledge supported by new information technologies and communications, changing the way we see education, democratization of education, the quality of education and the emergence of a new century university.

Moreover the University as a knowledge-generating character stands out by the OECD, five functions in the era of knowledge which are: development of training capacities, knowledge creation, innovation generation, space for public discussion.

The entrepreneurial university in the words of Juan Mulet "is one that is committed to participate as a direct agent in the economic development of their national or regional environment. Firstly and most obviously, is to transform their research ability in industrial property rights in tradable goods or other benefits for economic development with the aim of increasing university funds or the status of its professionals.

There are five elements, according to Clark (1998), on the issue of entrepreneurial university based on the technology commercialization process of university resources that constitute an irreducible minimum of the transformation of universities: First, a stronger central direction, second extended developmental periphery; third the diversification of funding; room a stimulated academic core and fifth integrated an innovative culture. The five elements identified, obtained primarily through research comments, become a widespread way of university transformation rate, which is built on research and strongly encourages the institution to orbits of science and learning increasingly competitive . In scenarios even more turbulent, universities can be strengthened as they develop problem-solving skills, built around a flexible approach. For the university to respond to all this required reorganizing constantly.

We conclude that there are different actions or strategies that entrepreneurial universities may apply for a better business environment in context.

First of all a Corporate University must be able to meet the needs of regional and national economy, developing high level skills for work, play a more active role in job creation and the processes of welfare and prosperity of its context; concrete results to the region so it can be seen as a useful entity. To do this, must be related to the productive sector, government sector and the society where it operates.

The research is important to note the various actions ranging from: Establish process for the creation of spin-and spin out, develop processes to generate marketable patents, processes for producing copyright and adaptation and technology transfer.

La Universidad Tecnológica de Bolívar promotes the transfer of knowledge through joint research in cutting-edge consulting firms and promotes through its faculty in institutions of the environment. These experiences are published and serve as academic material that can renew teaching.

The support processes of spin-and spin-out of new enterprises based on research and supported by new technologies is a strategy that allows, from the technology through its Center for Entrepreneurship University, promoting the creation of a culture towards business formation; the behavior change of teachers, students and administrators, the creation of a business curriculum through their curriculum that drive and motivate entrepreneurship among undergraduates and postgraduates, the generation and participation of students in competitions local, national and international that motivate and drive business leadership in the university community.

From teaching with a curriculum in innovative educational offerings to promote a university with a twenty-first century educational model for students to access, analyze, process and communicate information, using technology tools through its platform SAVIO, working with people from different cultural backgrounds, and commit to continuous learning and self-directed.

Are all the above findings in the investigation and presented as part of this written work

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Conference

Madrid, October 2010

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O-120 **Absorptive capacity and the delocalisation of university-industry interaction**

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Increasing university-industry interaction and university contribution to the local economy are compatible –conventional wisdom would say. However, as other university activities, interaction with industry may be limited due to a lack of absorptive capacity in local firms. We exploit data on participations to EU 6th R&D Framework Programme (FP6) to generate measures on the number and, notably, the budgets of UII projects at regional level for the EU27. We consider two types of interactions: inside and outside the region. Our analysis indicates that universities from regions with low absorptive capacity participate more often in FP6 projects with firms outside the region. Our results highlight the value of policies that facilitate firm R&D to enhance collaboration with regional universities.

Note: This is a short abstract. There is no extended abstract but a full paper is already available under request. The authors hope this is not a problem.

Triple Helix VI) Conference Madrid, October 2010

ST-02 The American Triple Helix during WWII: Technological and Innovative Outcomes

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M.A. Student Work

Subthemes: one and three

The paper aims to write about the findings of my M.A. thesis project on the American Triple Helix during WWII.

Abstract

The American Triple Helix during WWII: Technological and Innovative Outcomes

The interactions among the Triple Helix –university-industry-government have been counted as one of the major elements in technological innovations in different countries. During WWII, many technological and innovative products were made and many foundations were established in America, which drew the world's attention to the United States leading position in diverse aspects of science and technology. The effects of the Triple-Helix on the American technology and innovation have been significant, millions of technology related jobs were provided by different programs from the beginning of the New Deal up to the end of the World War II, which decreased the unemployment. Until the end of the war many new and better developed products, goods and services were introduced to the world and the rate of world's demands for U.S made productions applying new technologies grew very fast which brought more wealth and power for the country. The development of import/export provided the sought prosperity in economic fields and U.S entered the international economy in a massive way. The purpose of this article is to examine the American Triple Helix during WWII, and it will find more about the results of the relations among governmentuniversity-industry in the American technology and innovation. The paper will study how the Triple Helix has influenced the outcomes and products of the U.S technology and innovation in wartime. It tries to count and elaborate the areas that U.S Triple Helix has helped the growth and developments of the U.S technology and innovation on land, water, and air plus the basis, which were formed for the upcoming achievements in space and virtual world. The paper will discuss how much the Triple Helix model is applicable to the wartime America, and if there is a new model to be more compatible to portray the wartime triple helix. The following questions will be examined throughout the work.

-What are the technological and innovative outcomes due to the American Triple Helix during WWII?

-How much any arms of the Triple Helix has influenced producing technological and innovative goods and services?

-How much the New Deal was influential in the trend?

-Is there a new model for wartime Triple Helix?

The methodology of the paper will be historical analysis, providing more collective related data of WWII. Key Words: Triple Helix, Technology, Innovation, World War II

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O-103

Determinants of scientific international mobility: evidence from foreigner researchers in Italy and Portugal

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The international mobility of researchers is a phenomenon of growing interest for scholars and policy makers, especially for its impact on national innovation systems. At the same time, due to the lack of empirical evidence, there is not agreement on the general interpretation of the phenomenon (consequences) and even less on the determinants of individual researchers. Typically the phenomenon has worried because of the negative consequences for countries that are involved in a "brain drain" (Bhagwati & Hamada, 1974). Furthermore a risk of "brain waste" has been often associated, i.e. the employment of highly skilled researchers in activities not requiring their competences (Morano-Foadi, 2005; Sretenova, 2003; Levin, Black, Winkler, & Stephan, 2004). Nonetheless there is evidence that often foreign researchers present a higher scientific productivity on the average, and widely contribute to scientific improvements (Libaers, 2007). At the same time a reverse knowledge transfer towards the origin country is possible (Agrawal, Kapur, & McHale, 2008). Mahroum (2000b) observes that mobility became a powerful agent of "scientific expansion and institutional empowerment". Finally, from an individual point of view international mobility is part of professional life, since it may be necessary to improve professional skills, to join international knowledge networks and to exchange tacit know-how (Morano-Foadi, 2005; Mahroum, 2000c). Hence some scholars consider the concept of "brain drain" at least incomplete, inviting to replace it with the idea of a "brain circulation" (Gaillard & Gaillard, 1997; Ackers, 2005). This approach tends to underline the temporaneity and the global positive value of the phenomenon (Meyer, 2003).

In relation to the determinants, many authors refer the motivational structure of researchers to a specific psychological pattern of scientists (Busse & Mansfield, 1984). Researchers are motivated by work characteristics and by conditions and the specific environment of their activity, pursuing independence, responsibilities, prestige (Mahroum, 2000a, 200c; Morano-Foadi, 2005). Generally, economic issues appear less important, but the theory of the specific nature of scientific mobility ("scientist outside space and time") is partly criticized by a second thesis. The thesis of the "convergence of scientific and general migration" (Golup, 2002) argues that scientists can be driven by the pursuit of the basic economic conditions. They are first of all persons with different social conditions, cultural back-ground, characters (Mahnoey, 1979). Furthermore, mobility choices must be understood within the life course of the individuals taking into account the age, social and cultural integration and the family issues (King, 2002).

Some authors claim that different movements should be distinguished assessing the relations between determinants, forms and effects (Golup, 2003; Ackers, 2005). Some others pointed out that temporary and permanent mobility could be a misleading dichotomy since a temporary movement can lead to a permanent migration (Khoo, Hugo, & McDonald, 2007). We propose an analysis on foreign academic researchers in Italy and Portugal based on their characteristics, the reasons and features of their movement, the level of satisfaction in respect to professional and personal aspects, their research activities and their future mobility choices. In particular we investigate: 1) in which way different patterns of mobility are related with the scientific productivity of foreign researchers in the host country; 2) which personal and professional factors mostly determine their mobility choices; 3) the presence and the impact of different linkage mechanisms with the origin country. The findings that we intend to present at the forthcoming Triple Helix conference pertain to a survey on a sample of researchers, professors and doctorate students at 44 different universities and 2 Public Research Centers in Italy for a total of 259 answers, and at institutions (University and Public Research Centers) of 22 different cities in Portugal for a total of 239 answers.

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Triple Helix VII) Conference Madrid, October 2010

W-11 TRIPLE HELIX in R&D&I - Research, Development and Innovation - of Brazil's Electric Energy Distribution Sector

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We study the arrangement of the R&D Programs - Research and Development - in Brazil's energy concessionaires. The sample summarized 20 out of 84, being considered the most significant in terms of annual Research Projects volume in these Programs and their economical importance. In addition to the research made by sampling, one specific concessionaire was studied in order to understand the internal and external relations in its R&D Program.

The objective of this analysis was to establish a non-competitive benchmarking, in order to allow the evaluation of the structural transformations and the development of management proficiencies, both in R&D Programs - Research and Development - and in innovation management, in a way to allow future comparatives in researches, given the construction/establishment of a set of indicators.

The management of Research and Development Programs (R&D) is a critical action of the regulatory obligations of the concessionaires of electrical energy, in the settlement of Aneel's sector regulation - a national agency. The companies' relative lack of experience in this activity, around just one decade, made these concessionaires appeal to research projects ran in Universities. At the same time, the recent change in the R&D Programs orientation from Aneel towards Innovation, with the publishing of its Manual of R&D in May 2010, brought up the perspective of market introduction of the results from Research Programs accomplished in these R&D Programs, what makes Concessionaires to be always looking towards perfecting their organizations and infrastructure to accomplish this activity, not to mention the tracing of a new role for research managers inside Universities. Such managers are required to become partners and also in charge of the innovation process - by the means of involving suppliers or even industries in the research and innovation projects, or by prompting market deliberations in their projects. Such a role is opposite to the previous role of a research executor that ends in result delivery.

Considering the new roles taken by the different actors: government agencies, concessionaires and industries, as well as universities, we developed a qualitative research of such relations, in order to proceed to suggest another set of indicators to be added to those investigated in the benchmarking done which considered the open innovation.

Conference

Madrid, October 2010

Madrid, October 20, 21 & 22 - 2010

O-071

The formation and exploration of networks across the university-industry gap: An institutional approach

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Introduction

The present study investigates how a high-tech-small-firm (HTSF) can perform an inter-organisational exploration of actors located at universities. Responding to calls to study how entrepreneurial firms exploit institutional norms and changes (Devereaux Jennings et al. 2009), this study returns to focus on the different strategies used by a HTSF to instigate and balance adopted academic norm-sets, commercial imperatives and formal regulations to support network formation with universities. In the present context weak ties are at the center of attention, and the paper is thus also a response to the call by Perkmann and Walsh (2007) on the role of weak ties in the formation of university-industry (UI) relations.

University-industry relations in an institutional perspective

Extant research on the institutional norms and logics of academia and industry argue that they are converging in many respects (Vallas & Kleinman 2007), reinforce each other (Owen-Smith 2003) or are substantially different and best kept separate (Perkmann & Walsh 2007).

Previous research shows that adoption of academic norms by firms expressed in UI co-authorships signal willingness of firms to engage in reciprocal knowledge exchange, which enables access to scientific networks (Bouty 2000; Hicks 1995). However, since many of these studies on institutional convergence and adoption of academic norms by firms have been conducted in historical and macro-level perspectives or relied on large surveys (Colyvas & Powell 2007; Vallas & Kleinman 2007), relatively little has been done on an explorative micro-level to elicit how firms actively use adopted academic open science norms to optimize the process of network formation.

Research focus

By combining new developments in institutional research and network theory, the aim of the present study is to achieve a better understanding of the strategies used by a HTSF to instigate different institutional norms to support different formations and explorations of UI-relations bridging different institutional settings.

Methodology

Interviews, observations and archival data from a 12 months ethnographic field study in a HTSF constitute the basis for this research. Unisense is a Danish biotech/high-tech SME.

Findings

Unisense instigates different institutional norms in the network formation process, depending on constraints and requirements from different contexts. Unisense engages extensively in scientific publishing and interacts frequently, openly and intensively with university actors, but the form of interaction and the institutional framework is different in different academic settings. The process, structure and outcome of network formations with universities is thus dependent on the efforts of the firm in actively using and balancing different academic norm-sets, commercial imperatives and formal regulations in ongoing interactions with external agents.

In a general non-biotech, high-tech setting Unisense employs open academic norms to form diverse reciprocal relations, based on weak tie interactions. In this way Unisense brokers across many different technological segments by using academic practices of being open about the potential collaborations and offering the external actors information on research strategies, technological opportunities and potential grants.

In a biotechnological context, where the interaction between academia and business is particularly strong the form of collaboration is different. Research projects in this setting rely on bridging very different islands' of expertise and accumulating a significant critical mass, in part due to regulations concerning research on living entities. Some form of embeddedness is needed, and a loose and open weak tie interaction is hence not viable, and would not be beneficial to neither the business nor university partner.

Contributions and implications

The paper contributes by documenting and explaining how a HTSF can form and explore UI-relations. Inter-personal embeddedness or contracts are not necessary components for Unisense being able to explore university-ressources in a weak tie setting (Liebeskind et al. 1996; Perkmann & Walsh 2007). Adoption of academic norms and practices by HTSFs constitute a form of institutional innovation in innovation by opening up new collaboration roles and forms of interaction with the university system (Etzkowitz 2003). This study expands the extant body of knowledge on the adoption of academic norms in science-intensive entrepreneurial firms by using network theory and new developments in institutional theory to elicit the various strategies of using different institutional norms to support the process of network formation and exploration. Particularly in a weak tie setting where there are meetings with actors from very different academic settings, a HTSF must embrace multiple challenges in responding to diverse agents located in differential institutional settings where different collaboration practices and role expectations exist.

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W-04 **A policy to unleash innovation**

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Innovation and entrepreneurship are no longer only two words that make it easier for us to describe and explain societal phenomena on "newness", "change" and "diffusion", but have also grown into important policy areas in assisting the European Member States to establish conditions for creating economic growth, new jobs and social cohesion. In the policy-making context innovation and entrepreneurship seems to make up a nice pair, and are considered as necessary prerequisites for economic growth. Consequently, they are often combined and intertwined in policy-texts as well as in concrete programs and projects that are constructed in order to increase our society's innovative and entrepreneurial potential.

In this article two texts within the frame work of the Lisbon strategy - Innovative Sweden (2004) and the Green Paper of Entrepreneurship (2003) - are addressed in discussing how the policies on innovation and entrepreneurship are colored by gender and how they, in turn, shape initiatives in one particular direction. By conducting a discourse analysis it becomes visible how innovation and entrepreneurship policy discourses are constructed against a background of combined masculinities. The interplay between innovation and entrepreneurship policy thus create up a "gender gap" which get social consequences, emphasizing certain areas of interests as well as particular social groups. It is argued that this narrow view of innovation and entrepreneurship policy does not contribute to create innovations that help us solve the grand challenges, addressed in contemporary policies. Hence, a different rationality should be considered. It is suggested that this can be done by applying a gender perspective.

The concept gender refers to the relation between female and male as socially constructed categories (Thurén, 2003, Wahl et al., 2001, Hirdman, 1990).). Within the international research tradition that sees gender as socially constructed a common method called "doing gender" is applied, which means that the construction of gender is done in each and every corner of everyday life (Gunnarsson & Westberg, 2008). What the notion of gender then teaches us is that our conceptions of what is regarded as male and female permeates everyday life in subtle yet thorough ways. In order to put the discourse in a more concrete form we will pose some questions to the text in order to make visible what assumptions that are taken for granted in this discourse community. The questions are developed with inspiration from the theoretical landscape presented. In line with similar studies (Ahl, 2004, Berglund and Johansson, 2007 Pettersson 2002, 2007, Lindberg 2008, 2009), the purpose is to pose following questions in order to make clear how innovation and entrepreneurship is constructed by way of policy texts:

In this article we will conduct a discourse analysis of two texts within the frame work of the Lisbon strategy - Innovative Sweden (2004) and the Green Paper of Entrepreneurship (2003) - in discussing how the policies on innovation and entrepreneurship are colored by gender and how they, in turn, shape initiatives in one particular direction. Our point in making the gap between innovation and entrepreneurship policy visible is not only to open up for more women to take part in societal initiatives, but also to show that the notion of gender itself can help us develop innovation system from aspects that give newness its justifiable meaning. Our purpose is thus to create knowledge about the relation between innovation and entrepreneurship, and also how this separation (re)construct gendered structures in policy initiatives.

We will begin to discuss innovation and entrepreneurship from a gender perspective, and then from a policy-making perspective. After that we will delineate the policy discourses of innovation and entrepreneurship in order to analyze in what way that they are gendered. Finally we will discuss the gender implications of the gap between innovation and entrepreneurship policy and make some suggestions for how policies could be constructed differently.

Our study shows that the innovation and entrepreneurship policy discourses are constructed against a background of combined masculinities. Besides of the physically strong and mechanically skilled man there is also the technological expert as well as the business man. The absence of women is obvious from this perspective. Not only are women excluded by the male-connoted traits that make up the entrepreneur, women are also silently excluded in a subtle yet thorough way. As our introductory example from Sweden showed this "gender gap" get social consequences emphasizing certain areas of interests as well as particular social groups.

O-130 The Triple Helix balancing act – Industrial research institutes as knowledge intermediaries

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Introduction and Research Focus

Processes of innovation are in this day and age increasingly viewed as collaborative efforts where different types of actors, representing the spheres of academia, business and government, are involved at different stages of development (Leydesdorff & Etzkowitz 1998).

This development has certainly made innovative processes more flexible and efficient, allowing various actors to specialize and combine their resources in accordance with current needs. At the same time, R&D collaboration, sharing of resources and exchange of information between organizations that is necessary for most innovation processes also give rise to considerable new challenges, for example in the fields of management of knowledge and intellectual property (Teece 1986, Arora & Gambardella 1994). Since collaboration often involves actors with differing institutional set-ups, goals and knowledge management strategies, like for example private firms and public research departments, differences regarding for example the handling of intellectual property (IP) are to be expected.

In this paper semi-public industrial research institutes are studied empirically. This type of knowledge intermediary is owned jointly by the government and private firms (often through an owners' association) and is supposed to transfer industry-relevant research results in a particular area of science to a wide audience while at the same time being engaged in activities like contract research for private firms. Research institutes are placed right at the center of the networks between academia, business and government and can thus for example contribute to commercialization of research that otherwise might not have reached the markets. However, they also have to deal with an inherent risk of conflict between contradictory goals. Questions concerning knowledge management and IP strategies of research institutes are thus vital with regard to the use and commercialization of research results.

The following research questions are analyzed in the paper:

1) What types of strategies for management of knowledge, research results and IP are available to industrial research institutes? 2) How are these strategies shaped and how do they influence possibilities for commercialization of research results?

Methodology

In this paper knowledge management and IP strategies at two Swedish industrial research institutes are studied empirically through interviews with key personnel and the study of internal documents and publications. The studied institutes are both part of the Swedish ICT innovation system, active in the field of computer software (Institute A) and optics, electronics and communication technology (Institute B).

Findings

Considering the possible strategies for management of knowledge, research results and IP available to industrial research institutes this study shows that institutes tend to either lean towards the commercial side, developing the organization in accordance with commercial principles of successful R&D or towards the academic side.

Institute A is strongly dedicated towards research and publishing of research results internationally while Institute B is geared towards detecting patentable innovative steps early on in the research process. At Institute B, patenting is in most cases chosen over early publishing, due to a strong commercial focus. Institute B has also produced a large number of spin-off companies based on protected technologies developed there.

The formation of strategy and decision-making processes considering means of transferring knowledge from the research institute to other firms and the society at large differs considerably between the studied institutes. The relationship to and balance of power with the owners' association seems to play an important role.

Institute A seems to be influenced by its owners' association in a much more profound way than Institute B, which has effects on how activities are organized and research results used. While Institute B can make important decisions independently and can focus on its own mission and results, Institute A has to take its owners' association into consideration and tread carefully when exploring commercial possibilities. Even releasing research results as open source software has been difficult for Institute A, as firms in the owners' association have expressed concern over providing undeserved advantages to their competitors. Contributions and Implications

The main contribution of this study is the highlighting of the "balancing act" of industrial research institutes, which act as knowledge intermediaries between the spheres of academia, business and government. The study shows that the role of research institute can be played in different ways and with different approaches to commercialization and management of research results. Institutes are potentially very important in Triple Helix networks, as they focus on particular areas of industry-relevant science and technology and connect together various types of institutions. However, they seem to lack a common strong set of own criteria of success and clearly defined roles, which could explain why they choose to adopt one of the two established "sets of institutional arrangements" – the academic or the commercial one.

There is a need for a continued debate on the role of industrial research institutes in society and the types of knowledge transfer they can be expected to deliver. Patenting and commercialization through spin-off firms is one possible mode of transferring research results to the economy, academic publishing is another. These modes have to some extent contradictory demands which may be difficult to fulfill for one organisation. Open source constitutes a third option and could potentially be adapted for both software and hardware. A move towards open source would encourage the development of actual products and services while making them available for others to use and develop further.

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O-059 Research, facilitate, evaluate - the role of ongoing evaluation in triple helix projects

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Introduction

Evaluation of triple-helix projects is important to secure quality and effects of publicly financed interventions. However, lessons learned through evaluation sometimes come too late, which has been one of the fundamental problems of project evaluation and a driving force for change in evaluation approach from the EU (cf. Brulin and Jansson, 2009). Traditional evaluations are commonly made before, during or after a project, and are commonly undertaken in purpose to measure goal attainment and/or effects of project. Recently, ongoing evaluation has been launched, i.e. evaluation that is not confined to specific phases of a project but a companion to projects throughout their entire lifecycle and rather aiming at facilitating learning and the process than controlling the programme (Svensson and Sjöberg, 2009).

The first important question that arises is related to the learning aspects; ongoing evaluation is considered as being better suited to support sustainable learning within the project and is also seen as a tool to facilitate goal compliance within the realm of the project itself (cf. Svensson and Sjöberg, 2009). This could be illustrated by the concept of single- and double loop learning models of Argyris (1976), where it is argued that single loop learning implies improvement of how to execute a given task, while double loop learning entails reflection and the possibility to alter roles and strategies (Faugert et al, 2005). However, to reach societal learning, first and second loop learning is not enough. According to Nonaka and Takeuchi (1995) an intermediary is required to diffuse learning from one individual to a collective. We argue, in line with Storey (2000, 2003) that involving researchers in ongoing evaluation entails participation in the public and academic debate (through publications and conferences); thereby facilitating societal learning and improvements of future projects.

A second problem concerns how research is, and should, be related to ongoing evaluation. According to the guidelines of the Swedish Agency for Economic and Regional growth (Brulin and Jansson, 2009), the ongoing evaluator is supposed to be actively engaged instead of distanced, and his or hers findings are to be immediately returned to the project management in order to monitor the programme towards achieving its goals. These principles are in conflict with the principles of the "objective" researcher.

The purpose of this paper is to analyse potential conflict(s) between the three main stakeholder interests in ongoing evaluation of triple helix projects; namely project financiers, project managers and the researchers that conducts the ongoing evaluation.

Methodology

This paper builds upon literature studies and the writers' extensive experience from ongoing evaluation. The conflicting stakeholder interests are, through our analytical model, discussed and analysed against the overall goals of ongoing evaluation.

Findings

From our experiences of ongoing evaluation we have identified three different stakeholders with three different expectations on the process of evaluation: the researcher that expects to conduct research, the project manager who expects facilitation of the project and the financier that expects evaluation, control and societal learning (see figure 1).

Figure 1. The archetypical roles of the ongoing evaluator

The three archetypical roles are difficult to combine even though planning and acknowledgment of the potential conflict alleviate that (Nählinder 2009). The role the ongoing evaluator takes is dependent on the perceived action-space, previous experiences and also upon the demands from the involved stakeholders. The mix of these three roles has an impact on the activities of the ongoing evaluator and furthermore for the way in which the first-loop learning and second-loop learning can be transformed into societal learning.

Contributions and implications

Our special contribution is to sort out if the above mentioned interests can be combined in order to reach the full expectations on ongoing evaluation or if they are incommensurable. As it is of great importance to take the learning from Triple Helix projects to the next level, i.e. beyond learning on the level of the project itself, we suggest that the results of ongoing evaluation should be codified and offered to the research and practice community. Taking part in the public and academic debate is an expressed task of ongoing evaluation, as this is one of the links to societal learning. Resources should therefore be dedicated towards making use of the experiences from ongoing evaluation as well as the data collected during the process for conference presentations and research publications. In such way results gained through ongoing evaluation can be integrated into the ordinary stream of research in relevant disciplines. Otherwise the lessons from the programmes are hidden in the drawers of the clerks rather than becoming an interactive instrument for learning.

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P-047

Gendered structures in academic entrepreneurship and innovation - A development towards world-class standard in educational programmes in Sweden

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An integration of activities such as incubators, technology transfer, student and alumni organisations etc related to entrepreneurship education is seen as promoting economic development and innovativeness in many parts of the world. This way of creating systems for entrepreneurship development has also recently been focused in Sweden. As a result of Swedish Government's ambition to stimulate growth economy, university entrepreneurship education program spring up all over the country in order to promote students' entrepreneurship.

From previous research we know that the infrastructure has an impact for entrepreneurship (Delatte & Baytos, 1993; Hannon, 2003; Rosa & Dawson, 2006, Xu, 2010). The structure relates to the number of individuals in the management structure and the role the individual has in the management structure such as member of the board or manager. It also refers to characteristics of the individuals involved in the management such as diversity, gender, age, education competence and previous experience (Rosa & Dawson, 2006). Further, it has been shown that managers are important since a lack of role models have been shown to have an impact for both female entrepreneurs and female managers in decisions of starting and/or managing a business (Crampton & Mishra, 1999; Mattis, 2004). However, public and private initiatives aimed to support business development usually are following a gender blind norm both in the way it is presented, for example regarding language and psychological accessibility, and considering the fields pointed out. Research shows that women don't feel themselves addressed by these initiatives or that it concerns them (NUTEK, 2001; NUTEK, R 2007:34).

Swedish Government recently challenged to higher education institutions to apply for finance to a development towards worldclass standard in educational programmes in entrepreneurship and innovation (Prop. 2008/2009:1/16). The invitation was directed to higher education institutions that already run advanced studies in entrepreneurship and innovation and that also have a strong connection to research in the same area. Swedish National Agency for Higher Education was commissioned by the Government to examine the applications and invited a panel of international academic experts to asses the applications. Eleven applications were submitted from higher education institutions in the field of entrepreneurship and innovation. Four of the eleven institutions which applied where recommended by the panel of experts and these institutions were further ranked and recommended by Swedish National Agency for Higher Education to the University Chancellor. Two of these institutions were finally selected to be financed by the Swedish Government.

This paper focuses on these eleven applications and the review process. The aim of the paper is to analyze and illustrate in what way the applications as well as the review process is gendered for example in terms of discourse and symbols in relation to educational setting, organizational structure, infrastructure, education management, education team assigned and branches of industry (Acker, 1992; Bruni, Gherardi & Poggio, 2005; Gunnarsson, Westberg, Andersson & Balkmar, 2007). We expect to find how gender is mirrored in these highly ranked applications and what impact the presence or absence of a gender focus will have for entrepreneurship and innovation education.

Keywords; Gender, entrepreneurship, innovation, academic education

O-003

Centreless governance for the management of a global R&D process: Public-Private Partnerships and Plant-Genetic Resource ManagementII

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Introduction

Recent research suggests that the key to economic growth is developing an institutional framework that connects local capabilities to the global knowledge flows to create a value-added process. In this world view, codified knowledge consisting of intellectual property rights and specialized proprietary technologies, exist in global flows that are available to any entity with the requisite institutional characteristics to connect to the innumerable global networks of knowledge pipelines, while tacit knowledge is derived from "learn by doing" and exists locally (Phillips 2002 and Bathelt, Maimberg and Maskell 2004). This paper presents and critically examines the public-private partnership (P3) as the logical institutional design to create the linkages required to capture and process global knowledge flows into local value-added innovation.

Research focus

Pulse crops are an important source of plant-based protein, supplying about 10% of the world's total dietary intake of protein. However, due to the inability of both the public and private sectors to provide production ready technology, producer groups have had to create self-governing organizations for the purpose of creating technology oriented P3s. The global pulse breeding network of 248 actors (42 P3s, 107 government agencies, 83 universities and 16 private-sector entities) has been identified and coded. The global pulse network has also been disaggregated into 3 regional sub-systems, one in the EU (134 actors), one consisting of the US, Canada and Australia (the Export System with 66 actors) and one in the Developing World with 69 actors. All four networks are constructed on, and dependent upon, a small number of P3s for their structural integrity. The removal of these particular P3s causes significant impairment to the composition of each network, demonstrating that P3s possess the institutional attributes that both facilitates collaboration between partners of dissimilar characteristics and connects local networks into the global systems of knowledge flows, providing the structural foundation for regional and international R&D networks.

Theoretical contextualization

A P3 can be defined as an organizational structure that facilitates collaboration between partners from different sectors—public, private and voluntary. The factors that have influenced the advent of the P3 include declining public revenue, technological advances, increasing citizen participation and privatization efforts (Boase,2000). As the theory of the P3 is under developed, a number of theories are required to contextualize the P3. One perspective, postulates that three theories are required to explain the existence of research oriented P3s (Hagedoorn, 2000). These are transaction cost theory, which seeks the lowest cost of contract management and enforcement. Strategic management theory, which suggests partnerships and networks permit firms to attain economies of scale and scope in their R&D endeavours and industrial organization theory, where knowledge is a public good therefore public-private collaboration is needed for cost sharing and commercialization purposes. Research P3s can be categorized by the type of knowledge developed, a formal structure is best suited for codified knowledge, and an informal structure for non-codified knowledge.

Methodology

Social Network Analysis (SNA) is a tool that illuminates the previously invisible relations between individuals and institutions in a networked environment (Mead, 2001). With SNA it becomes possible to graphically identify and quantify the relative power relations and functions between individuals and organizations within a network or sub-networks. SNA utilizes three unique measures of centrality. First, total degree centrality measures the ability of a single actor to influence communications over a network providing that actor with relative control over the flow of information. Second, betweeness centrality measures how often an actor is positioned between the shortest paths linking other actors. Third, eigenvector measures power by measuring the relative strength of one actor's connections to other well connected actors'. Put simply, a high eigenvector rating implies relative power in a network is derived from the relative importance of an actor's connections, not the quantity of connections (Bonacich, 1972).

Findings

Individual actors are ranked according to how many standard deviations their centrality measures are above the overall population mean in each of the sub-systems and the global network. Therefore, only institutions with a centrality measure of one standard deviation or more above mean are considered central actors. Of the 19 actors with measures one standard deviation or more above the mean of the three measures in the Export System, 13 (68%) are P3s, including the top ranked actor in each of the rankings. The ratio is 100% for the central position of P3s in the Developing System (9 of 9); one P3 is ranked number one in all three categories in the EU System, but overall, P3s occur at a much lower ratio (18%) and in the Global System, 20 out of 25 (80%) top ranked actors, again, are P3s. As characterized by the three SNA centrality measures and demonstrated graphically by the vulnerability analysis, the four networks would not exist without the structural coherence provided by P3s.
Strategic implications

Given the focus on knowledge-based growth, there is a need to examine further the microeconomic governance challenges of creating and exploiting new knowledge. This research advances the theory, analysis and policy review of the P3 as a governance structure for directing the process of networked knowledge generation and management.

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P-014 De-constructing State-supported Research in Brazil: The Evolution of Decentralized Innovation Policy

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In the course of the last decade Brazil research productivity accelerated, driven by rising research expenditures. As early as the late nineties, the scale and scope of state-supported research increased, federalist demands to correct regional disparities reached the fore of the science policy agenda. In order to politically sustain the budgetary momentum, the Brazilian state began to decentralize its research policy towards its 26 federative units. These have widely different levels of social and economic development, research infrastructure and human resources and institutional capacity and arrangement.

A singular characteristic of Brazil's innovation system is that the university is the locus of innovation, particularly in hightechnology areas, rather than the firm as in OECD countries (Póvoa, 2008). Although universities and public research institutes represented about 1.6% of patents deposits in Brazil by residents, they accounted for 56.3% of deposits in the area of biotechnology and 45% in organic chemistry. Póvoa (2008) and Rapini et al. (2006) suggest that because of the weak involvement of firms in R&D activities in immature national system of innovation, universities relationship with firms has a dual role, either as a complement or as a substitute, in part due to the industrial structure and competitive dynamics of the Brazilian economy, with strong variations across sectors, and in part due to the concentration of researchers in universities.

In fact, in the next moment with the rapid expansion of innovation financing from the passing the 2005 Innovation Law and the renewed claims by the Brazilian federation units to the local nature of innovation, the de-construction of the Brazilian statesupported research deepened. The Technological Innovation Law No. 10.973/2004 was an important watershed as it established innovation incentive measures and situated scientific and technological research within a productive environment, seeking to create technological autonomy and industrial development in Brazil. This law aimed at encouraging strategic partnerships between universities, technological institutes and companies; stimulating the participation of science and technology institutes in the innovation process; and creating incentives for innovation within companies.

The paper maps and assesses the evolution of a decentralized innovation policy in Brazil, its key mechanisms and main programs, and concludes by discussing its consequences upon the deconstruction of state-supported research.

It tracks and analyzes in detail the trajectory and regional institutional impact of two main decentralized policies for universityindustry cooperation (PAPPE) and MSME business innovation financing (PAPPE Subvenção). Next, it explores research and innovation State and regional policy learning and the transformation of their structure and governance. It concludes that the rapid rise of innovation policy and the structural and process demands it has imposed upon the Brazilian state have radically altered the form and the function of state-supported research in the country. References:

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O-098 The role of Tunisian universities in regional development

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Universities have long been recognised as providers of basic scientific knowledge for industrial innovation through their research and related activities. The emergence of the national systems of innovation approach (Freeman, 1991) shifted this conceptualisation of universities' role in economic production, bringing universities 'inside the tent' (Gunasekara, 2006). The university has been considered as a key contributor to wealth generation and economic development (Dooley and Kirk, 2007).

In Tunisia, developing education and training, higher education and scientific research is considered as vital building blocks of the knowledge-based society. The Tunisian higher education faces more and more the challenge of interacting positively with economic, social and technological transformations (Eleventh Tunisian Development Plan 2007-2011).

This paper aims to explore the main mechanisms implemented by Tunisian University in order to contribute to the social - economic development and their characteristics (mimetic or innovative)?

Two bodies of literature are being mobilized: A triple helix model emphasizes the university's role in knowledge-based economies and the rise of the entrepreneurial university which has three missions: teaching, research, and service for the economy through its entrepreneurship activities (Etzkowitz, 2003). This approach asserts that universities generate economic development mainly through knowledge capitalisation and other boundary spanning mechanisms like business incubation, spin-off formation, scientific parks, technology transfer, advanced training programs to support firm formation and cross-institutional mobility by organisations and people, university-industry cooperation, etc (Gunasekara, 2006).

The literature on the engaged university (Chatterton and Goddard, 2000) also focuses on the third role of universities in regional development, but it differs from the triple helix model in its emphasis on, adaptive responses by universities, which embed a stronger regional focus in their teaching and research missions. This approach does not eschew the development of hybrid, boundary-spanning mechanisms for external engagement; rather, it takes a broader, developmental focus that includes a range of mechanisms by which universities engage with their regions. These mechanisms include stronger regional focus on student recruitment and graduate retention, research and education programs developed adapted to meet regional skills needs, shaping regional networking and institutional capacity, entrepreneurial activities, as well as regionally focused teaching and research, etc (Gunasekara, 2006).

Our empirical study is based upon a qualitative approach related to Sfax University (SU). Qualitative research is of specific relevance to the study of social relations (Flick, 2009). The data have been collected between 2007 and 2010, using participant observation (attend a meetings, a conferences and a formation circles, teach entrepreneurial culture unit, etc.), universities' institutional web-sites and documentation methods. The data are analyzed by using coding and categorizing method.

This choice is justified by the features of Sfax as an economic, higher education and research pole in Tunisia. In other hand, SU is designed by the Tunisian ministry of higher education since 2004 as a "pilot site for application of management per objectives". Its strategic vision is characterized by a partnership with the social and economic environment and the promotion of the entrepreneurial culture (Maalej and Damak Chaabouni, 2007).

The findings results show that some knowledge capitalization and hybrid, boundary-spanning mechanisms are implemented by Tunisian government in order to improve SU capacity in social-economic development: encouraging the mobility of researchers between research centres and production firms, setting-up of Sfax technopark in order to provide the appropriate environment for the transfer and diffusion of the technological know-how, setting-up of incubators and business incubators as a receiving platform for providing the counselling, support and initial accommodation to young researchers, LMD reforms, etc...

In addition, specific mechanisms related to the opportunities and threats of the region are created by SU. These mechanisms engage SU with the regional needs and development. In 2006, SU has created a university center of insertion and spin-off formation (CUIES) in order to improve the entrepreneurial dynamic of the region. The actions of CUIES are based on three pillars: before university, in university and after university. These actions are based on formation, networking, flexibility, decentralisation, involvement of different stockholders from the region, data bases (statistics, diagnostic, prospective studies, communication, etc.) and regional focus on student recruitment.

The contribution of this empirical research is to show that some mechanisms implemented by SU are innovative taking into account the features of the region. The roles performed by SU are path-dependant. The evaluation about outcomes has influenced not only the future strategic orientation and actions of SU but also the political actions. This empirical result confirms the triple helix thesis related to the interdependence between the institutional spheres (government and university).

The relevance of this paper is to explore the main mechanisms implemented by SU in order to contribute to the social-economic development. Two types of mechanisms are identified: knowledge capitalisation and other boundary spanning mechanisms and mechanisms by which universities engage with their region. Although SU is influenced by international experiences and has implemented some mimetic mechanisms, it has adopted other innovative mechanisms related to their national and regional context.

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ST-10 Alliance Capability in Tunisian pharmaceutical industry

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A Triple Helix model of university-industry-government as relatively equal, interdependent and interacting institutional spheres is increasingly becoming the requisite basis for innovation and development in a knowledge-based society (Etzkowitz and Dzisah, 2007) in which, the determinants of success of enterprises, and of national economies as a whole, is ever more reliant upon their effectiveness in gathering and utilising knowledge. The crucial role of knowledge is now preached by a variety of academics, business and policy sources. The knowledge-based economy is characterised by the need for continuous learning as a way for enable the organisations to renew themselves and to keep up with competition (OCDE, 1996, Lundvall and Archibugi, 2002). In particular, interorganizational learning can be regarded as a process of developing new knowledge and insights through knowledge transfer enabling improved actions through better understanding (Fiol and Lyles 1985; Von Krogh et al, 2001). Various scholars have argued that interorganizational learning is critical to competitive success, noting that organizations often learn by collaborating with other organizations (Holmqvist, 1999, 2003), such as firms, universities or research institutions, and with the support of government (OCDE, 1996).

Some authors suggest that organisations can learn also about cooperation (Gualti et al, 2000; Soekijad and Andriessen, 2003). Organisations may want to acquire knowledge that can be used for the management of cooperation in general (Inkpen and Dinur, 1998). It refers to the mechanisms or routines that are purposefully designed to accumulate, store, integrate, and diffuse relevant organizational knowledge acquired through individual and organizational experience of cooperation (Kale et al, 2002). This paper aims to study interorganisational learning developed by Tunisian pharmaceutical firms through different cooperative agreements (north-south, south-south, and firm-university cooperation). Our main objective is to investigate the relevance of the pharmaceutical firm alliance capability in managing its portfolio of cooperations by taking into account each agreement's specificities.

Our empirical research is based upon a case study related to a Tunisian pharmaceutical firm (ALPHA). Case studies are especially appropriate for exploring new areas and when the researcher is interested in questions concerning (how) and (why) (Yin, 1989). Data were collected through a series of interviews conducted with employees from different functions within ALPHA. Data are collected through semi-structured interviews and analysed through content analysis.

ALPHA has concluded three licensing agreements: one with French partner (FP) and two with Jordanian partners (JP1 and JP2). Other agreements are made with Tunisian universities (National Engineering School of Sfax "NESS", Faculty of Pharmacy of Monastir "FPM") and Public centre of biotechnology "CBS".

Our results show that interorganizational learning differs among firms and university partners:

- Cooperation with pharmaceutical firms present the principal way to the transfer of knowledge and competencies needed for drugs producing. This transfer involves the acquisition of learning and acquiring partner's knowledge and know-how. In these cooperations, main interorganizational learning is expected in the licensing agreements.

- Cooperations with university are short-term relations that aim to achieve some scientific activities needed by ALPHA due to the lack of some technological resources. Consequently, no significant knowledge and know-how are expected in the cooperative contract and internalised by ALPHA.

Our results show also that unexpected learning is developed through the portfolio of cooperative agreements. ALPHA has developed interorganizational learning about how to manage relations among different partner's context.

The contribution of this empirical research is to show that ALPHA alliance capability is path dependent. This capability is developed over the time and based on prior experiences with the French partner (since 1992), the Jordanian partners (since 2000) and university (since 1992). Alliance capability, developed through this portfolio of cooperations, motivates ALPHA to conclude two new cooperative agreements with its French partner and with a local pharmaceutical firm (TFM) in 2010 in order to extend its drugs' producing portfolio.

However ALPHA alliance capability differs among partners from the north (FP), the south (JP1 and JP2) and university. This can be explicated by the difference of agreements' objectives, agreements types, agreements length and organisational differences (public vs private sector, north vs south context) that underlie these different arrangements.

This study emphasises that Tunisian pharmaceutical ALPHA has developed two categories of interorganizational learning. In addition to expected learning, ALPHA has developed unexpected learning about how to manage relations among different partner's context and building an alliance capability. ALPHA alliance capability plays a vital role in enlarging and managing its portfolio of cooperations by taking into account each agreement's specificities.

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O-139 Individual-level antecedents of spin-off involvement

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The concept of academic entrepreneurship (Etzkowitz et al., 1998) has inspired a vivid research agenda covering a variety of issues at the level of innovation systems, institutions and individual scientists (for a comprehensive overview, see Rothaermel et al., 2008). On the level of individual academics, a growing body of evidence points towards the feasibility and even positive effects of combining scientific and entrepreneurial activities (e.g., Azoulay et al., 2007; Calderini & Franzoni., 2004; Van Looy et al., 2004, 2006). At the same time, the dynamics behind successful academic entrepreneurship remain somewhat obscure. In spite of some qualitative evidence suggesting an impact of individual strategies (e.g. Callaert et al., 2008), the gap in the literature remains significant. Moreover, this literature strongly focuses on academic patenting, with less attention being paid to spin-off activities (for notable exceptions: see Fini et al., 2008; Grandi & Grimaldi, 2003). Our study contributes by analyzing antecedents of spin-off involvement at the individual level of academic researchers, and by relating it to scientific and technological performance.

Academic spin-offs are companies created to exploit knowledge that originates within universities. The importance of these companies for creating economical growth is widely acknowledged (e.g. Roberts, 1991; Shane, 2004), and their creation has become a key issue for policy makers around the world (e.g., Lockett and Wright, 2005). Consequently several authors (Di Gregorio & Shane, 2003; Grandi & Grimaldi, 2005; O'Shea et al., 2005) have studied the factors fostering their creation. Much of this research concerns institutional support (e.g. government laws, ?nancial and non-?nancial incentives, etc.) and university policies (e.g. spin-off regulations, business plan competitions, university business incubators, etc.). Individual level factors, such as researchers' scientific and technological profiles, have been less studied. Accordingly, as different scholars point out, additional research is required at this level to understand academic motivations and capabilities in developing successful spin-offs (Lockett and Wright, 2005; Rothaermel et al., 2008).

For our individual level analysis, we started from survey data, that were gathered from autonomous engineering professors at the Catholic University of Leuven (KUL) and the Politecnico of Milano (PoliMi). Both universities have opted for an 'entrepreneurial' orientation on the level of the university and are characterized by similar regulations and attitudes towards managing knowledge and technology transfer. Over 500 professors were contacted, and we had a response rate of approximately 35%. We received 186 filled out questionnaire with information about professors' collaborative projects with firms, realized in the period from 2003 to 2007, including their involvement in spin-off companies. These survey data were complemented with secondary source data on publications and patents, as obtained through the ISI-Web of Knowledge and the EPO-PATSTAT databases respectively.

Our econometric analyses consider individual-level characteristics of professors (age, university, field, teamsize, scientific output, involvement in consultancy) and their relations with involvement in spin off activities on the one hand and with patenting activities on the other hand. In comparing antecedents of spinoff involvement to those of patenting activities, special attention is being paid to the mutual relations between scientific productivity, patenting productivity and spinoff involvement.

The first results reveal significant university and field effects, whereas age and involvement in consultancy activities are insignificant in relation to both spinoff and patenting activities. Teamsize is positively related to spin off involvement but not to patenting. Furthermore, we can reconfirm the positive relation between scientific performance and patenting – as already widely documented in the literature – but our results do confirm the same for spinoffs. Given the latter observation and a positive relation between spin off and patenting activities, we are engaging in additional modelling using structural equation and path analytical techniques, in order to create further insight into the relation between patenting activities and spinoffs, and into their direct or indirect relations with scientific performance.

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P-008 THE STATE OF TECHNOLOGICAL INNOVATION IN AGRICULTURE AND PROTECTION OF CULTIVARS IN BRAZIL

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The Brazilian economy has in the last few decades gone through transformations that point to the growing integration of its productive activity and markets with international markets. This trend calls for integration within and between sectors in order to achieve the advantages of systemic competitiveness. Brazilian agribusiness has had a considerable impact on the balance of trade in the last few decades due to investments that were made in technology and innovation in this sector. With the arrival of new technologies and the opening and greater integration of the global economy, there has been a revolution in the system of intellectual property that was consolidated in the GATT; a system of rules substantiated through the TRIPS and marking a radical shift in the institutionality of the system. In 1996, the Brazilian regulatory framework was revised to adapt to the new rules, with the introduction of the Laws of Industrial Policy (LPI) and the Law for the Protection of Cultivars (LPC), among others. On the other hand, the seed sector also needed to adjust to the new regulations. Mechanisms for the protection of intellectual property are essential for the organisation and management of know-how and innovation in livestock breeding, to strengthen the institutionality of public research. They are a part of the process that allowed Brazil to climb into the position of second largest exporter of food in the world, significantly contributing to the sustainability of the country's recent period of economic growth. Even with all the developments that have taken place in the seed sector, the system of intellectual property does not appear to be driving the rate of innovation. Recent data from the Department of Agriculture (2009) indicates that there are currently 4141 recorded crop varieties in the National Register for Crop Diversity (RNC), whilst there are only 1284 records of protected crop varieties registered in the National Service for the Protection of Cultivars. Nonetheless, the LPC has encouraged private companies to develop new cultivars, something that was previously nearly the exclusive remit of the public sector, and has increased the possibilities for appropriation by institutions that research new seeds. Among cultures, such as soya for example, more than half of the varieties in use are produced by the private sector, suggesting that there is profit to be made from this activity. It is also important to note that since the LPC, the number of soya varieties available to producers has increased considerably, indicating that competition has been beneficial to business. This development also allowed for the feasibility and appropriation of innovations, i.e. guaranteed the intellectual property over varieties with payment of royalties for the use of seeds and technological duties for national seed producers. Such investments, originating internationally, prioritise the development of new varieties, especially of soya - the rogue of the Brazilian seed market - concentrating the use of GM products. In other words, the entrance of transnational companies in the soya varieties market owes, in part, to the generation of new biotechnologies, where seeds are the main vector of usage. Thus, we can infer that Brazil has developed in its scientific-technological capacities. However, the impacts of this will depend, more broadly, on a number of factors and can only be assessed objectively in the medium and long term. Expectations of gains in the generation of jobs, external investment and funding for research and the development of human resources are still below what will be required. As was the case in the advanced countries, and as can be seen in emerging States, the issue is related to the existence of consistent and coherent policies of promotion and protection of innovation that can allow for it's appropriation by and incorporation into the output of the different productive sectors in Brazil's economy. This paper aims to identify the contribution of intellectual property to the development of Brazilian agribusiness and its impact on the growth of the country.

Key-words: Intellectual property, protection of cultivars technological innovation, economic development.

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conference

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ST-04 LINKAGES BETWEEN THE DEVELOPMENT OF THE INDUSTRIAL AND FARMING SECTORS IN BRAZIL: A PROCESS OF TECHNOLOGICAL INNOVATION

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Brazil's industrial sector has shown reduced annual growth rates when compared to the dynamic witnessed in other emerging countries. In this paper we show that Brazilian industrial development is closely tied with productive advances in the farming sector and that low levels of growth in the industrial sector have been the result of long-term industrial policy. Technological innovation is the main determinant of development in productive economic sectors, stimulating radical changes in production processes and having the potential to destroy more traditional processes. For this reason, Schumpeter describes technological innovation as a process of "creative destruction". In Brazil's farming sector this process of creative destruction began with the introduction of technological advances in the 1970s and intensified in the early 1980s. During the 1990s, the technological standard was consolidated, with a high degree of adoption of new technologies and with significant increases in production in the main seasonal farms of Brazil.

The research analysed data on farming production in Brazil from the main crops and herds in the country. Other variables were selected from the Farming Censuses of 1996 and 2006 to characterise the structure of production and the adoption of technologies in this sector. This data was compared and analysed along with data from the industrial sector in Brazil to demonstrate the linkages between the expansion of the farming sector and the dynamic of the Brazilian industrial sector. The industrial sectors considered were those tied to the production of agricultural goods and the agro-industrial sector that requires raw materials from the farming sector.

Food price inflation in 2008, along with the effects of the crisis at the end of that year, demonstrated the necessity of a rapid response from the farming sector to reduce the impacts of an economic downturn that could harm the labour market and aggravate loss of income. The sector is under pressure to maintain the supply of food at accessible prices in order to avert social pressures that can arise for access to the consumer market. In this context, technological innovations are considered to be essential for a sustainable production system that is environmentally and socially efficient.

Given the availability of agricultural land, Brazil is considered to be a viable country for the rapid increase of farming production needed to meet international demand. Another possibility that is highlighted is the incorporation of degraded pastoral land or even areas that could be cleared to increase the productivity of Brazilian livestock through the concentration of animals and the use of technologies. The need to adopt technology in this sector is not limited to a single product, but is a trend applicable to all productive sectors. Another factor that encourages technological innovation is the demonstration effect which allows innovations to be rapidly transmitted to other productive agents. Because of this, we consider the adoption of technology in agriculture – unlike in industry which seeks to preserve a particular technological process – to promote dissemination in a more homogenous way across rural producers.

It is argued that the need to guarantee the profitability of productive activities has promoted an ever greater consolidation of the intensive use of technology in production, showing that this sector is a source of demand for the industrial sector. In order to meet demand there is an increasing use of technologies such as machinery and modern supplies – for instance, seeds and fertilizers – to guarantee constant productivity gains in the sector.

This technological transformation is responsible for the productive gains that became one of the most important sources of foreign currency in Brazil, yet, there is persistent criticism about the orientation of agricultural production towards the global market. Nevertheless, the country could capture opportunities in the international market more efficiently and direct the foreign currency generated towards long-term policies for integration into the global economy.

The lower participation of industrial goods in the export basket cannot be adequately explained by a possible bias towards agricultural goods, but instead by the fact that development policies were not led in a way that supported industry. Thus, industrial development in Brazil benefited from the expansion of agribusiness and from the dynamism that this sector has shown since 2003. Agribusiness currently operates in a context of great economic transformations, such as, most importantly, globalisation, biotechnology, the growth of new forms of processing and trade, along with economic and political changes that influence consumption patterns and international trade. Brazilian industry can appropriate and build networks of research and innovation that can multiply the positive effects of these technological developments, thus benefiting from the demand that will be generated in the rural sector in Brazil.

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P-009 INTELLECTUAL PROPERTY – AN IMPORTANT INSTITUTION FOR ECONOMIC DEVELOPMENT: THE CASE OF THE TECHNOLOGICAL DEVELOPMENT IN CAMPINAS – SP – BRAZIL

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In Brazil, the promulgation of the Intellectual Property Law, in 1996, starts a new stage to valuate technical innovation. We emphasize that the Brazilian innovation rate is low when it is compared to the same rate in other countries, especially to OCDE countries. In despite of its relevance, the mechanism of protection and negotiation about intellectual property are unknown in business and university areas. There isn't yet a culture to require patent, mainly about "small solutions" that are use daily. However, many technologies can be copied, improved and patented by huge international corporations due to lack of protection of main idea that generates innovation. But, many institutional mechanisms have promoted the increase of investments in research and development. Then, Brazil has a university system, with international prestige and a good business basis to contribute and accelerate the process of technological diffusion over the country. These two actors - university and business are important to the decrease of the gap between science and market in Brazil. The scientific policies, which create public universities and research institutes, contribute to formation of researchers (basic and broaden) about technical and scientific infrastructure and the increase of production chain competitiveness in more dynamic sectors. But, the scientific community can't be restricted to the production of knowledge. It's important the validation and evaluation about this knowledge and its integration with sector and regional policies. The knowledge, which is generated in universities and research institutes, need to be transformed in goods and services and contribute to the increase of population's life quality and country's development. In Brazil, the knowledge chains are concentrated in developed states and this situation produces regional asymmetries and fragmentation of productive structures. People talks about the needs of a national project that relief the regional inequality regarding to the technological matrix, according to a strategy for the development of local innovation systems and national integration. A way to promote a productive and technological desconcentration is building regional poles in strategic fields. These poles enlarge the scientific and technological infrastructure and allow connections with interdisciplinary research networks in Brazil and over the world. In this hand, the Campinas Area has been characterized by a regional pole for scientific, technological and innovation development. This pole is well-known over the world, but it doesn't have appropriated policies that promote the integration between knowledge chain and the process to promote the innovation and modernization of productive techniques inside local productive sectors. The aim of this paper is to introduce the development of technological innovation in Brazil, after the appearing of Trips and after the modification of institutions regarding to intellectual property, using the case of the installation of the technological park in the Campinas Metropolitan Area, in São Paulo state. To reach this aim, the methodology used in this research was the survey of secondary data about the technological development in Brazil. The variables collected were quantity of patents, scientific papers, quantity of innovation business and another kind of information considered important for the comparative analysis that was done in this study. National data was compared to some countries data to show the Brazilian insertion in a broad international innovation process. The information about Campinas Metropolitan Area was analyzed to characterize the building process of the technological pole of Campinas and its insertion in technological context in Brazil. We hope to contribute to the characterization and discussion about the importance to build a technological pole in Campinas Area and also about the Brazilian technological progress. We understand that this paper is the first step to know the theme and it's a general mapping of the advances reached inside this technological pole.

Keywords: intellectual property, technological innovation, institutions and technological development, technological pole.

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O-106

The multiple historical hermeneutics of ideology of the counters and analysts of information systems from the point of view of postmodern capitalism, Sabato's Triangle and Triple Helix as a strategy for encouraging innovation

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The main objective of this paper is to elucidate the multiple connotations that exist in ideology in modern capitalist society. So in this sense, a quick overview of the thoughts of Mannheim, Edgar Morin, Althusser, Marx and Dobb is performed. Accountants and analysts, information systems must understand that a vision of these major ideologies will assist to better negotiate with their peers. In other words, they can better understand this as a competitive advantage in the global economy and lead their companies to obtain better rates of profitability, productivity and profitability, which is the desire of shareholders owners. With this in mind, we analyzed the impact of the thoughts of Karl Mannheim, Oskar Lange, Karl Marx, Maurice Dobb, Edgar Morin, all to be able to elucidate clearly and objectively the main ideas that the accountants and analysts information systems can dominate with their ideologies and professional practice various capitalist countries which are England, Germany, United States of America and several others, including actors were different and severe bouts of high-risk management. The important thing to note is that the crises have shaken the belief in the consolidation of capitalism worldwide. In the postmodern age is crucial, the argument of "Triple Helix" as a reference to model the environment as a professional. The "blades" are formed by the regulatory sector of government, the sector of professional bodies and universities, laboratories and research centers. More comprehensive than "Sabato Triangle", the argument of the "Triple Helix" proposes, in general, the actors of the innovation system roles are not rigid, it is proposed that they are also prepared to take the lead in actions aimed at achieving technological innovation, hence the importance in these environments of intense synergy among social actors in order to strengthen the proposition of technological innovations for the sector of management, will be analyzed by factor analysis of the cities of São Paulo, Brazil, where accountants and systems analysts play a crucial role in corporate governance.

First-region strongly attracted to the capital of the State of Sao Paulo, with high standards of governance set up by accountants and systems analysts

1.ltu, 2.Jundiaí, 3.Sorocaba, 4.Atibaia, 5.Itapetininga, 6.Porto Feliz, 7.Bragança Paulista, 8.Campinas, 9.Piracicaba, 10.São Roque, 11.Tietê, 12.Piracaia, 13.Cabreúva, 14.Indaiatuba,15.Santa Bárbara, 16.São Pedro, 17.Salto, 18.Rio das Pedras, 19.Laranjal, 20.Americana.

Second-region largely agricultural area, strong influence of accountants, small influence of analysts in the governance system 21.Mogi-Mirim, 22.Franca, 23.Lindóia, 24.Batatais, 25.Casa Branca, 26.Amparo, 27.Itapira, 28.S.João da Boa Vista, 29.Serra Negra, 30.São Simão, 31.Cajuru, 32.Socorro, 33.Ribeirão Preto, 34.Mococa, 35.Igarapava, 36.Patrocínio Paulista, 37.Mogi-Guaçu, 38.Ituverava, 39.S.J.do Rio Preto, 40.Sertãozinho, 41.Cravinhos, 42.Orlândia, 43.S.Joaquim da Barra, 44.Morro Agudo, 45.Serra Azul, 46.Águas da Prata, 47.Pontal.

Third-region region highly developed in industry, commerce and services, with growth of the performance of systems analysts in governance

48. Araraquara, 49. Limeira, 50. Rio Claro, 51. São Carlos, 52. Descalvado, 53. Pirassununga, 54. Jaboticabal, 55. Araras, 56. Barretos, 57. Santa Rita, 58. Bebedouro, 59. Porto Ferreira, 60. Monte Azul, 61. Guairá, 62. Itirapina.

Fourth region-developing region, there is little influence of meters or systems analysts in governance

63.Brotas, 64.Jaú, 65.Dois Córregos, 66.Ribeirão Bonito, 67.Ibitinga, 68.Bariri, 69.Itápolis,70.Bocaina, 71.Pederneiras, 72.Taquaritinga, 73.Nova Europa, 74.Dourado, 75.Boa, Esperança, 76.Matão, 77.Barra Bonita, 78.Santa Adélia, 79.Catanduva, 80.Novo Horizonte,81.Mirassol, 82.Pindorama.

Fifth region formed by very different cities on your profile and underdeveloped corporate governance

83.Bauru, 84.Piratininga, 85.Penápolis, 86.Pirajuí, 87.Lins, 88.Avaí, 89.Araçatuba, 90.Birigui, 91.Promissão, 92.Avanhandava, 93.Cafelândia, 94.Garça, 95.Marília, 96.Andradina, 97.Tupã, 98.Pereira Barreto.

Sixth region-Little development in the area of governance, little influence of professional accounting, not noticed the influence of systems analysts

99.Botucatu, 100.Lençóis, 101.Avaré, 102.Santa Cruz do Rio Pardo, 103.Bofete, 104.Piraju, 105.São Manoel, 106.Itatinga, 107.S.Pedro do Turvo, 108.Agudos, 109.Salto Grande, 110.Assis, 111.Cerqueira César, 112.Ourinhos, 113.Palmital, 114.Presidente Prudente, 115.Chavantes, 116.Cândido Mota, 117.Presidente Venceslau, 118.Regente Feijó.

Seventh-region region late, no notion of governance in human resources.

119. Itapeva, 120. Capão Bonito, 121. Itaporanga, 122. Iporanga, 123. S. Miguel Arcanjo, 124. Itararé, 125. Ribeira, 126. Apiaí

Contributions as far as can be seen from the above text, it is necessary that the accountant and systems analyst or information manager leader can negotiate in antagonistic environments par excellence, ie, there is always a dichotomy, a division embodied in concentration income at its apex, thus determining the separation between top and bottom. In other words, it is necessary that the accountant and systems analyst - agents of change - in taking advantage of these concepts embodied above can take off from the dominated class - if he is - and settle down in the ruling class, if possible, bearing in mind that the main goal is to minimize the social imbalances between capitalist enterprises on the one hand, and between workers on the other.

The role of EU integration in Latin American development was proposed in 1968 by George Sabato (then Director of the Atomic Energy Commission of Argentina) based on the arguments: to achieve greater efficiency in the use of new technologies, to export goods with higher added value, and Indeed S & T are catalysts for social change.

According to Sabato, for the integration of science and technology in the development process would require the coordinated action of 3 key elements of contemporary society: the government, the production structure and infrastructure of science and technology. The geometric configuration of these elements became known as the Sábato triangle, where the state occupies the apex (Plonski, 1995). Sabato forecasts of the main difficulties were the joint horizontal infrastructure (S & T and production structure), which acquires a character even more important if we look at the experiences that were held in Brazil in recent years have found problems in its consolidation and implications.

Some incubators and technology parks which originally engendered the ideas of small entrepreneurs, now charge for services and rents rooms at market prices, increasingly restricted their assistance in favor of incumbents in the market.

Triple Helix VI) Conference Madrid, October 2010

O-113 Triple Helix System: The Heart of Innovation and Development for Rural Community in Thailand

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Farmers, figuratively regarded as the backbone of the nation, have been playing a crucial role in Thai society for centuries. Despite their highly important responsibility as food suppliers for the entire country, more than 80 percent of them still live in rural, less developed areas and often are poorly educated, thus lacking knowledge sufficient for supporting their well being. Although most of Thai people consume rice as their main food, and rice is one of the country's most lucrative export products, Thai farmers have long been threatened by various difficulties, such as water shortage, lower productivity and lose of field fertility. As a result, the new generation tends to abandon this century-old career to work in factories in cities for better income. It is thus essential that science and technology be implemented to enable them not only to sustain their career, but also to improve their life quality.

This paper discussed the Triple Helix model for rural community development by using the agricultural village at Ban Pakub, Bo Kluea district, Nan province in Thailand as a case study. The strategic intervention effected by the collaboration of government, university and industry have resulted in prosperity, improved standard of living and stronger community. The Triple Helix system applied in this case explained the integration of interaction, knowledge transfer and different roles of each player in the system from knowledge production, implementation and commercialization. By using local resources, the Triple Helix model for agricultural development has created a large impact on local and regional economic development, especially in a remotely rural area.

The development project of H.R.H. Princess Maha Chakri Sirindhorn named Phu Fha Development Center has been held at Ban Pakub, a village with several hundred years history, located at Bo Kluea District, Nan Province. It is 113 kilometers far from the hub of Nan Province. Forty-seven families with 183 people live in this fertile plain landscape. Agriculture is a major source of income of these people with approximately 3-rai land (1.2 acres) per family. In addition, they earn their livings through wildproduct searching and some other temporary jobs. Most areas of the landscape are paddy fields with the Mang River as the main source for nourishment. The high latitude location of 600 meters above the sea level, surrounding forests and steep valleys landscape are all the factors contributing to invariably cold climate, especially at night. Despite such a pleasant setting, most of them unfortunately leave the land to find other jobs after crop harvesting. Part of the problem is likely due to a lack of rural technology transfer. For this, the National Science and Technology Development Agency (NSTDA) by Rural Development Technology Service Unit (TS) under the National Center for Genetic Engineering and Biotechnology (BIOTEC) viewed that introducing science and technology to the village could open the windows of opportunities for them to lift up their community by helping them access more work channels after harvesting and, most importantly, encouraging new developments based on their own local wisdom. As a result, the project supported by NSTDA and alliance agencies aiming to stimulate the agriculturists to become concerned about land using after harvesting period has launched since 2004. As one actor of the triple helix system, NSTDA, the government agency, has been a leading provider and contributor of new knowledge and technology transfer such as seed production, some commercial vegetables such as sweet corn, Snack slim tomatoes, new breed of tomato suitable for fresh consuming and naturalistic hens farming. Moreover, such a synergy provided opportunities for training and collaborating with the community, academy and the company by transferring technology based on the guidance for the country's economic and social development known as sufficiency economy, the economic philosophy created by His Majesty King Bhumibol Adulyadej. This philosophy can be applied in agricultural system to help farmers become more self-reliant through a holistic management of their land, and live harmoniously with nature and society through various types of technology to encourage their wisdom. Rajamangala University of Technology Lanna (RMUTL) plays an active role as a technologist, providing training of new process such as wheat and wheat tea production. The Lemon Farm company linked the market of developed organic and macrobiotics products with the consumers, providing the consultation on new ideas to produce quality product and designed attractive packaging. The synergy therefore, played a pivotal rule in collaboratively developing these people's community.

The collaborative system among this synergy was found very essential for rural technology transfer. It was a key success for technology management. As a result, the farmers, after harvesting, had more activities to increase the productivities in their own land, earned so much more income that they could thrive in their community, provided more sources of food and gained more opportunities to produce quality goods with their resources for the consumers.

Although it seems impossible to enrich all of the farmers or to convince them not to leave their village, we, to a greater extent, have been successful in assisting them to learn how to gain more agricultural productivity after harvesting, improve the productivity, make the best use of their resources, including applying new knowledge with their own local wisdom. The integration of these different actors lies at the heart of the triple helix system that combines the innovation and development to strengthen the community. As a consequence, more activities are created in the community besides regular paddy farming, resulting in more income. Moreover, productivities have been significantly improved, giving rise to more high-quality protein sources for themselves and those in other communities. Most importantly, they are enabled to practice self-sufficient lifestyle by relying on their own capability without superfluous expenses and live happily with their families.

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O-034

Insights into academic understanding of the university's third role in a developing system: empirical evidence from Thailand

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Introduction

There is growing interest in the development of regional innovation systems (RISs) and the involvement of higher education institutions. In Thailand, RISs are being widely promoted; it is assumed that the knowledge economy will be built not only at the national but also at sub-national levels. This idea is emphasised during the effective period of recent National Economic and Social Development Plans, particularly that of the Ninth (2002 - 2006) and the Tenth (2007 - 2011) plans (NESDB, 2005, Termpitayapaisit, 2009). This is reinforced by Webster (2006, p.1) who states that '[t]he geographic dimension of development will become even more important during the Tenth National Development plan... [the objectives of development are] all place-based concepts'.

Given the national mission, public universities are expected to play their roles in the RIS within their regions. Implicit in this policy, academic staff are expected to help fulfil the third role of their universities, alongside the mainstream activities of research and teaching. Notwithstanding this recognition of academic involvement, there is very little literature regarding the delivery of academic services at operational levels and concerning the way in which these academics make sense of and fulfil the university's third role; expectations of their involvement are often made from the national and institutional viewpoints but very rarely have previous studies looked at the involvement from the perspective of academic staff themselves, especially in the context of a developing country. This paper therefore takes a distinctive approach by delivering insights into the perceptions and practices of academic staff regarding their roles in the RIS. In this sense, the physical connection between the university and its region lays a foundation for this inquiry made into academic roles in making a contribution to the economic and social development of the region.

Research Methodology

The presentation of this paper is based on grounded theory research involving three investigatory propositions, namely regional, institutional and individual profiling of individual academic members of staff.

The setting of this investigation is a multi-site case study carried out in three traditional public universities in Thailand. According to the OEC (2004), this type of university is expected to play a leadership role within their regions, producing and delivering suitable knowledge that meets the social and economic needs of the country. Additionally, in order that these universities can adopt an entrepreneurial approach to enhance their organisational management and academic performance, they are currently encouraged by the government to become autonomous institutions (ONEC, 2002; OEC, 2004).

Given the empirical setting above, research findings presented in this paper are drawn from semi-structured interviews with 24 academic staff from various academic and professional backgrounds and positions of leadership and management. A range of government and institutional documents was also used as a supplementary source of research data.

With the grounded theory approach employed, a substantive theory was eventually developed to explain academic involvement with the RIS, taking into consideration the national policy, the institutional profiling of their universities, the region of which their universities are a member and the individual profiling of the academic staff themselves.

Research Findings

At the institutional level, in response to the national policy, traditional universities have developed their organisational structure and policy on academic management as an attempt to promote the provision of systematic services carried out within their institutions.

At the operational level, there are many different forms of academic service delivered at regional level. These services are performed either in response to regional needs or using resources existing within the regional proximity. Forms of knowledge delivered through these services could be classified into three categories, including: (1) commercialising knowledge, (2) knowledge as a public good, and (3) knowledge spillover.

Despite services performed, not all of the activities undertaken are systematically accounted as 'academic service' performance. Four key issues of relevance to this problem are identified regarding the linkages between institutional and individual perspectives, including: (1) poor internal connections across the university organisational structure; (2) some individual misconceptions of academic services in the RIS; (3) the lack of shared vision of services at regional level; and (4) the undermined services of endogenous wisdom specific to the place identified as the university's surrounding region. These issues reflect the designated system of the university being underused.

Implications of the Findings

Based on research findings presented, this paper also discusses the way in which systematic services are to be promoted in universities in developing systems. With respect to the university of today being expected to adopt an entrepreneurial approach to enhance their operation, a strategic planning of regional engagement is proposed. The four elements of the plan include: (1) the planning of departmental productivity and function in the RIS, (2) the planning of expected outcomes of knowledge service, (3) the projection of required resources, and (4) the promotion of systematic services delivered with the university's full recognition. By so doing, this paper helps to make a contribution to the knowledge by shedding some light on the way in which academic involvement in the RIS could yield practical outcomes that result in the development of the region.

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O-028 LEARNINGS FROM A TRANSATLANTIC TRIPLE HELIX and a new MODEL for BORN GLOBAL VENTURE FORMATION

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Principal Topic

In the growing knowledge economy, the spaces where knowledge is created become increasingly more important. Interactions between government, university and industry can foster innovation and the creation of new ventures from the knowledge base. New forms of triple helix collaborations, such as hybrid organizations, as well as trilateral networks, are created by these actors in order to fill gaps in roles and reduce transaction costs while enhancing innovation and firm formation (Etzkowitz 2000). The innovation of organizational structures and re-ordering and reforming of institutions can assist in the creation of innovative new firms that are formed within this triple helix context.

However, triple helix configurations and networks are usually assumed to benefit a particular region or micro-economy. Little has been research and written about transnational triple helix combinations that are created for the purpose of facilitating entrepreneurial activity and culture across national boundaries (Clouser 2006).

New international ventures that are comprised of members from different countries, or serve multiple international markets in the early phases of their lifecycles are referred to as "born global ventures", "international new ventures" or "global start-ups". These new business types have been in the rise in nearly all developed countries, and researchers have noted the phenomenon (OECD, 1997; Simon, 1996; Nikkei Sangyoo Shimbun, 1995). These new ventures leverage knowledge and use its applications to achieve superior performance (Oviatt and McDougall, 1994).

The Edinburgh-Stanford Link (ESL1) was a unique and arguably successful research, commercialisation and entrepreneurship education collaboration that crossed international boundaries. Through an act of the Scottish Parliament, the ESL1 was started as an "experiment", with a key goal of informing government and university policy makers. In addition, it was given a mantra of "culture change", with the goal of making the staff and students of the university more entrepreneurial. Moreover, the ESL1 had a specialized model of technology transfer and intellectual property ownership that favored the funding Country. The stated purpose of new venture creation from ESL1, a triple helix hybrid, was to benefit the local (Scottish economy) through the creation of new knowledge-intensive jobs, while curtailing "brain drain" in the context of a declining Scottish population base. The intended new knowledge firms were to be "born regionals" therefore and the assumption was that mechanisms of protection and control would ensure regional benefits from the exploitation of the science base.

Much was learned over the last five years studying the organization and its networks. Taking what was learned from "ESL1" the author has proposed "ESL2" as a higher impact project to both governmental and university players in both Scotland and Silicon Valley region of the US.

This paper will explore the potential use of new technologies and propose an innovative new mechanism for firm formation in an expanded transatlantic triple helix collaboration designed to birth new "born global" ventures in an educational setting. In doing so it will bring into question current the intellectual property regime that is based on nationalistic structures of protectionism. The creative deployment of emerging platforms and available technologies can facilitate new global venture creation as never before. Our paper addresses the use of virtual environments for interaction and new venture building using a new breed of architecture. The rights to the ownership of intellectual creation, formerly dictated by university and governmental policies that were constructed in the era of regionalism, become impediments to the birthing of international knowledge ventures in the new era of technological globalism. This constraint is evidenced by lessons learned from the ESL1 experience as well as its conceptualized and proposed successor.

The research questions to be answered in the paper include the following: How was the ESL structured and what were its activities? What happened through the process of change and what was learned? How can the collaboration be improved and what does the ESL2 propose to enhance the collaboration? What are the constraints to the new collaboration's success?

Method

To examine the questions that were posed, we have conducted a qualitative field study over a period of four years. Ethnographic and action research methods were used. Besides participant observation, semi-structured qualitative interviews were used along with focus groups and archive review.

Results and Implications

An enhanced model of international collaboration and high growth venture creation will be proposed. The paper presents a new "trilateral triple helix combination", a model that could provide insights into other governments and universities. The paper will impact entrepreneurship educators and researchers, university policy makers, and governmental policy makers, including those who might have an influence on determining intellectual property rights in the new global era of technological development and exploitation.

Entrepreneurship educators might find new models for international entrepreneurship courses that could lead to the creation of new global businesses from their student bases. In addition, they might find new ways to collaborate with their peers throughout the world.

The research and findings will benefit policy makers, especially those considering transnational university collaborations crafted for the purpose of developing entrepreneurial activity in the knowledge economy setting, and of facilitating technology firm creation for the benefit of their economies.

This paper impacts the movement of international entrepreneurship for it provides a potential method for the creation of "born global" ventures. In addition, it brings into question the status-quo intellectual property regime and prods policy makers to reexamine the relevancy of the legal structure and underlying assumptions of current ownership rights.

Triple Helix VI) Conference Madrid, October 2010

O-038 THE EDINBURGH-STANFORD LINK: LEARNINGS FROM A TRANSATLANTIC TRIPLE HELIX TOWARDS BORN GLOBAL VENTURE FORMATION

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In the growing knowledge economy, the spaces where knowledge is created become increasingly more important. Interactions between government, university and industry can foster innovation and the creation of new ventures from the knowledge base. New forms of triple helix collaborations, such as hybrid organizations, as well as trilateral networks, are created by these actors in order to fill gaps in roles and reduce transaction costs while enhancing innovation and firm formation (Etzkowitz 2000). The innovation of organizational structures and re-ordering and reforming of institutions can assist in the creation of innovative new firms that are formed within this triple helix context.

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Much was learned over the last five years studying the organization and its networks. Taking what was learned from "ESL1" the author has proposed "ESL2" as a higher impact project to both governmental and university players in both Scotland and Silicon Valley region of the US.

This talk will explore the potential use of new technologies and propose an innovative new mechanism for firm formation in an expanded transatlantic triple helix collaboration designed to birth new "born global" ventures in an educational setting. In doing so it will bring into question current the intellectual property regime that is based on nationalistic structures of protectionism. The creative deployment of emerging platforms and available technologies can facilitate new global venture creation as never before. Our talk addresses the use of virtual environments for interaction and new venture building using a new breed of architecture. The rights to the ownership of intellectual creation, formerly dictated by university and governmental policies that were constructed in the era of regionalism, become impediments to the birthing of international knowledge ventures in the new era of technological globalism. This constraint is evidenced by lessons learned from the ESL1 experience as well as its conceptualized and proposed successor.

The research questions to be addressed in the presentation include the following: How was the ESL structured and what were its activities? What happened through the process of change and what was learned? How can the collaboration be improved and what does the ESL2 propose to enhance the collaboration? What are the constraints to the new collaboration's success?

Method and Experience.

To examine the questions that were posed, we have conducted a qualitative field study over a period of four years. Ethnographic and action research methods were used. Besides participant observation, semi-structured qualitative interviews were used along with focus groups and archive review.

The co-presenters worked together at the Edinburgh-Stanford Link for fives years from the period of 2004-2009. Both were PhD students at the time.

Findings, Implications and Contributions

An enhanced model of international collaboration and high growth venture creation will be proposed. The talk presents a new "trilateral triple helix combination", a model that could provide insights into other governments and universities.

Entrepreneurship educators might find new models for international entrepreneurship courses that could lead to the creation of new global businesses from their student bases. In addition, they might find new ways to collaborate with their peers throughout the world.

The research and findings will benefit policy makers, especially those considering transnational university collaborations crafted for the purpose of developing entrepreneurial activity in the knowledge economy setting, and of facilitating technology firm creation for the benefit of their economies.

This presentation impacts the movement of international entrepreneurship for it provides a potential method for the creation of "born global" ventures. In addition, it brings into question the status-quo intellectual property regime and prods policy makers to re-examine the relevancy of the legal structure and underlying assumptions of current ownership rights.

Triple Helix VID Conference Madrid, October 2010

0-049

Regional University Knowledge Centres: Comparison betweeen the Hungarian automotive and ICT industries

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Networks and other types of collaborative activities have gained importance in R&D and innovative activities in the last three decades. (Hagedoorn, 2002) Since the 1980s more and more economists emphasized the relevance of interactive, systemic view of innovation against the traditional linear models. (Nelson and Winter 1982, Kline and Rosenberg 1986) In their view R&D and innovation (RDI) – which became the main factor of economic growth and competitiveness – is a continuous, 'evolutionary' process, which builds on the past experiences and thus resulting in path-dependency (or technological trajectory), which enables higher specialization. On the one hand R&D and innovation become more complex, knowledge intensive. Despite the voluminous literature on the role of RDI networks in economic development (Fagerberg et al. 2005) there are rather few information about their internal structure and functioning.(Lemmens, 2004, Gilsing, 2005) Innovation system research (either on national, regional or sectoral level) has initiated many studies investigating the collaboration of different actors which was complemented by researchers adopting the 'Triple Helix' model. However it has to be noted that the analysis of this research topic could be enriched by theories and methodologies borrowed from sociology, e.g. social network analysis, network capital, trust. The information on the structure and content of these collaborations is very important because they highlight the most important factors in favour or against RDI networking. In places where the general circumstances are not really favouring such knowledge intensive collaborations the governments try to boost the process. The Regional University Knowledge Centres program was an attempt by the Hungarian government to enhance university-industry linkages and collaboration from R&D to innovation.

This study compares networks in the Hungarian automotive and ICT industries in light of the government programme's impact by case studies. This method provides insights into background connections that otherwise (e.g. using statistical analysis) could not be obtained. It will highlight some general experiences about their organisation and impact in the Hungarian economy and about the relevance of government measures. To visualize the results the research relies on social network analysis tools (Pajek software). The chosen method enable not only to draw a picture or map of an R&D network but also to understand the reasons behind the structure, the motivations and the results of the collaboration. With social network analysis the measurement of the strength of linkages, prestige, intermediation, structural equivalence can be done in comparison among the cases, which might strengthen or weaken the qualitative information gained from the interviews.

The research was done at four regional university knowledge centres that were established in 2005-2006 with the support of the government programme. The support was offered for 3 years but the centres were supposed to establish sustainable collaborations. This means that there are some limited evidences on the success of the government measures in two ways: a) enhancing university-industry collaborations in different industries, b) establishing sustainable structures.

The global RDI networking can be observed in Hungary too but it has some distinct characteristics from that of the developed countries. This is to a large part due to the overall low level of RDI expenditures and to the different positions of enterprises. The empirical research investigates four Hungarian RDI networks that – although their fundamental motivations and aims are very similar – show some interesting differences in their structure and functioning which is more obvious between industries. All networks aim to enhance the RDI activity of their members and to build and utilize a unique knowledge base in their specific fields of expertise but with different success. It seems that the specific form of support seems to work more in the automotive industry which is traditionally more used to network-like collaborations (at least in the vertical chain, between brand owners and suppliers). At the same time in the ICT industry, where intellectual property rights, flexibility and quick reactions are bigger concerns, such knowledge centres seems to be less effective tools.

So far the chosen form of government support does not prove to be successful in its every targeted fields but it has very important values to improve the environment for RDI activities. The observations based on the analysed RDI networks show a two-faced scene. They do contribute to raising the level of activities in the core network members but the overall quality of projects among the partners is very uneven and they fail to attract a great number of new entrants into the scene. Policymakers should spend more efforts to support fields and activities more suitable for the needs of the industry and thus enhance their commitment towards RDI activities.

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0-089

Unlocking potential innovators: investigating the factors that attenuate entry barriers to innovation

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Research topic

Innovation studies have extensively examined the drivers and sources of innovation, but it has been comparatively less systematic in examining the factors that block innovation or cause innovation failures. Redressing this unbalance is crucial, on the one hand, to identify the entry barriers faced by potentially innovative firms in order to foster innovation-based competition dynamics and attenuate systemic failures to innovation. On the other hand, to identify the obstacles most commonly faced by firms along their innovative activities in order to enhance the economic pay-offs from innovation-related efforts.

This papers aims at improving our understanding of the factors attenuating obstacles to innovation by distinguishing between firms that face deterring barriers to innovation and firms that confront revealed barriers to innovation (D'Este et al., 2008). Deterring barriers refer to obstacles that prevent or block firms from undertaking innovative activities. Conversely, revealed barriers refer to obstacles to innovation that are realised by firms alongside their innovation-related activities. Making this distinction between revealed and deterring is crucial to help disentangling two essentially different mechanisms when referring to 'obstacles to innovation'.

Drawing upon the literature on innovation studies, we would expect the following factors to attenuate deterring and/or revealed barriers to innovation.

a) Firm size

We expect that the size of the firm would have an attenuating effect on both deterring and revealed barriers to innovation. Larger firms are more likely to draw upon an internal pool of financial and knowledge-related resources that make them less vulnerable to entry barriers to innovation (e.g. Katila and Shane, 2005); though organizational complexity and routines can offset the advantages associated to size among firms already engaged in innovative activities (Christensen and Bower, 1996).

b) Being a start up

There are two conflicting arguments with regards to new firms: the creativity and entrepreneurial dynamism associated with start ups and the liability of newness. On the one hand, recently established firms are more likely to participate in innovative activities than established firms since they are less constrained by the risks of cannibalising existing product portfolios or destabilizing core competencies (Henderson, 1993). However, start ups are comparatively more likely to confront barriers alongside their engagement in innovation activities due to a lack of prior expertise, scarcity of financial resources or lack of complementary assets (Tripsas, 1997).

c) Human capital

The availability of highly skilled employees, and particularly of employees with a higher education degree, is expected to equip firms with an adaptable, responsive and pro-active workforce, softening the challenges imposed by changes in market conditions and the emergence of disruptive technologies. Therefore, we would expect that firms with a higher proportion of highly skilled employees would be better positioned to overcome both deterring and revealed obstacles to innovation.

d) Being recipient of public financial support to innovation

Firms that have been recipients of support from public programmes oriented to stimulate innovation, should be better positioned to face entry barriers to innovation. However, for those firms that engage in innovative activities already, being recipient of this type of governmental support may actually enhance the perception of revealed barriers.

Datasets and methods

This research draws on two successive waves of the Spanish Innovation Survey (i.e. years 2004 and 2007) to construct a longitudinal dataset on firms' innovation strategies. In order to avoid a sample selection bias problem, we consider only firms that are willing to participate in the innovation contest (see Savignac (2008) for a similar method). We then proceed to identify the sample of firms that have not engaged in any type of innovative activities - i.e. those confronting deterring barriers (1711 observations) - and those firms that have engaged in innovative activities - i.e. those that confront revealed barriers (4191 observations).

We construct a set of dependent variables measuring the extent to which firms assess 'cost-related', 'market related' and 'knowledge related' barriers as important, and we examine the impact of the expected attenuating factors on these three types of obstacles. We systematically compare the results for the two samples of firms mentioned above. We run Ordered Logistic Regressions due to the ordered categorical features of our dependent variables, controlling for a number of firm and industry features, such as: whether the company has engaged in innovative activities in the past, the internationalisation of the firm's customer base and industrial sector dummies.

Results and emerging conclusions

Our findings show that: a) both firm size and being part of a larger group have an attenuating effect on deterring and revealed barriers; b) start ups face stronger revealed barriers as compared to established companies; c) a highly skilled workforce has a significant impact in attenuating deterring barriers but not in attenuating revealed ones; and d) having received public financial support to innovation in the past significantly attenuates cost-related deterring barriers.

These findings provide a valuable contribution to improve our understanding of the factors that mitigate systemic failures to innovation, so long as they shed new light on the factors that attenuate "entry barriers" to innovation. This research also contributes to the study of barriers to innovation suggesting a method to disentangle the deterring and revealed nature of obstacles to innovation.

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O-075

To what extent do university-industry collaborations entail a two-way flow of knowledge? An empirical investigation of UK manufacturing and service companies"

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Research Topic

A crucial tenet of the Triple Helix analytical framework is that interactions oriented to the co-production of knowledge between universities, businesses and government agencies are instrumental in leveraging the innovative potential of economic systems (Etzkowitz and Leydesdorff, 2000). One of the potential benefits from university-business research collaborations is the contribution of businesses in bringing complementary expertise and inspiring new avenues for academic research (Gibbons and Johnston, 1974; Branscomb et al., 1999). Indeed, an increasing number of government initiatives are put in place to attenuate systemic failures based on the argument that favourable institutional arrangements are required to facilitate the co-production of knowledge between universities and businesses (Poyago-Theotoky et al., 2002).

However, while much of the public support of university-business research collaborations is based on the two-way flow of knowledge between these two types of partners, little is known about the factors that are more conducive to the active contribution of businesses to knowledge generation. In this research we aim at shedding some light on this neglected issue by investigating two questions: (i) among businesses collaborating with universities, what are the conditions that favour businesses actively contributing to the co-production of knowledge (as opposed to "simply" being recipients of knowledge generated by universities); and (ii) to what extent manufacturing and services businesses exhibit systematic differences in their contribution to the co-production of knowledge.

The first question is examined by analysing the factors influencing businesses' decision to actively contribute to co-production of knowledge. First, the type of knowledge exchanged: we hypothesise that the more tacit is the knowledge exchanged, the more likely the company is an active knowledge contributor (Bierly et al., 2009). Second, the degree of organisational convergence: we hypothesise that knowledge co-production is positively influenced by the experience of firms in establishing formalised contracts with universities, and the proportion of employees with graduate degrees (Hagedoorn and Schakenraad, 1994). Third, the orientation to exploration: we hypothesise that firms with a more exploratory orientation are more likely to actively participate in co-production of knowledge (Berkovitz and Feldman, 2007). Finally, the type of university partner (i.e. top-ranked university departments): we hypothesise that interacting with top quality research partners require a more active engagement of businesses in two-way flows of knowledge (Ponds et al., 2007).

The second question is addressed by examining the profile of two groups of firms: high-tech manufacturing firms (HTMs) and knowledge-intensive business services (KIBS). We compared these two groups with respect to: a) the frequency in which businesses engage in contributions to knowledge; b) the extent to which businesses engage in the exchange of tacit knowledge; and c) the extent to which businesses have a more exploratory orientation in their partnerships with universities. By examining this, our aim is to identify whether manufacturing and services share a common profile in their pattern of collaboration or exhibit systematic differences.

Methods/Data

The data used in this paper is based on a survey of businesses that participated in research collaborations with universities. The sampling frame has been the records of grants awarded by the Engineering and Physical Sciences Research Council (EPSRC) over the period 1999. This sampling strategy resulted in a frame list of 3119 businesses, covering both manufacturing and services. The survey was conducted between November 2007 and February 2008, and a total of 602 valid questionnaires were returned (19% response rate).

The questionnaire included a section of particular interest for this paper, where firms are asked to report how important was their contribution to knowledge in the context of their collaborations with universities (i.e. contributing with 'ideas for research projects').

For the first part of the analysis, ordered Logistic Regressions were conducted to examine the extent to which businesses contribution to knowledge in the context of the research projects in which they participated were significantly correlated with the factors mentioned above. For the second part of the analysis, we stratified our sample of responding businesses by aggregated industry sectors, and comparing the profiles of four groups of firms: HTMs, KIBS, other manufacturing firms and other service firms.

Results

The results show that (i) the more tacit the knowledge exchanged, (ii) the more experienced businesses are in formalised contracts with universities, and (iii) the more oriented towards exploration, the more likely they substantially contribute to coproduction of knowledge. However, we did not find a significant relationship for business absorptive capacity and for the interaction with top-ranked departments.

Our findings also point out that, while both HTMs and KIBS are particularly likely to actively contribute to a two-flow of knowledge with their university partners, they display distinct profiles with respect to the type of knowledge exchanged and the orientation towards exploration.

We believe that the paper contributes to uncover the conditions favourable to two-flow knowledge exchanges between universities and businesses; and second, it sheds new light on the distinct role of manufacturing and services in their patterns of interactions with universities.

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W-09 BioEnergy Brazilian Program (BIOEN) Innovation Networks

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Introduction

This article investigates the ex ante appropriability pattern for the Brazilian BIOEN – BioEnergy Program, a multidisciplinary ethanol sugar-cane project, from its economic issues, assets management and social network formation together with scientific and technical perspectives.

Networks of patent citation are used for technological foresight of ethanol research and development scenarios building. The project's goal is the formulation of an organizational design: a) analysis of the demands due to intellectual property of technologies, supplies and genetic material that can create risk situations for the continuity of the program itself; b) preparatory analysis of business plans and economic exploration 'models', from intermediate products and supplies to final products. It includes an incentive system, and scenarios of partnership formation, from the formation of networks that identify patent families, networks of quotations on intellectual property attribution and appropriability pattern in plant biotechnology; c) ex-ante impact evaluation for the formulation of business plans based on the research results.

State of Art

Knowledge communication, which supports the discussion of technology networks and links it with questions of merit and approval (Dal Poz, 2007; Cowan & Jonard, 2007), appears in the simplified form of a division between integrated and unintegrated research structures which, besides defining a rule for sharing of gains (alpha percentage not dependent on the amount of total revenue earned), involves a variable relating to knowledge transmission from the research unit (creator of the invention or new knowledge) to a firm that intends to develop it in a second stage. Two conclusions are obtained: (a) an integrated structure facilitates knowledge diffusion by reducing the percentage to be paid to the research unit to a compatible incentive; and (b) if an unintegrated structure persists, a system of intellectual property is required to avoid the dissipation of earnings determined by ex post competition. Raised by Aghion & Howitt (1998), remits us to the system failure represented by the Brazilian patent regime, which does not recognise gene patents, a matter of paramount importance to BIOEN.

The indication given by Aghion & Tirole (1995) that integrated units are more conservative corroborates the correctness of the BIOEN strategy while at the same time extending the technology paradigm from applied molecular biology to bioenergy and increasing the scope to negotiate technology with economic agents.

Research Focus

Networks of innovation approach will be used to foresight BIOEN potential intellectual property pattern. R&D technologies involve techniques of biological markers, viral vectors for introduction or genetic engineering (Dal Poz,2006). The objetives of BIOEN are:

- To search and selection of technological trajectories of plant varieties;
- To define patterns of market interests;

• To develop a network tool which can be accessed by R&D Brazilian institutions in order to protect efficiently the technological results of the BIOEN and to identify strategic behaviors of appropriation.

Methodology

According to literature on industrial ensembles, the actors interests in the assets based on technology result on the building of innovation networks.

This paper deconstructs the technological content of IP aspects for innovative arrangements of BIOEN, in order to understand its technological dynamics. The methodology is based on forward citations that a patent receives, which are indicators of innovative strength on markets based on technology. Highly cited patents are proxies for technological market values.

According to Hall et al. (2001), patents may be considered as reliable sources of innovation studies and technical change. Sampat and Ziedonis (2002) show the economic and technological importance of such analysis. Trajtenberg (1990) and Jaffe & Trajtemberg (2002) claims that the measurement of forward citations received by a patent is an innovation indicator.

Odysseýs Patent Computacional System for Information Retrieval is used for forward citation search, selections and aggregation data from the United States Patent and Trade Office (USPTO), identifying networks by algebric indicators.

Findings

The foresight proceedings are under construction, once BIOEN is a 4 years project. Preliminary results consider a lexical query composed by combinational BIOEN R&D areas and International Patent Classification areas (C07h21 and C12Nat "title", "abstract" and "claims") as:

o Enzyme characterization and Process Engineering

o Gene Expression

o Cell and molecular biology

o Fermentation yeasts enzymes

The citation networks (Figures 1 and 2) – from a macro structural analythical approach - shows that the "sugar cane R&D process" is an emergent enterprise. From BIOEN's micro-aspects of technological capacity building, other broader considerations about the innovation dynamics and about the holes of the different clusters, hubs and connectors will be found.

Figure 1 – Network of citations: IPC = C12N and Abstract = cane

Figure 2 – Network of citation: IPC=C07h21 and Abstract= sugar

Contributions and implications

This paper colaborates for the perception of technological opportunities and for formulating problems that result in innovations, via what are known as "focusing devices" (Marengo e Dosi, 2000). These are defined on the basis of a systematic application of technical and scientific knowledge by agents who compete in a context of selective market processes. These processes take different trajectories and generate different patterns of technology diffusion within firms, between firms, among firms in the same industry, and between industries and sectors.

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P-003 Gender mainstreaming in EU's promotion of innovation and clusters

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In this paper, we elaborate a gendered perspective on entrepreneurship, technology and innovation as implemented in European Union policies promoting innovation and clusters. In this endeavour, we employ Squire's (2005), Walby's (2005) and Rees' (2005) classifications of different kinds of gender mainstreaming. Our study comprises the European Regional Development Fund (ERDF), which provides resources for regions throughout the Union. During the period 2007-2013 priority is given to measures promoting entrepreneurship, development of small and medium-sized enterprises, innovation and clusters. Gender mainstreaming is perceived as a key element in the implementation of ERDF. However, evaluations carried out between 2000-2006 show that there are several obstacles for the integration of a gender perspective in ERDF, e.g. that concepts such as entrepreneurship, innovation, technology and clusters are perceived of as gender neutral and that a gender perspective is not applied when promoting innovation and clusters.

Our study investigates how gender mainstreaming is approached in the Operational Programmes (OP) for the period 2007-2013 within the framework of the European Territorial Cooperation Objective supported by the ERDF. Ten of in total 13 programmes supporting transnational cooperation between different European regions are analysed in a gender perspective. The study shows that most OPs lack gender SWOT-analyses and/or an integration of a gender perspective in the overall SWOT analysis for the territorial cooperation areas. Few make any references linking gender equality to economic growth, entrepreneurship, innovation or clusters. Positive actions for women in entrepreneurship, innovation and technology are rare. Gender equality is referred to as a horizontal objective and in relation to non-discrimination, but it is not mentioned in relation to specific objectives and measures. In theory, most of the programmes are open to initiatives supporting entrepreneurship, innovation and clusters in sectors where many women are active, such as for example tourism. But underlying assumptions of innovation and clusters, as well as an extensive focus on high-tech sectors, in practice constitute obstacles for women's participation and potential benefits of the ERDF.

Conference

Madrid, October 2010

Madrid, October 20, 21 & 22 - 2010

O-079 Universities and Economic Development Activities – a UK Regional Comparison

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Introduction

In the UK, a number of universities engage in economic development or regeneration activities and this can, in some cases, form the majority of their knowledge transfer (KT) work. Economic development activities have been funded in the UK by the European Union (EU) through the European Regional Development Fund (ERDF) and UK Regional Development Agencies (RDAs) since the late 1990s. However, the amount of funding available is dependent on the level of economic deprivation in sub-regional areas. This difference in funding has led to disparate experiences in different regions of the UK and in the context of this paper, very different responses from universities.

Another unusual feature of such university economic development work is that the links between industry, government and the university are via a funding model that sees government at regional or European level providing funding directly to the university. This funding requires the university to meet targets associated with support of small to medium sized enterprises (SMEs). Within de minimis regulations, this support is often free of charge for the SMEs involved.

This study compares two regions of the UK, the North West and the South East of England. In addition to the effect of funding; geographical, historical and cultural influences on university behaviour with respect to economic development activities in their region are considered.

State of the Art about the Topic

The UK academic literature relating to direct knowledge transfer from universities is relatively sparse and often utilizes descriptive methodologies and/or analysis of survey results. This literature tends to examine entrepreneurship, particularly spin-out company formation, amongst UK academics. Government reports look for overall trends and classifications of university types which are unrelated, and possibly irrelevant, to university knowledge transfer behaviour. There is no evidence of published research which attempts to examine the patterns of KT at individual universities and the effects on economic development work. There also appears to be little use of theory in relation to the choices of individual universities in relation to KT work.

Research Focus

The research considers the factors which influence UK universities to engage with economic development activities. The relative levels of such activities will be established for the individual universities studied. Using these levels of engagement as a starting point, the different economic development strategies of universities are explored through their strategy statements and interviews with KT professionals. Elements of evolutionary theory will be used to explore the reasons for these differences and examples of some university programmes to illustrate approaches.

Methodology

Quantitative data such as regeneration funding, work with regional SMEs and graduate start-up statistics, from the UK government Higher Education Business and Community Interaction (HEBCI) Survey, are used to track economic development activity from universities in two UK regions. This provides a basis for understanding the extent of these activities at each institution studied. However, to understand the drivers for universities to engage in this work we need to examine qualitative data. In this case strategy documents published by each university in compliance with the fourth round of the UK government Higher Education Innovation Fund (HEIF) are analysed to discern themes relating to economic development work. HEIF 4 strategies are analysed using Wmatrix, a software tool for linguistic analysis through corpus comparison. Wmatrix is a data-driven approach to linguistic analysis. Interviews with KT personnel at universities in the two regions provide further insight into the direction of KT programmes at universities.

Brief case studies of programmes developed using research findings at one university in the North-West of England are presented. Leading Enterprise and Development (LEAD) and Innovation for Growth (IFG) have been developed by the Institute for Entrepreneurship and Enterprise Development (IEED) at Lancaster University. LEAD aims to contribute to raising regional productivity, competitiveness and skills by addressing issues of leadership within the context of the SME sector generally and in particular in the owner-manager's business. IFG, a new programme, which aims to drive both product and process innovation into SMEs, takes IEED experience utilising models of SME engagement and incorporating feedback taken from SMEs. Both programmes have been built on the innovation research emerging from the Management School.

Findings

Although external funding is essential to maintain university engagement in economic development, other factors influence the decision to embark on regional regeneration projects. The motivations of individual universities to engage with their regions can be the influence of institutional history and events that have shaped the views of university management and KT personnel. These issues are illuminated in more depth in this study.

Contributions and Implications

This study utilizes novel techniques for comparison of university KT behaviour and seeks to understand the motivations for universities to engage in economic development activities beyond simple funding influences. Also the research makes a contribution through the use of evolutionary theory to help to explain this behaviour and the variety of reasons for and influences on university KT development in the UK.

The range of influences on individual UK universities has not been explored effectively in academic research. In the UK there has been huge government investment both in university research and, since the late 1990s, in knowledge transfer activities. Understanding the influences that affect university relationships within their regions, both positively and negatively can help to ensure that this investment is beneficial to the UK economy. Understanding the KT behaviour of universities allows for more effective policy making in this area.

Triple Helix VID Conference Madrid, October 2010

O-001 TRIPLE HELIX MODEL TO CREATE GLOBAL NETWORKS OF CLUSTERS OF INNOVATION (NCOI)

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In this paper, we analyze the emergence and rapid growth that has been recently observed in some environments around the world. Specifically, we study how mobility of resources and global connections among individuals, startups and other organizations in geographically remote environments has contributed to their emergence and growth. We base on the Global Cluster of Innovation Framework (Engel and del-Palacio, 2009) to identify what we think are the key elements of an effective innovation policy that could help an specific environment to get involved in a global Network of Clusters of Innovation (NCOI). Further, we analyze examples of policies that have failed because they had not been appropriately articulated and identified the reasons why they have not success. We use the Triple Helix model to understand the role played by each of the spheres in these policies. Finally, we build on the results of these analyses to propose a guideline for policymakers to create a globally competitive Cluster of Innovation (COI).

In the last decades, the design and characteristics of territorial innovation policies have been changed significantly. Before 1990 most of these policies were defined as incentives focused on R&D infrastructure provision, financial innovation support for companies and technology transfer, neglecting, in many cases, the absorption capacity of the firms (Tödling and Trippl, 2005). Subsequently, the efforts shifted towards Regional Innovation Systems (RIS) and have pointed to Local Knowledge Spillovers (LKS) to be the key actors in the process of knowledge creation and diffusion (Asheim, Coenen and Svensson-Henning, 2003; Wolfe, 2003; Asheim and Isaksen, 2002; Malmberg and Maskell, 2002; Cooke, 2001). Ultimately, the literature has stressed on the importance of including a global innovation perspective in governments' agenda (e.g. Chaminade and Vang, 2008; Cooke, 2005). Specifically, this approach asserts on the importance of creating a strong regional innovation system as a key asset in the formation of global knowledge networks (Chaminade and Vang, 2008; Cooke, 2005).

The Global Cluster of Innovation Framework (Engel and del-Palacio, 2009) serves a guideline for policymakers to define an effective innovation policy and for managers to get involved in the value-chain of the companies in a Cluster of Innovation (COI). This Framework supports that some environments around the world have rapidly emerged and grown by encouraging international connections with geographically remote individuals and companies. It also states that, unlike in Porterian clusters, in these COI other agglomeration benefits dominate, defined not by industry specialization, but by the stage of development and innovation (Engel and Del-Palacio, 2009). In a COI

1) Resources, mainly people, capital and technology are mobile and lead to rapid formation, experimentation, and innovation cycles (Freeman & Engel, 2007).

2) Innovation occurs principally through new firm creation and thus startups in a COI benefit from being co-located with other companies, suppliers, and service providers specialized in or compatible with entrepreneurship (Saxenian, 2006).

3) New born companies have a global perspective earlier in the venture development cycle than the historical norm.

4) Finally, extraordinary mobility of resources leads to a heightened affinity to collaborate while these collaborations are enforced by mechanisms to align incentives and goals among all stakeholders in the environment.

Additionally, the Global Clusters of Innovation Framework (Engel and Del-Palacio, 2009) defines that global mobility of resources and the affinity to collaborate, lead individuals and startups in a COI to get connected with other individuals and startups in other COI and to constitute the global Network of Clusters of Innovation (NCOI). These networks include two types of linkages. Weak ties connect individuals with their acquaintances through a trustworthy linkage, while durable bonds emerge only if these relationships are formalized. When the connections progress to the point of mutual dependence covalent bonds form tightly interrelated business communities, or Super-Clusters of Innovation (Super-COI). In these circumstances, individuals and companies in the COI get benefit from the continuous flow of information, capital, and commodities. The two dispersed entities linked through covalent bonds operate then in a coordinated fashion of mutual dependency and benefit.

In this paper we rely on the relationship between the Triple Helix model and the Framework to propose a guideline for policymakers to develop COI and to get involved in a strong global NCOI. We expect that the analysis of other innovation policies in Europe will give us evidence of good practices as well as mistakes that have made a policy succeed or fail. We propose that development strategies require governments to get industries and universities involved, in order to foster mobility, align the goals among actors and promote a culture of entrepreneurship. An effective intervention is only possible if the policy is appropriately articulated, and is implemented locally but at the same time including global perspective.

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O-033 PROMOTION OF THE ENTREPRENEURIAL CULTURE IN THE UNIVERSITY: THE UNIVERSIDAD AUTÓNOMA DE MADRID AS A CASE STUDY

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Introduction:

Madrid is one of the most innovative poles in Spain and it is amongst the regions with a greater economic growth in Europe. It is considered a dynamic, multicultural and entrepreneurial region characterized by a superposition of public administrations and a great concentration of Universities (approximately 20). This social an economically complex environment is proved to be a very competitive setting for a conventional enterprising activity. Nevertheless, it is the right place to establish collaborative models.

This paper will analyze a typical Triple Helix case for the promotion of the Entrepreneurial Attitude via a program chartered by one of the most active Universities in Madrid, in collaboration with a financial institution's Foundation and two Public Administrations.

The organization to focus in is the Center for Entrepreneurial Initiatives (in Spanish Centro de Iniciativas Emprendedoras – CIADE) of the Universidad Autónoma de Madrid (UAM), which has been working for eleven years to foster entrepreneurial values and supporting the creation of spin-off and technology-based enterprises within the University.

The CIADE-UAM, since its origins, has applied the Triple Helix model. Due to the lack of specific financial resources from the University, it has been compelled to adopt collaborative models with agents of the environment, both governmental and social or financial, and now it plays a relevant role in transferring knowledge from the University. Nowadays, the Triple Helix model constitutes the CIADE hallmark, both in the global business model design and in the way the different projects are undertaken. The different elements characterizing this model are: collaboration, self-financing and social innovation.

State of the art:

Since Etzkowitz and Leydesdorff (1995) defined the Triple Helix model, the relation University-Public Administration Management-Enterprise has been deeply studied by a broad number of researchers. This coordination is closely related to country competitiveness (Lumppkin and Dess, 1996, Song and Peterson 2000) and as well as to regional development (Marton and Säl, 2009).

There are ample records dealing with the importance of diffusion of entrepreneurial culture and the policies oriented to its promotion (Lumpkin and Dess 1996, Song and Peterson, 2000). The relevance of entrepreneurship as the key factor for economic growth is constantly increasing, thus justifying its promotion. To illustrate this reality it is relevant to mention the recommendations of the OECD's Business and Industry Advisory Committee (BIAC) and the commitments of the UE Lisbon Summit, March, 2000.

Research focus:

By means of the present study we shall try to give an answer to the following questions:

What role is to be played by the University when there are several levels and several government authorities? Can a university act as a catalyst and make compatible the targets of programs designed by different administrations? Has the participation of the public administrations affected in some way the development of an entrepreneurial culture in the University? In which way contribute the diffusion actions in the main indicators of the entrepreneurial activity? Is it attractive for people in general to be supported by the University in the development of enterprises?

Methodology:

Following the One Case methodology (Yin, 1989) we work around five main components

- A set of research questions
- Some theoretical propositions to be contrasted with the research results.
- The Center for Entrepreneurial Initiatives (CIADE) from 1998 up to 2010 is the unit of analysis chosen.
- A quantitative study of the Center's data, GEM's data and the UAM Employment Observatory, surveys and interviews.
- Logical links of data and propositions, stating the criteria used for data interpretation.

Findings:

The CIADE channelling of politics developed by various public administrations within the same territory, linked to the social compromise of a financial entity such as Caja Madrid, improve the short-term self employment indicators and the creation of spin-off companies in the University, and it is expected that in medium and long-term the results of students creating new companies will expand.

The opening of support services for the creation of companies within the Madrid Region has meant a higher interaction of the University with its environment, and a rapprochement between general population and University.

Contributions and implications:

The University can act as coordinator of national and regional politics in the setting up of new companies in order to cooperate in the transformation of the regional productive model by means of a cooperative model based in the Triple Helix and high social innovation.

The adoption of regional perspectives from the University enables the said University a greater involvement with the region not strictly limited to the university community.

Triple Helix VII) Conference Madrid, October 2010

O-086 Innovation Challenges and Opportunities within the Brazilian Mining Industry

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Introduction

The paper discusses innovation management applied to the Brazilian mining industry, with special focus on the opportunities for innovation and on the related challenges for generating tangible outcomes.

The Brazilian mining industry has been growing significantly over recent years. The effects of the 2008 international crisis have been neutralized by the end of 2009 for most mineral commodities. Although the impact of the crisis has been significant, the country's mining activities have been recovering and expanding ever since, in particular, due to the upcoming international sporting events scheduled to take place in Brazil in 2014 and 2016 which are pushing several initiatives for new and upgraded infrastructure all across the country.

However, the challenges for mining companies operating in Brazil are not only related to profitabily, sustainability, legislation and political issues but also associated to the introduction of innovations that will unlock value by modifying the way the Brazilian mining sector operates and expands.

The paper shows that the promising future of the country's mining industry is highly dependent upon a combined effort by the authorities, the mining companies and the research institutions towards the pro-active dissemination of innovation management focus on longterm results for the mining companies.

State-of-the-Art

Recent publications (Marceau, 2007; Global Economics Ltd., 2001) report the successful application of innovation management for the development and the increase in competitivety of the mining industry in countries such as Australia and Canada. On the other hand, the Brazilian mining industry has not achieved significant results from innovation efforts and the mining sector has not been active in accessing innovation funds and R&D grants over the last few years.

It is important to note that, back in 2005, the Brazilian government has introduced new legislation to increase the level of support for innovation initiatives in the private sector. As the country's economy is largely based on natural resources with core business such as mining and agriculture, significant growth will only be achieved with the introduction of new technologies and process improvements (Brazilian Ministry of Science and Technology, 2010).

The basis of this new legislation, known as "Lei do Bem" (or 'Positive Approach Law' in a free translation), is to promote the benefits of investing in R&D and innovation. The tax incentive applies to the corporate income tax and the social contribution fee and it may accommodate up to 100% of the innovation project expenses.

Although "Lei do Bem" has been introduced over 5 years ago, the vast majority of the Brazilian mining companies still do not benefit from it. For instance, the mining sector generates approximately 13.9% of the Brazilian gross national product, but it has used only 0.1% of the overall innovation benefits provided by the government in 2008. Even more pronounced is the fact that only one mining company in the entire sector has been benefited in that year. One apparent reason for such a limited usage of R&D tax incentives is the risk of rejection of the tax benefit application which has increased from 9% in 2007 to 20% in 2008. This situation indicates that, although the Brazilian government is trying to promote R&D and innovation through incentives and resources, and although the companies are in need of innovation to expand their markets and their competitivety, most business are not yet ready to fully exploit the benefits available.

As far as global companies are concerned, there is a growing competition for the R&D dollars. A number of countries, and even provinces within specific countries, have increased their tax incentives in recent years. The general objective for a government to offer R&D incentives is to promote successful innovation which will eventually generate more income and more jobs. However, the specific legislation varies from country to country, and although it applies to global companies doing in-house R&D, additional incentives for domestic business may also apply. The paper will present the findings of a preliminary analysis carried out recently in Brazil with the specific tax benefits identified in a selection of countries (KPMG, 2009).

From the research carried out, it is clear that a well established R&D strategy can greatly benefit mining companies in Brazil. Another key-finding is that an essential component for an appropriate R&D strategy is the capability of the supporting entity in supporting the mining companies in the structuring of winning innovation projects that produce the expected results for the receiving company.

Research Focus

The paper describes the application of a results-oriented innovation approach which has been successfully applied to a number of projects as illustrated in the case studies presented in the paper.

The innovation approach is based on the "Lei do Bem" but it is applied in such a fashion to maximize the R&D benefits and outcomes for companies operating in Brazil. The specific value proposition of the proposed innovation approach is to promote R&D at very low risk for mining companies that require innovation to expand their markets and their competitivety, benefiting from the tax incentive and the innovation resources provided by the government.

Findings and Analysis

The paper includes the brief overview of two recent success cases is provided here, where the proposed innovation approach above has been applied and validated within the Brazilian mining sector. The first case refers to a mining services company in Brazil and the second example is an industrial minerals company with an opportunity to launch a new product, using a new mineral processing route.

Contributions and Comments

The paper proposes a new approach for supporting winning innovation projects with the objective of encouraging mining companies to further exploit the R&D benefits provided by the local government.

Because most mining companies are taking up ambitious growth programmes, the authors strongly believe that a strong focus on continuous improvement and operational savings activities is required. Such growth plans will be maximized through the definition of structured, results-oriented innovation strategies and implementation approaches.

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O-085 BEWARE OF THE RED QUEEN

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Keywords: University funding, radical rethinking, government role, innovative models

Introduction

Lewis Carroll, the author of 'Alice in Wonderland' made the observation in his book 'Through the Looking Glass, and What Alice found there' [1], where the Red Queen addresses Alice as "'You see, it takes all the running you can do, to keep in the same place" and "If you want to get somewhere else, you must run at least twice as fast as that".

The Red Queen effect was first explored by van Valen [2] an evolutionary biologist. His theories have been extended in the context of business strategy development, where organisations had to be nimble and to move exceedingly fast just to keep pace with change. In the current climate of financial uncertainty, government cut-backs and the growth in the cost base, universities are increasingly being challenged to work harder just to stay still. Hence the 'Red Queen effect' [3].

Research Focus

This paper will explore the alternatives available to the university sector in overcoming the Red Queen effect, with particular reference to the higher education sector in the UK. Gone are the days of generous public funding of higher education, with government policy shifts towards increasing concentration of resources (for research) into a smaller number of universities, seeking wider access, social inclusion, and knowledge transfer.

As a starting point, the UK Government's Higher Education Funding Council for England (HEFCE) has announced on 1 February 2010, a reduction in the Higher Education Budget of £440 Million in 2010-2011, and £660 Million in 2011-2012 [4]. This implies a real reduction of 4.6% in the unit of funding, year on year. Similar announcements are expected from the Scottish and Welsh Funding Councils, reflecting real cuts in the budgets for the university sector in the region of 5.0%- 6.5%. It is clear that the trend will persist.

The impact of such a reduction in resources is for a radical rethinking in universities, where the historical model of universities as education providers and knowledge creators is being challenged. The situation offers opportunities for innovation through sharing of approaches and 'redesigning and re-assembling the basic building blocks of higher education [5, 6], and establishing themselves as 'agents of learning'. In this context the role of the Triple Helix comes into play, where in addition to the above university re-thinking, Governments need to reassess their policy approaches from directing supply-side policies for higher education to promoting the need for demand-driven policies, and industry will have a significant role in partnering with universities in support of income diversification within universities.

The above tensions are further being aggravated by - universities being perceived as one of several competing providers; the extensive and pervasive growth and availability of information technology where students are becoming the arbiters for the acquisition of knowledge, deciding where and how to acquire education through full-time, part-time, blended, work-based, distance learning; and the shifts in government policy.

Key Findings

To address the above issues university managers are exploring a range of scenarios. These include the following approaches:

- (i) Cost containment.
- (ii) Increase in revenue through (home and overseas) student fees.
- (iii) Spectrum of actions ranging from sharing back office jobs to university mergers.
- (iv) New models of universities operations.
- (v) Income diversification.

The above are operational issues that can provide some respite, and perhaps an amelioration of some of the current tension, following the dictat of the 'Red Queen'. However, in this paper we contend that what is required is a radical approach and construct for universities to survive and grow in the current turbulent environment. This can be achieved by a bold venture into different models of higher education provision.

Contribution and Implications

To achieve such a vision, the three elements of the Triple Helix will have to work together and interact in radical ways Further details of how this can be achieved will be provided in the paper through proposals for policy derivatives, restructuring of the teaching programmes, strategic alliances with commercial providers and referenced by examples. Brief comments may be made as follows:

It is recognized in the foreseeable future that in the demand for energy resources and global warming, the environment will form the key driver for societal and governmental concern and change. The solutions would require complex interactions between the three elements of the Triple Helix. Subject/discipline-based academic departments will simply not be in a position to address these issues, rather the value chain extending from inter- and cross-disciplinary activity (combining research, knowledge exchange, and education) to partnering with multiple industries, catalysed by government policies would lead to new structures that go beyond traditional university models of governance and departmental configurations.

Further details of such radical rethinking and associated issues will be presented in the paper.

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P-017 **University cluster: Russian experience**

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The work of Educational Scientific Innovative Complex (ESIC) of Tomsk state university of control systems and radio-electronics (TUSUR) in context of cluster theory is analyzed in this science work. The principles of interaction among the structures of the university and innovative companies included in LSIC are considered.

Economic transformations in Russia bring around new economic mechanisms in all fields, including higher professional education. Which methods can play the key role in modernization of Russian business and educational system? Which mechanisms are able to create fertile ground to boost competitiveness potential? What are the advantages of these mechanisms facilitating business and innovations development? This research attempts to answer these as well as many other questions.

The majority of leading Russian universities are undertaking purposeful actions for improving their structure and management systems in order to meet the needs of the current economic situation in Russia. One of the methods to respond to these challenges is consolidation of educational organizations and innovative companies in clusters.

Cluster is a group of geographically concentrated interconnected companies and organizations related to them, which are mutually complimentary and specialize in a certain sphere [1].

This definition focuses on three basic characteristics of clusters:

- Geographic localization.
- Interconnection among the companies.
- Technological interdependence of different fields.

Educational Scientific Innovative Complex (ESIC) of Tomsk state university of control systems and radio-electronics (TUSUR) fully corresponds to these characteristics and definitions, which means that in fact it is a cluster. ESIC is created on the basis of the university in order to develop mutually beneficial partnership and entrepreneurial processes between TUSUR and its business-environment, to create favorable conditions for innovative activity.

ESIC TUSUR includes research institutes, design bureaus, student design bureaus, engineering centers, student business incubator, science laboratories, innovative companies created by TUSUR alumni. The main feature of ESIC is that every firm has its "own" structure inside the university (research institute, design department or science lab, creative team within the system of collective project training or in business incubator, etc.) and provides it with orders, financing, themes for students research work and final theses. There is a constant circulation of information about human resources inside ESIC. It means that information about a student or an employee spreads immediately within the cluster, which on one side creates awareness about personal and professional qualities of certain people inside the ESIC, and on the other stimulates competitiveness among these people.

Hence, ESIC is a net-shaped cluster located in a specific geographic region (Tomsk) where close location of firms allows them to enjoy the benefits of increased communal efficiency and improves the frequency and level of their interaction.

Educational process in TUSUR is designed in a special way, whereby a student develops in the innovation filled environment, studies and absorbs the basics of innovative thinking, and therefore gains capability to implement innovative projects in "real life". In fact if an innovative project lies in the field of control systems, information technologies and electronics, the order for R&D will most likely be given TUSUR, rather other university or research organization.

TUSUR creates the conditions and motivates students to start up their own companies, which are oriented towards knowledgebased business. It should be noted that 115 companies of Tomsk IT-sector are created by TUSUR alumni, which constitutes about 80% of the market.

The other numbers and facts are also quite impressive:

• The number of companies and private entrepreneurs in high-tech industry, which are included in ESIC, and possess their own organization status in the university – 100 companies and private entrepreneurs.

- The total amount of companies created by TUSUR alumni 176 companies.
- The volume of services provided by ESIC companies in 2009 15,2 billion rubles, which is about \$500 million.
- The volume of private business investment in ESIC companies in 2009 400,5 million rubles, which is about \$14 million.
- Capacity of student business-incubator 3300 m2, 300 work places.
- The number of companies which came out from the incubator 15 companies [3].

The detailed investigation of ESIC as a cluster is provided in this research; the advantages of this type of structures over isolated companies are outlined. The data from annual statements of ESIC companies and organizations serve as an evidence of the aforementioned facts.

The ESIC's example has demonstrated us the following:

- Clusters will play the decisive key in modernization of Russian business and educational system.
- The advantages for innovations and increase of efficiency can be developed better in clusters than in isolated companies.

• The companies included in cluster are able to react faster and more appropriately to the customers' needs. The cluster's companies benefit from location in a place with a high concentration of other businesses which have already established strong customer relationships and thus know their needs.

• Clusters allow us to remove or decrease negative impact of organizational problems, which usually appear in more isolated territorial structures and in companies with a high vertical integration.

• Participation in cluster facilitates in access to new technologies, educational methods and good supply and demand opportunities. The companies included in a cluster can easily get new information about technological progress, availability of inventory and equipment, about new concepts in services and marketing, etc.

• The existence of cluster itself is an evidence of availability of certain opportunities. People who work within the cluster can easier detect the existing niches for certain products, services and supplies. All the required assets, skills, manufacturing factors and employees are easier for access inside the cluster.

All these facts taken together suggest that ESIC has great perspective and opportunities in bringing around new educational and entrepreneurial methods and mechanisms which will positively impact on Russian economy.

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O-053 The Triple Helix of Knowledge: The Organizational Tool for Socio-Economic Development

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Introduction

With the increasing shift in the economy to the organization and management of scientific innovations (Drucker, 1995; Porter, 1990), knowledge embodied by creativity and enterprise has become arguably, the driver of the new knowledge-based economy. The term "knowledge-based economy" itself, is of a relatively heritage (David and Foray, 2002) and represents a muddled adjustment in the industrial mode of production. This process ushered in a transition to knowledge-based society as a universal cure. However, in terms of the context of the knowledge-based economy, David and Foray (2002) indicated that the sign that it is in motion is when "knowledge-based communities revolving around networks of individuals striving, first and foremost, to produce and circulate new knowledge and working for different, even rival, organisations such individuals penetrate conventional organisations" (2002:9). In this regard, an accessible objective knowledge and free-market capitalism are seen as mutually dependent upon each other. The process itself resembles a path dependent route: "start with a region that has a particular industrial base, itself the product of long historical evolution" (Krugman, 2000:271).

The triple helix development

The triple helix is based on the premise that the university plays an enhanced role in development in concert with government and industry, the two traditional leading institutional spheres. The prominent role of the university in the triple helix has made this model especially relevant to developing countries where universities are present and industry is either making strides, relatively weak or largely lacking. The form and content of education and curricula most often mirror the prevailing concept of development underwritten mostly by donor agencies (Dzisah and Etzkowitz, 2008). In these countries, the goal of the educational system was to turn out clerks to monitor and record in basic accounting terms the purchase of traditional agricultural export commodities, missionaries to engage in proselytizing activities, and officers for the colonial civil service (Dzisah, 2006). But as was the case in Brazil and Ethiopia, new universities were built on research institutes to give them enhanced knowledge transfer capabilities. These new universities enable Institute researchers take on teaching responsibilities, with students contributing to research as their assistants. However, by their nature, research institutes on their own are very isolated. Unless a university supports them, with a flow of competent personnel, a research Institute will not function on its own (Etzkowitz and Dzisah, 2007).

Critics have argued that the university systems in most developing countries are academically oriented and industries are either non-existent or too weak and governments too bureaucratic to play respective roles envisaged by the triple helix model. However, the problem as noted by Konde (2004) does not lie with the model, but the fact that, in many countries, the triple helix entities seem to be weak because their elements tend to work in isolation. Realizing that knowledge holds the key to a fast tracked development and reconstruction, post genocide Rwanda harness triple helix actors through its emphasis on the role of universities in economic reconstruction. In 1997, Rwanda converted the premises of a military academy into a base for a new technical university, the Kigali Institute of Science, Technology and Management (KIST), which received the Ashden Award for Sustainable Energy in 2001, for developing an energy-efficient oven that uses 25 per cent of the fuel required (Juma, 2005).

Conclusion

As equal interacting spheres develop, aided by the explosion in knowledge, and the emergence of a global knowledge-based economy, the pace of innovation is not only accelerated, but more importantly, the classical functional differentiation of institutions is replaced. In a triple helix regime, the hybridization of functions has ushered in a new innovation and development environment in which, both developed and developing countries found a common applicability for institutions of knowledge at the local, national and global levels. Based on these diverse conclusions and recurring debates on the centrality of knowledge in the contemporary period, we see a reconfiguration of old organizational forms, depicted by changes, from the ivory tower to an entrepreneurial university, from curiosity-driven to application oriented research, and from the dominance of land, labour and capital accumulation to innovation, creativity and ideas. We contend that while, the knowledge infrastructure and processes to enhance utilization are necessary for innovation and growth, the critical prerequisites revolve around an efficient and effective interaction among independent but yet interdependent institutional spheres of university, industry and government. It is from this standpoint that we propose to detail the transformation of the university from an isolated knowledge unit into a prominent player in innovation and regional socio-economic development.

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O-131 Forms and barriers in inter-firm international cooperation on innovation and R&D

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Introduction

Knowledge creation and networking are increasingly taking place at the international level together with the emergence of the global patterns of R&D and innovation (Archibugi & Ianmarino, 2002; Edler, 2007). The internationalisation of R&D is not a new phenomenon, but it is occurring at a much faster pace today. Moreover, it is spreading more widely, including to emerging economies as China and India (OECD, 2008). Current evidence on flows of R&D suggests that the global innovation environment has changed due to intensified global competition and the need to innovate more quickly at different scale and scope. The internationalization of R&D and innovation is due to the following causes: the major complexity of global competition with the advent of new, more differentiated products and producers; institutional change through liberalization; the impact of general-purpose technologies (such as ICT); transformations in markets, competition and industrial organization (especially vertical specialization through network arrangements) and adjustments in corporate strategy and business models (Ernst, 2005; OCDE, 2008).

These new scenarios have affected the need of firms to collaborate with other agents of the innovation system, particularly in capital- and knowledge-intensive sectors. The increasing similarity of technologies across countries and cross-fertilisation of technology between sectors, coupled with the increasing costs and risks associated with innovation has led firms to consider cooperation as a best option in many instances (Narula & Duysters, 2004). For this reasons, cooperation between state, university and private sectors and particularly technological collaboration have become one of the key strategies in the analysis of the innovation processes. Our work is closely related to this issue, investigates the extent to which Spanish and Argentine firms engage in co-operative cross border R&D behaviour and attempts to identify barriers hampering the cooperation inter-firms on R&D and innovation in both countries.

Research focus

The principal objectives of our study are:

- To determine the importance and forms of cooperation relationship between Spanish and Argentine firms, attending the particular cases of firms which we suspected have realised cooperation activities (firms that have participated in international cooperation programmes and export firms)

- To identify barriers which could influence cooperation inter-firms on R&D and innovation between Spain and Argentine

Methodology & samples

We apply a survey by means of a database (N= 540 innovative firms) from Spain and Argentine, with a 19% response rate. A significant percentage (47%) of surveyed enterprises has participated in a special governmental program, called IBEROEKA -a political instrument that arose in 1991 to reinforce the industrial competitiveness in 21 Iberoamerican countries throughout scientific and technological cooperation among innovative enterprises and other actors (Hidalgo y Albors, 2004).). The survey was realised by mail and online and we have obtained complementary information by telephone interviews.

A questionnaire with both multi-item and closed-ended, as well as open-ended questions was designed. It is made up of 51 questions distributed in three parts:

- Part 1 collects data regarding firms' background and their general characteristics (size, sector and branch of activity, human resources, etc.).

- Part 2 solicits data pertaining to firms' general experience with cooperation relations on innovation and R&D (motives of the collaborating parties, modes of cooperation, types of partners, previous experience in cooperation with other firms, universities, technological institutes and other agents, forms of agreements and expected outcomes, investments and public support for innovation activities and results of cooperation, among other aspects).

- Part 3 collects data concerning to cooperation relationship between Spain and Argentine, attending to the in-puts, out-puts and the cooperation process.

Preliminary Results

Our study shows that there are some significant differences in the forms of cooperation in both countries according the firm specific characteristics (size, sector of activity, innovation strategies, R&D and innovation activities types). Customers and universities, followed for suppliers, are the most widely engaged cooperation partners for Spanish firms, while universities are the preferred partner for Argentine firms. In both cases competitors are not chosen as the best option. In general, the firm's cooperation activities are very linked to the origin of public funds for R&D and innovation activities. In this sense, the differences in the financial mechanism of supporting the R&D and innovation activities between Spanish and Argentine firms constitute an important barrier to cooperation. The asymmetrical distribution and conditions of the financial supporting in the IBEROEKA programme is other relevant obstacle for the success of cooperation initiatives. Other important barriers detected are bureaucracy, legal factors and distance.

Contributions & implications

This paper aims to provide a major knowledge about different forms of cooperation, contributing with empirical evidence on the identification of the barriers which can affect significantly the inter-firm cooperation on innovation and R&D relationships, in the particular case of Argentine and Spanish firms. Both aspects have significant implications for governmental policies in this area.

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O-011 CONTRIBUTION OF UNIVERSITIES TO REGIONAL INNOVATION VIA TECHNOLOGY TRANSFER

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The evolutionary interpretation of the Triple Helix model stresses the role of universities as promoters or generators of socioeconomic development in particular for those regions with poor R&D investments and technology base. The model focuses in the role of the university as the promoter of spiral trilateral interactions that result in the formation of hybrid university-industrygovernment projects like industrial parks or technology incubators with the potential to build up resources and increase the formation of intellectual capital. In order to achieve regional development, the following four elements are recognized by Gunasekara (2006): regional agglomeration, proximate stock of human capital, an associative governance framework and a trust a cooperation culture. This author claims that these factors could be useful to explain the various roles of universities at different regional settings. In the case of Mexico many universities are located in regions with well identified clusters of firms and human resource availability, being the other two factors more determinant to understand the differential degrees of contribution of regional universities to socioeconomic development. For example, a traditional culture of no-cooperation obstructs the participation of academic researches in R&D projects with the industry; while deficient associative policies limit the application of basic scientific knowledge. Gunasekara (2006) combines the triple helix model and the engaged university theory - which emphasizes the adaptive responses to universities to engage with private and public actors- to develop a conceptual framework that could explain the variations in the roles of universities in the development of regional innovation systems. The objective of this work is to use the framework proposed by Guansekara (2006) to analyze the role that two private and public Mexican universities are performing to contribute to regional development and in particular to determine if the university is assuming a generative role in agreement with the triple helix model. To cover the regional perspective of the analysis, the study setting was a private university operating in the Central Region of Mexico and a public university of the North East Region of Mexico. The conclusion derived from analysis is that university performs a developmental role in three of the key elements of a regional system - regional clustering, human capital formation and associative governance- and a non-significant role in the fourth, regional cultural norms. The entrepreneurial culture promoted in the university has the potential to make a contribution to regional clustering and human capital formation provided the university is able to consolidate research lines in alignment with the technology and knowledge needs of the region. With respect to contribution to associative governance and regional cultural norms, government intervention is required as local industries are not used to finance regional R&D or cooperate with universities. Then the interactions claimed by the Triple Helix model are far away to be observed in a medium-term horizon.

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P-035 Toward an analytical framework for Nanotechnology Network Governance– Some evidences of the Brazilian case.

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Nanotechnology is considered the technology of this century because their high potential and impact in the different economic activities. Thence one critical element for the development and sustainability of this technology are the networks (Bozeman, et al 2007). In this area, the collaborative and transdisciplinary work is fundamental.

Countries around the world have been making strong investments in Nano technology and specially deploying funds for implementing national networks In this sense they pretend fortify their national innovation systems with positive impact in their economic and social development. (Maclurkan, 2005). Brazil is not exception, so this country since 2001 comes developing different efforts to establish nanotechnology and their networks as strategic issues. (NNI, 2006) Nowadays exist more than eleven segments of this network dedicated to the exploration and exploitation of nanotechnology, inclusively several products have been commercialized

In front of this, each more practitioners and policy makers are interested in the management and specially in one topic, in their governance and impact of the performance of this kind of networks. Unfortunately the research about this issue is scarce.. Exist in the literature some exceptions, but they are fragmented visions and not necessarily with focus to Nanotechnology.. Inclusively exist some approaches against the network governance, because networks are not legal entities (Ness, et al, 2005; Provan et al 2007; Moller et al, 2005)..

But according (Provan et al, 2007; in our opinion some form of governance is necessary to ensure that participants engage in collective and mutually supportive action, that conflict is addressed, and that network resources are acquired and utilized efficiently and effectively. The focus on governance involves the use of institutions and structures of authority and collaboration to allocate resources and to coordinate and control joint action across the network as a whole. From a policy perspective, it should be clear that selection of governance and of ans specific form, whether through mandate or funding incentives could have critical implications for overall network effectiveness. (Provan, Kenis, 2007), Arra et al, 2007; Lamming, et al 2000, Nassimbeni, 1998).

In this sense the main question of this paper is how is the governance of the nanotechnology networks in nanotechnology? So, with the aim to contributing somehow with this research area, this paper pretends to develop an analytical framework which one can be a tool to analyze the network governance in nanotechnology.

The research will be exploratory and a depth case study. The empirical research will be in the Brazilian nanotechnology network. The approach will be qualitative in the first phase but in a second one will be quantitative. A survey will be applied to key actors of the above national network (actors from academy, government, firms etc).. About 35 questions are considered in the survey including Likert scale from 1 to seven. This survey will be applied directly (face to face) to the critical actors, but also it will be on line for actors localized in another Brazilian states. The empirical research will be from July to September of this current year. The analyses of the date will be in a qualitative way and also in a qualitative way (in a second stage) using structural equations and supported in a software. Documental data will be useful in order to make the triangulation of the date

It is expected that the analytical framework for network governance and their applications in the Brazilian network will be useful for the different actors related with this network, specially with academics, practitioners an policy makers, specially as an analytical tool to support empirical research and as a guide to improve the network governance and the formulation or reformulation of public innovation policies.

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0-029

Entrepreneurial Universities for Academic and Economic Reform

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Keywords: entrepreneurial university; economic crisis; higher education reform

Introduction

Cuts in higher education spend be redirected to fund start-up entrepreneurial universities as part of a knowledge-based economic growth strategy. The potential for universities to contribute to economic development has long been noted, initially through the multiplier effect of spending on their surrounding region, and more recently, through their role in growing new clusters to enhance regional economies (Etzkowitz, 1983; Goldfarb and Henrekson, 2003). Indeed, the plans for the foundation of the La Jolla campus of the University of California as a science and technology-based university, by the business and political leadership of San Diego were formulated on this premise, as early as the 1950's. More recently the Merced campus has been established in an agricultural region of California as an explicit entrepreneurial university.

The Design of an Entrepreneurial University

In the past, old universities have been renovated and new ones founded to fulfill new needs in changing social structures. A solution for the scale and scope crisis of mismatch between societal needs and current academic structures is the creation of new universities founded on an entrepreneurial model.

The growth of interface mechanisms to link university and industry such as incubator facilities, technology transfer offices and science parks are typically an overlay on traditional universities, designed to facilitate interaction without affecting the academic heartland and its traditional organization and culture. The basic principles of an entrepreneurial university in action, beyond enhanced autonomy and introduction of technology transfer and incubation capabilities have yet to be fully defined. In the following, we suggest two sigificant innovations in undergraduate educational programmes and design of faculty positions in order to realise the entrepreneurial university: (i) the Novum Trivium undergraduate degree model; and (ii) the Professor of Practice (PoP) initiative.

a) The Novum Trivium comprises (a) a traditional specialty e.g. arts, science, engineering etc. to gain command of a "core competency"; (b) training in entrepreneurship and innovation to learn how to put one's knowledge to use; and (c) a language and culture in addition to one's own to enhance ability to interact with diverse colleagues, globally. By adding entrepreneurship and innovation training to the traditional disciplinary education in order to translate knowledge into use, as well as knowledge of a language and culture different from one's own, the Novum Trivium model for higher education reform aims to generate technically literate business people, entrepreneurial scientists and engineers with a global orientation and a boundary-spanning crosscultural awareness, and sophisticated understanding of another language and culture. b) The PoP initiative has been implemented as an experiment by Newcastle University and the One NorthEast Regional Development Agency, starting in 2006 (Etzkowitz and Dzisah, 2008). The Professor of Practice is commonplace in the US as a format to attract a distinguished professional to the university as a teacher. In the UK, the model was adapted to a research format, with dual university-industry roles, in order to attract back to the university on a half-time appointment, scientific entrepreneurs with high academic credentials and research experience who developed success-ful firms and gained significant management experience to serve as entrepreneurial role models for teachers and students. If scaled up to 20% of faculty positions, the PoP model could change academic culture to an entrepreneurial regime. It could also provide a way for academic entrepreneurs to leave the university to found their firms, while retaining their positions on a half-time basis, after the initial intense start-up period that should be arranged on a temporary leave basis. As faculty go out of the university on a half-time basis, new faculty could be drawn in from industry on a half-time basis, making this a self sustaining programme.

Conclusion:

Although short-term strategies to create immediate, if temporary, employment gains are necessary, an intermediate-range strategy to foster entrepreneurial growth is also warranted. In the 1930s US, the adoption of a similar strategy provided the means to grow the New England region out of its long-term economic depression from the early 20th century, capitalizing upon an academic base that was significantly stronger than that of the rest of the country. The region had an early prototype of an entrepreneurial university in MIT, a school that had been generating spin-offs for several decades. An analysis of the regions strengths and weaknesses led to the invention of the venture capital firm as a means to enhance start-up creation and growth during the early post war (Etzkowitz, 2002).

The entrepreneurial university model has thus far been introduced at the margins of universities, through technology transfer offices, small and medium enterprise coaching programmes, Today, we need new universities and existing ones modified around new knowledge paradigms that will be the basis for future industry. Michael Crow, President of Arizona State University, has encouraged reformulation of traditional departments into conjoint academic teaching and research structures based on new paradigms to diversify economic activity, for example, a Bio-design College (Crow, 2010).

One way to achieve academic renovation that is currently under consideration education policy-makers is mergers or takeovers among universities. This should be complemented by a start-up strategy based on an entrepreneurial academic design to introduce new models into an academic system that needs to reinvent itself.

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P-024 THE INFLUENCY OF CAMPINAS (BRAZIL) HIGH TECHNOLOGY POLE ON INNOVATION CAPACITY OF LOCAL INDUSTRY

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The advanced economies try to apply public policies which the main aim is building reference centers that are able to attract investments and to promote the knowledge diffusion to another spaces. The concentration of the science and technological development processes are an important factor to make real these centers. High technologies poles are a kind of concentration, so its technological and scientific make possible a connection between interdisciplinary networks to national and international research, which enlarges the local capacity to produce high level knowledge. A study about the assimilation of innovative content in 23 locals, in six countries, Lester and Sotarauta (2007) introduces international cases about building innovation local systems. This study emphasizes the idea about the importance of poles and show that presence of universities is a differential to enlarge the generation of knowledge and the integrations between different areas in technologies studies. The Campinas Metropolitan Area is characterized like a innovation, scientific and technological regional pole, and it's recognized over the world by a research did by PNUD in 2001. It's one of 46 locals in the world classified as innovation hubs. To build this situation, there are contributions not just for a lot of research centers and universities located in this area, like the Campinas' University State (UNICAMP), but also a lot of business that invest in research, development and innovation. Because of that, this area presents a great proportion of innovative enterprises if you compares to national average. However, this area still shows deficits about the integration between knowledge chain, innovation generation process and modernization of techniques applied on local productive sector, that means a lack of good mechanism to cause a better dynamic in the relationship between research institutions, industry and local government. A research done in 2009 with business that uses technological basis in Campinas' area showed a light relationship between the technological pole and the productive sector. Local industry knows about the quality of the knowledge produced, but they have difficulties to build an approach and partnership with research centers and universities. These enterprises hope for more actions by local government to establish public policies that promote a good environment for the innovative and technological development to enlarge the potential to generate new enterprises and to attract productive investments in intensive technological fields. In the case of Campinas Area, the components of the triple helix are present, but they also are very representative individually. However, in despite of the region has al the elements that are necessary to build a innovation local system, the integration process have weak points that have influence in the system working and make hard a better using by local enterprises. The aim of this paper is to analyse, indentify the gaps in the Campinas' local innovation system and to offer suggestions to solve this kind of problems.

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Keywords: Local Innovation Systems (LIS), technological pole, high technology, local development.

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W-29 **'Personas' as a method for applying gender theory in Triple Helix constellations - experiences from two research projects**

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In Sweden, funded by VINNOVA and other government funding agencies, gender researchers are currently trying to develop methods in order to move beyond "armchair feminism" in both different kinds of gender equality projects, in innovation systems and Triple Helix constellations. Based on our previous research, we have come to the conclusion that gender mainstreaming measures can be problematic and even counterproductive, leading to the reproduction rather than the transformation of gendered structures. The same is true for the use of gender as a point of departure for research. Even if this insight is not new, it calls for new ways of approaching the problem, theoretically as well as methodologically and for what might be called a "feminist degendering movement" (Lorber, 2000). Such a movement however still needs to start by attending to how gender divisions structure work places, work organizations and working life. It needs to start in critical analyses of the gendering of competence, work identities, technology, entrepreneurship, innovation and leadership. It needs to attend to complex relations between learning and 'doing gender' and to highlight paradoxes and unsymmetrical change processes. But it also needs to move forward, not by merely establishing and describing these phenomena, but also by actually contributing to sustainable change.

In this paper, based on experiences from two ongoing research projects; Daring gender - academic entrepreneurship and The Future Factory, we present and reflect upon one of the methods used in our research. In the project Daring gender, in addition to exploring how global as well as local discourses of academic entrepreneurship are constructed and gendered, our research aims at designing gender equality interventions in the arena of academic entrepreneurship. Rather than developing interventions that tend to restrict targeted women into 'entrepreneurial ghettos', we try to actually change gendered constructions and conceptions of entrepreneurship at two Swedish universities. In The Future Factory, based on a Triple Helix approach, our research group works together with a design team of women engineers, architects and industrial designers from different industrial organizations. The project is aiming at developing a conceptual model of a future factory that promotes gender equality and sustainability. In both research projects, Personas is used to stimulate the participants during the activities (for example work-shops, seminars, group interviews, design projects). A persona is a fictitious description of a character that is used to create a mutual and multi-perspective understanding of the problem to be solved and to communicate this understanding to others. The personas used are fictitious, but based on observations of and interviews with people that will be affected by the change at hand. For example, at the universities researchers - both women and men - were interviewed and, for the other project, women working in industry were observed and interviewed.

In this paper, preliminary results will be presented and so far, our research shows that as negative attitudes towards gender equality projects still exist, Personas seems to be a way of "tricking away" conceptions of gender discussions as threatening, useless and "feministic". It is also a method that facilitates the analysis of the dynamics of practices and constructions of masculinities and femininities in organizations, on structural as well as discursive levels. However, the challenge is to find a method that allows us to together with the participants move away from both individualistic and structural explanations and solutions. In this paper, therefore, drawing on Acker's model for the study of gendered processes in organizations, we elaborate on how Personas might be a way to, not only illustrate and discuss gender inequality, but to actually challenge and - in the long run - fundamentally and sustainably change gendered structures, symbols, interactions and identities.

Keywords: personas, gender mainstreaming, gender equality, research, Triple Helix

O-056 THE ROLE OF TRIPLE HELIX ORGANIZATIONS IN UNIVERSITY-INDUSTRY RELATIONSHIPS

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Introduction

Triple Helix dynamics have emerged together with a group of specialized organizations aimed at creating networking and consensus spaces for different actors. Offices of technology transfer (OTT), science and technology parks and incubators are the main Tripe Helix (TH) organizations to promote and channel university-industry relationships.

This paper studies the role played by TH organizations in the existing relationships between university and industry in a regional university system. Our main goal is to identify the degree to which they are involved in the innovation dynamics of firms in a region and the functions they play in the multiple forms of the relationships that firms establish with universities.

Background

Hybrid organizations are one of the main micro-components on TH institutional arrangements. They function as boundary spaces that allow practices from different domains to operate, and eventually to overcome cultural barriers. Research in this field usually highlights their growing importance, the conditions for promoting interactions and effective alliances, as well as the problems associated with merging different cultures and practices.

Nevertheless, research on this topic has difficulties in showing the real importance of hybrid organizations for the innovative firms surrounding a university system. On the one hand, empirical studies face the problems of using data reported by universities, especially from OTT registries. These data usually display the firms that strive to establish some formal relationships. On the other hand, official innovation surveys neither observe all the specific links maintained with universities, nor do they address the value attributed by firms to TH organizations. Therefore, it is difficult to determine what kinds of firms in a given environment really use TH organizations, and for what kind of relationships.

Research focus and methodology

Our paper pursues three research questions for studying these issues: 1) What kind of firms use TH organizations? 2) Why such firms draw on TH organizations, and specifically, for what kind of purposes? 3) Do different TH organizations have a specific role depending on the kind of university-industry relationship?

The data for our empirical analysis resides in a face-to-face survey to 737 firms conducted in 2008. The research site is Andalusia, the biggest region of Spain in terms of population. It is characterized for having an extensive public university sector, a traditional industrial environment and a set of innovation policies which are designed to mobilize R&D capabilities in the region. Our sample of firms reflects the diversity of sectors, size and innovative profiles of firms in the region.

The survey includes two sets of indicators reflecting both the intervention of TH organizations in establishing links with universities and the importance attributed to them by firms. The survey also measures an extensive set of university-industry relationships, ranging from projects and patents, to consultancy and human resource training.

The analysis of the data is organized in three steps. In the first step, we use descriptive procedures to show the role played by different TH organizations and the importance attributed to them by firms. In the second step, we build dependent variables that account for the 'centrality' of three of them: OTT, science parks and incubators. In the third step, we use regression analysis to detect what factors shape the role of these organizations in a regional university system.

Findings and implications

The findings show that TH organizations have different levels of participation depending on the structural and absorptive capacities of firms in the region. TH organizations also differ depending on the kind of knowledge associated with the links firms establish with universities. The results of the study highlight contributions for refining the TH framework from a micro-level point of view and provide implications for university policy in catch-up regions.

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O-095 Sustainable Triple Helix experience in a Brazilian rural area

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KEYWORDS: Local Development; Triple Helix; Sustainable Triple Helix; Triple Helix twins; entrepreneurial university

Introduction

This paper aims to show an experience on sustainable local development coordinated by a Brazilian University throughout a spreading technology process. The experiment was held in the municipality of Itamonte, State of Minas Gerais, Brazil under the so called Sustainable Upper River Aiuruoca Project - Projeto Alto Aiuruoca Sustentável/PAAS.

It was an experiment that brought together University (Federal Fluminense University-UFF), Government authorities (Itamonte City Council), a state owned company (PETROBRAS) and small landowners. The project was sponsored by Petrobras and carried out by UFF and the local dwellers association (FERRAZ at all, 2005). In this paper the role of the University as a Sustainable Local Development Organizer is presented, leading a process where included community needs identifying, search for technology, search for financial resources, planning, articulating and coordinating in order to create sustainable local development.

State of the art

Previous works dealing with Triple Helix and Regional/Local Development (ETZKOWITZ, H.; KLOFSTEN, 2005) focus at University as a Regional Innovation Organizer, based on their capacity to produce new technologies, articulate the spread of it and to produce wealth. Recently, the concept of Triple Helix Twins (ETZKOWITZ & ZHOU, 2006) adds a new dimension on the dynamics of Regional Development process where both logics, economic and sustainable development, are presented, and society and industry reaches equilibrium throughout dialogue.

In this classical Triple Helix twins the university-industry-government Triple Helix works to promote innovation and economic growth, while the university-government-public one serves as a balance wheel to insure that innovation and growth take place in ways that will not be harmful to the environment and health

Here we are dealing with a special type of Triple Helix. Here technologies are not new ones or even produce from knowledge generated by the university. All technologies involved in this process are well-know low-technologies. Here the sponsor of the project is a firm who is expecting that the project reaches results at the environmental domain. The welfare of the local community express their expectative in relation to the project, they want results that improve their conditions of life, at the social domain. Here therefore we have two logics working, the environmental and the social one. The rule of the university here is to work out like a Sustainable Local Development Organizer, mobilizing technologies, social organizations and public authorities. Akin to the concept of Triple Helix Twins, we may say that we are dealing so with a special type of a Triple Helix, the Sustainable Triple Helix.

Research focus

This paper presents the most important results reached from the analysis of the dynamic of the project, considering it as a Sustainable Triple Helix, taking in account its drawbacks and strengths.

Methodology

It was conducted a documents analysis comparing the results achieved, the results previewed in the approved project, and the initial project. Based on this documents analysis, interviews were conducted with the main actors involved in the process in order to assess their interests, their expectations and their strategies.

Findings

University has played a central role all over the process. Gathering information on dwellers needs was the first activity. As a result of this it was possible developing an initial project using University's technical and financial resources.

With a project initial version in hands University found the sponsor in the PETROBRAS AMBIENTAL PROGRAM. A new version of the project was workout in order to adjust it to the PROGRAM criteria and goals, since the PROGRAM was focused on environmental preservation. This new version of the project was submitted to a Call for Proposals of the PROGRAM and has been selected among others 29 projects on a total of 1,600 applications.

The moderator role was perceived as being the main role of the University. Some situations can illustrate this. Producing seedlings was an issue negotiated when the community starts planning the reforesting activity. It was decided that the dwellers themselves would produce seedlings instead of other institutions, as initially planned. This was decided in order to allow dwellers to earn some money out of this activity.

Other important finding was the role of choosing adequate technology. The choosing of the septic tank technology illustrate quite well this. At first time in the initial project a more common septic tank technology was planned, after making soil tests this first one proved no being adequate for technical and economic reasons. So the University has searched for a better option and found it in EMBRAPA. This technology allows not only treat the human feces but also produce a good fertilizer for crops dwellers grow.

Notwithstanding, it was perceived that the project had brought about major advances for the community as a whole such as selective garbage system collect, the septic tanks themselves, training sessions on sustainable production techniques, knowledge on tourism practices, and most importantly, the project has encouraged the community to organize itself by participating more effectively in their civil associations.

Nevertheless, in this project the sponsor company was mainly interested in the long term environmental preservation and the community was also motivated by short terms opportunity of earn money. The university had to adjust de expectations and find ways of attend both of them.

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0-009

Interaction Between the University and Industry in the Aim to Build a Regional Environment for Innovation: A Survey About the Perception from Industry

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The emergence of a knowledge society has attracted the interest of governments, entrepreneurs and academics to build innovation spaces, able to capture opportunities and take actions to leverage the economic and social development from knowledge creation and its conversion in innovative products and services. Among these barriers can be cited: (i) a low propensity of Brazilian companies to invest in innovation, according to PINTEC, the official data survey about technology investment and innovation (IBGE, 2009), (ii) a lack of institutional structure within universities to foster interaction between academics and local companies (RAPINI, 2007) and (iii) a low knowledge and use of legal framework and mechanisms to finance innovation, as tax subventions. In addition to internal issues, the institutionalization of networks among stakeholders in the construction of innovation spaces is a slow process and often there are no consistent or enough efforts for its establishment.

In this context, this article is part of a research project to analyze the contribution of a public research university, located outside the main cities of Brazil, to the innovation and development of its region of influence. The case studied is the Regional Campus of the Federal Fluminense University (PUVR-UFF), in the city of Volta Redonda, located at the Middle Valley of Paraíba River, in the south of the State of Rio de Janeiro. This is a strategic region in geographic and economic terms, because is in the middle of the two major economic centers of the country, Rio de Janeiro and Sao Paulo. The region comprises large industries such as Volkswagen Trucks, Peugeot Citroën, Saint Gobain, Votorantim and Steel Company Nacional - CSN, the largest steelmaker in Latin America, and a wide park of small and medium-sized companies with a strong vocation for metallurgy and, recently, services. The region has 851,982 inhabitants in 13 municipalities.

Created in 2005, as a part of the government program to expand the university system, PUVR-UFF is composed by two schools (engineering and human and social sciences) and in 2009 it has 116 members in the faculty staff, 70% with PhD, and 1,500 students. It is expected to achieve 5,000 students and 260 professors in 2012.

In the first stage, the research was conducted with the faculty staff in the end of 2008 and the data highlights that 47.5% of its members have had some kind of interaction with businesses and 91% of respondents agreed that academics from public universities can be engaged in such kind of activities. There is not any evidence to consider PUVR-VR as an entrepreneurial university (ETZKOWITZ, 2008), but there is great potential to interact with companies placed in the region. The key instrument to foster the relationship could be the creation of an institutional infrastructure to manage adequately the linkage building process (FERREIRA et al, 2009).

In the second stage, the research is focused on the companies located in the area of influence of PUVR-UFF. The data was obtained from a survey with managers of the companies selected and the findings are presented in this article. The non statistical companies sample was mounted based on a random selection of companies, with at least 50 employees, and managers. The sample represents the diversity of industrial segments in the region with the prevalence of industrial companies with respect to services companies. Semi-structured interviews, organized in three blocks, were realized to check if the company did some kind of interaction with the university in the last 3 years and characterize the interaction level. The perception of managers about the barriers and facilitators was also checked as well as the involvement of the companies surveyed in innovative activities, based on the PINTEC indicators

The sample data allow to conclude that is close to zero the level of interaction between universities and companies in the Region of Middle Valley of Paraíba River. The few activities founded are essentially in consulting and training. One possible reason to explain it is the short lifetime of PUVR-UFF and the absence of institutional arrangements in the both sides to encourage the interaction. About technology and innovation, investments from companies are low, under the national level, what was a surprise due to the relevance of industrial sector from this region in the country. Otherwise, interviewed people manifested a positive curiosity with respect to the potential rewards of this partnership what can be an opportunity to develop cooperation activities in the way to improve the development of innovative products, processes and services.

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O-114 SESI social Entrepreneurship Program in the state of Paraná-BR: Triple Helix in action

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Social issues in developing countries require the search for innovative solutions because of the size and type of deficiencies. Organizations and universities can collaborate to develop these solutions, particularly with the creation and adoption of social innovations. Social innovation is not a new phenomenon, and its concept involves the construction of a new way to meet social demands. Accordingly, in Brazil, since 2005, FINEP included social innovation FINEP for technological innovation. The Social Service of Industry (SESI), governing body representing industry in the country, also realizing the need to train skilled professionals for the design and implementation of social projects drew notice entitled "Guidelines for Promoting the National Department for Strategic Programs SESI -- 2005 Education, Sport and Health. SESI state of Paraná (PR), after extensive analysis, set the focus on Social Entrepreneurship. To create the Social Entrepreneurship Program at SESI (PR), was established a partnership with the Education and Engineering of Santa Catarina (FEESC), an institution linked to the Universidade Federal de Santa Catarina (UFSC), with extensive knowledge in entrepreneurship and technologies in the field of Distance Education (EAD). The focus of this paper is to present a methodology built for the development of technical and human to the social entrepreneur, through the partnership performed. This study is a qualitative approach, with literature review and data collection through interviews with the makers of the program and methodology. The results and consolidated in three editions (years 2006, 2007 and 2008) demonstrate the quality and accuracy of the creation of the program. The interaction of Industry (SESI) and the University (UFSC / FEESC), with the government incentive (FINEP) is the proposal of the Triple Helix, in seeking to break the social and economic crises, generating sustainable social enterprises. The spread of the methodology and results can contribute to the emergence of new proposals for social innovation, meeting the needs existing social and regional development.

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P-037 Innovation Trajectory of Brazilian Innovative Pharmaceutical Companies

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Introduction

This study aims to analyze the innovation trajectory of Brazilian innovative pharmaceutical companies. Specifically, we seek to (1) verify the process of innovation, (2) characterize the internal structure of R&D; (3) mapping the flows of knowledge and technology, and (4) examine the alignment between innovation activities (open and closed) and business model.

Since innovation is considered as an essential element of competitiveness for companies in this sector, its relevant to study the Brazilian companies that could break the vicious circle of company risk-averse - technological follower - who fear the cultural and commercial diversity. The analysis of the innovation process of innovative companies will result in discussions that could be used as the conceptual basis and as a generic parameter of innovation by entrepreneurs from developing countries in the pharmaceutical industry.

Literature review

2.1 Innovation

We start defining what is innovation using for it Hesselbein et al. (2002/xi apud BARBIERI, 2004) Drucker (2003), Schumpeter (1982) and OCDE (2005). We aproach the innovation process as a sistemic cicle (LACERDA, 2001; TIDD ET. al., 2008) and show the phases of innovation Schumpeter (1988). In the same line, we show the value chain innovation model of Hansen e Birkinshaw (2007).

Then, we deal with the competences to innovate (PRAHALAD, HAMEL, 1990; WOODWARD 1965 apud Fleury, 2003) and the five innovation trajectories (TIDD et. al., 2008). The types of innovation are approached using Tidd et al. (2008) and Oslo Manual (OCDE, 2005).

In the last section of this topic we deal with innovation models: close and open paradgim (CHESBROUGH, 2003; 2006). Specifically to the open innovation approach, we present its processes (GASSMANN, ENKEL, 2006, apud ROHRBECK; HÖLZLE; GEMÜNDEN, 2009), the categories of users (KEUPP; GASSMANN, 2009), the key factors that determines its success (CHESBROUGH; CROWTHER, 2006), the estrategies to overcame the chalenges of open innovation (WEST; GALLAGHER, 2008) and the need for balance in its adoption (ENKEL; GASSMANN; CHESBROUGH, 2009).

2.2 The Pharma Industry

We start with an overview of the pharma chain and presents some data about the Brazilian Pharma Industry (ABIQUIF, 2009; Sindusfarma, 2009), as revenues and its evolution, import and exportation. Then we present the Big Pharmas (Fortune Global 500, 2010), and some data about the sector in the world (IMS Health, 2010; RADAELLI, 2006).

We present the innovative variables and the main forms of alliances/partnerships in the pharma industry (PAVITT, 1984, apud RADAELLI, 2006; MCCUTCHEN, SWAMIDASS, 2004).

3. Research Method

We performed a descriptive qualitative study by means of two case studies in the pharmaceutical industry: Cristalia Laboratories and Recepta Biopharma.

The choice of the companies studied was defined according to three criterias: (1) 100% brazilian capital, (2) act in the pharmaceutical sector, and (3) to be innovative.

Primary data were collected through in-depth interviews with senior management of the companies and secondary sources of evidence were also consulted.

4. Contributions and implications

The survey results shows the innovation process of the studied companies, describes the internal structure of R & D, shows the flow of input and output of knowledge and technology and demonstrate the alignment between innovation activities (open and closed), the business model and the limitations of the companies strategy, and the ability to coordinate social networks regardless of company size and resources available.

The trajectory of innovation study shows that although both of the companies are dependent on scientific basic research, they manage to coordinate the work, their technology sources and opportunities in order to "maintain power", regardless of company size.

Both companies operate within the open innovation model, either partially, as in Cristalia, or so deep that it even defines the business model of the company, such as in Recepta case, what meets the tendency observe in the literature.

There was identified types of hybrid innovations in the studied cases: both in product as in process and in business model. In Cristalia case, the innovation in business model focuses on the practice of open innovation. In Recepta, the very business model can be considered innovative in its design. In addition to the types and sources of hybrid innovation, we highlight the combination of models that can streamline and make the trajectory of innovation more consistent and coherent.

One issue that arose during the study is related to the marketing process, once there is na evidence of a paradigm shift with respect to the degree of development most needed by the pharmaceutical industry: formerly there was demand just for products in advanced stage of development, and we can observed by the studied cases a change in the strategy by firms.

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O-004 The Development of Regional Innovation system in Tohoku area, Japan

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Introduction

In this paper, we will examine how the regional innovation system in the Tohoku region has been developed in the past 40 years. The Tohoku region is located in northern part of Japan. It has been thought of as a hinterland due to its location (far from urban areas) and climate. In fact, Tohoku was famous for abundant land and rich natural resources. However, when World War II ended and the Japanese economy expanded rapidly in the 1960s, the Tohoku region missed the boat and failed to change their industry structure. In order to catch up with other advanced regions, science and technology (S&T) and innovation have been thought of as the key factor for the revival of Tohoku.

State of the art about the topic

We will focus on four projects conducted in Tohoku area in the 1980s -the 2000s; (1)Technopolis policy (1983-1989), (2)Tohoku Intelligent Cosmos (TIC) plan(1987-), (3) the formation of triple helix model(1987-), and (4) Cluster strategy (Intelligent cluster and Industrial cluster project)(2001-). There has been some excellent and detailed research that highlight and analyze just a project (Ito et al., 1995, Ito, 1998, Abe, 1998, Tanaka, 1996, Fukushima, 2007). However, there is few research that see four projects in chronological order and at a regional level. By seeing things through times, we could see how the region could learn and accumulate knowledge on how they should manage projects.

Research focus

We will focus on four major projects conducted in Tohoku region as previously stated. Our purpose is to make clear what kind of abilities have been accumulated in the region through projects, how they have accumulated and how they have been handed on to the next, and what kind of obstacles made the projects stagnate.

Methodology

We use case study approach for achieving our purposes. We consult some papers dealing with these projects, archival data, such as articles of magazine and newspapers, and interview data to the person who have been concerned with these projects.

Findings

The first, the region has not always been passive, but parts of it have sometimes behaved actively and wisely. Seemingly most of the S&T and innovation policies were initiated by the central government, while regions just followed its orders, no matter what the ideals were. However, in the middle of the process, we saw endogenous initiatives appear in some parts of the Tohoku region. The TIC was the representative case. The plan was conjured and initiated by local people, as a backlash against the central government report that neglected the Tohoku region. In addition, triple helix models, such as INS, were also started by people who had a strong feeling of crisis about their situation.

The second, the Tohoku region has accumulated knowledge and procedures for economic development in the areas where there are endogenous initiatives and they are eager to enhance their S&T level for the purpose of their economic development. In these areas, the roles of universities are especially important factor in handing knowledge, network, and skills for managing projects on to the next.

The third, the problem with regional innovation system in the Tohoku region consists of excess egalitarianism. S&T policies in Japan are related to national land development and relocation policies, which insinuate that every region in Japan should grow at the same pace and implement the same kinds of policies. As a result, limited resources were dispersed by the central government and no program could yield satisfactory results due to the inefficient usage of resources. These things have been seen in the Tohoku region. It is difficult for all prefectures to proceed at the same speed and in the same direction, because the situation surrounding each region and the resources possessed by each region are quite different. We need to take account of this fact. We should have learned from experience that excessive egalitarianism sometimes makes everything fall apart.

Contribution and implication

Regional innovation policies in Japan are in jeopardy due to the new ruling party's policy on S&T and regional innovation. Under the circumstances, we need to know how to facilitate improvement of regional innovation abilities. The case of Tohoku would give some ideas for this matter.

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P-039

From theory to practice: The drivers needed to ensure Knowledge translation in Occupational Health and Safety (OHS) research environment

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Knowledge translation (KT) is an increasingly widespread practice in the research community. It is a process that, as a research and granting organization, the Institut de recherche Robert-Sauvé en santé et sécurité au travail (IRSST) uses to promote the appropriation of research results in the workplaces. Although the definition of KT does not make consensus, the IRSST gives it a comprehensive definition that includes both concepts of sharing and exchange of knowledge. The simple dissemination of research results is insufficient for changing how things are done in the workplace and for having a real impact on workers' health and safety.

An overview of the scientific literature reveals, among other things, that the following conditions must exist in order to achieve an efficient knowledge translation: the importance of establishing personal contacts between researchers and stakeholders/end-users; the continuous involvement of the stakeholders throughout the research process; the existence of a link between the moment of availability of the research results and their use; the applicability of the results to facilitate the actual appropriation by workplaces; the collaboration of the stakeholders/end-users to adapt and implement the research results.

The objective of this paper is to present the Research and Knowledge Translation Cycle developed by the IRSST and the 6 drivers needed to ensure KT in the Occupational Health and Safety (OHS) research environment.

In accordance with the Triple Helix's approach, IRSST has set as an organizational priority the existence of a solid relationship with decisions makers (including government bodies and Workers' Compensation Boards) and stakeholders/end-users in workplaces. This dynamic interaction between these three actors can (by knowledge creation and adaptation to specific context) influence the decision-making process that leads to the development of OHS standards and regulations

Established in Quebec (Canada) since 1980, the IRSST is a non-profit scientific research organization who contributes, through research, to the prevention of industrial accidents and occupational diseases, and to the rehabilitation of affected workers. Graham, Ian D. et al. Lost in Knowledge Translation: Time for a Map? The Journal of Continuing Education in the Health Professions 2006; 26 (1).

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The IRSST's Research and Knowledge Translation Cycle is structured around the development and the maintenance of networks that represent all the actors (researchers, employers and workers' associations and prevention associations). The dynamics of this approach respects the principle of union-management cooperation that characterizes Occupational Health and Safety activities in the province of Quebec. The continuous involvement of the stakeholders in all the research phases reinforces the idea that knowledge translation cannot be limited to the simple dissemination of results, once the research project is completed. For the IRSST, research becomes particularly relevant when workplaces appropriate results. A framework of practice was developed following a rigorous process led by knowledge transfer researchers and knowledge transfer advisors based on a extensive scientific literature review and a structured analysis of past knowledge transfer activities accomplished in the past 15 years.

As a result it became strongly evident that to ensure that the stakeholders (workers' and employers' associations, joint sectorbased associations) and end-users (workers and employers) appropriate the research results and implement them in their workplaces, some conditions had to be created. Six drivers were indentified to support the implementation of the model of practice. 1) The strong engagement and the support from the funding organization are instrumental in the development and the implementation of a KT framework of practice.

2) The active implication of the Knowledge Transfer advisor in all research team activities (including the determination of the research agenda, scientific/non-scientific activities and knowledge transfer activities related to the dissemination of results.). The role of the Knowledge Transfer advisor must be tailored to the research agenda to maximize its contribution in each research project.

3) The active participation and involvement of stakeholders/end users throughout the research process (by the establishment of a follow-up committee) is mandatory to create an environment conducive to the exchange, dissemination and use of results that answer the real needs of workplaces.

4) To make available funding and resources for researchers. To have researchers acknowledge for KT activities to take place by the granting organization and research organizations. Moreover, academic evaluations (by their home organization) should take into consideration KT activities being carried out in addition to the production of the scientific papers and conferences.

5) To establish KT practices and ensure that they are based on solid, frequent and ongoing interactions between researchers and users, the Knowledge Transfer advisor can develop and maintain the stakeholders' network for the researcher' team.

6) The Knowledge Transfer advisor needs to find ways to measure/appreciate outcomes of KT activities with stakeholders.

Since the establishment of these conditions and the application of the six key drivers, the results of KT increased, have evolved and changed in order to better meet the realities and needs of partners, both scientific and social.

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1. MISIONES TECHNOLOGICAL PARK IS THE CREATOR OF AN ENVIRONMENT WHICH IS THE DRIVING FORCE OF REGIONAL DEVELOPMENT.

Misiones National University evolved from a RESEARCHING university into an ENTERPRISING university. The relationship between the university-the enterprise and the government evolved towards the Triple Helix model and allowed, through a new strategy of innovating University, the understanding of the research work as:

(I) Researching at risk, this is the integration of the scientific production and the management of the results as a global tool, which means the generation of knowledge plus the generation of value;

(II) Cooperative Researching, which bears the step from the management of the offers to the management of the cooperation, through facility units, technological centres, Integrated Projects and the Technological Park;

Misiones Technological Park started as a product of this synergy between the knowledge, the state and the manager sector and it became into a real tool for regional development and in a short period of time it could generate and establish in its location technologically based enterprises of high impact towards the productive sector, propelling a Forester Productive Briquette for the technological innovation of the 900 pymes of the sector which are in the region thus, generating an incubators net in the boundary region of the Province of Misiones with the States of southern Brazil and Paraguay, with a very important socio economic impact in the influenced region and particularly towards the agro forester small producer.

Clue words: Innovating University, Cooperation management, Misiones Technological Park (PTMi), Regional Development.

2. Structure

In the year 2003 as an initiative of the National University and the National Institute of Agricultural Technology arose the idea of creating a Technological Park as a response to a crisis in the province economy which requires a deep reconversion which the manager sector is not in condition of producing it in isolation, without the support of the State and the help of the knowledge.

The provincial and local government where touched, as well as the private sector represented by the manager associations and chambers representing the main agricultural and forester economic activities of the province.

The basic objective was "to promote among the regional development agents a new paradigm of regional development which has to be democratic, socially fair, sustained and competitive within the context of the global economy and the knowledge society", being the driving force for the creation and location of technologically based enterprises, making their products innovating and competitive not only in the regional market, but also in the international one.

The Management model adopted by Misiones Technological Park is a foundation with equal participation: one third the knowledge, one third the state and one third the private sector.

2 Position of the Art about this topic.

A PTMi analysis lets us see it as one of the structural initiatives of a Project of the Province of Misiones for the future. The implementation of the Park motivates and is the driving force for the creation of politics and procedures so that the society can take advantage of the large possibilities offered by the new knowledge era.

Within the group of innovations given by the Park, emerges an institution consortium, designed to offer support to a newly born Latin American school of thought and action in innovating regional development.

The PTMi settled down on an area of 50 hectares, 7 km away from the urban zone of the city of Posadas. It is a medium-sized park, multisite or opened to intensive enterprises about knowing the wide spectrum of sectors, but the biotechnological, food technology and TIC's development areas are priory, which came out from the studies of the Park Guidelines. It is a technological enterprise that accepts the full productive cycle of intensive knowledge enterprises, including research and development, production lines and the administrative and commercial sector.

3 Researching focus

To demonstrate that the representative institutions of the knowledge in the Province of Misiones, the National University and the National Institution of Agricultural Technology evolved in their relationship with the government and the enterprise going from the static to the Triple Helix model and from this relation emerges a Technological Park which generates high impact enterprises towards a local and a sectarian development.

4 Methodology

At the beginning, through an analysis of the secondary information that was available in all the institutions that support the development, representative of the knowledge, the local and provincial government and the management sector. After that, by means of the elaboration of the functional guidelines for Misiones Technological Park, using the Methodology of the Innovating development that represents an evolution of the planning approaches which came out during the 60's and paves the way for the elaboration of concept and perception charts, with the purpose of structuring innovating and efficient answers to the challenges of the Knowledge Society, the new paradigm which emerges all over the world.

5 Results, contributions and their implications.

• 2003- Creation of the PTMi

• 2004- Creation of the INCUTEMI, technologically based enterprises incubator within the Park location, in the city of Posadas.

• 2006- Creation of the INCUTEL, technologically based enterprises incubator within the School of Forester Sciences location of Misiones National University, in the city of Eldorado 220 km away from Posadas.

• November 2006- A net of technologically based incubators is created due to the PTMi, formed by 5 incubators in Argentina and 10 from the nearby states of Brazil.

• December 2006- The PTMi got the financial support from the World Bank in order to build a Forester Cluster in the Province of Misiones and in the north op the Province of Corrientes, in a summons of the Nation Secretary of Science, technology and Productive Innovation.

• November 2008- The first five enterprises, one in Vegetal Biotechnology, one in food technology and three in Tic's

- April 2010, a graduation party of four new enterprises will take place.
- Nowadays: 18 enterprises are in incubation, 9 enterprises are in pre incubation and there are 10 Project Ideas.



P-038 Are third mission activities complements or substitutes of teaching and research?

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Introduction

Since the mid eighties, a new paradigm has emerged to explain the new context within which economic, social and political relationships are becoming established. This paradigm has three main characteristics: the globalisation of economic relationships; the speed of change; and the central role of the new information and communication technologies (ICT) in the economic and social development.

As might be expected, the traditional role of higher education institutions (HEIs) of rather conservative creators and transmitters of knowledge is being questioned in this new globalised context. Their new role is being seen as a response to changes in their environment that affect how universities are perceived by the various stakeholders in 21st century society.

The higher education (HE) environment has changed in different ways, but such change is not new in its long history. What is novel about the current changes are its depth and the direction, which has direct implications for HEIs in terms of their social and economic development, to the point that the existence of these HEIs is being questioned. Competitiveness, productivity, quality and efficiency have become 'buzz' words related to the organization and daily operations of universities, although these terms generally refer to the short term. However, the long term functions of universities as independent institutions are also being questioned and are becoming subject to political and economic pressures.

To make claims about on the diversity of universities may seem superfluous, but in some quarters there is a tendency to refer to a 'desirable' university model. Some universities have a marked local or regional slant which influences their activities and specialism; others have broadened their activities to become international actors.

The responses of universities to these new conditions have had implications for their structure and administration; there is a demand for closer collaboration with their immediate environment, which has been accompanied by greater autonomy and control over their activities and results.

State of the art

Education institutions are of interest because education, especially HE, is one of the main sources of economic growth. Numerous in depth studies have looked at the productivity of universities. Measuring productivity in public HEIs provides an indirect evaluation of public funding management informs policy making and improves university productivity.

Changes in productivity growth can be calculated using the Malmquist productivity change index, which is a particularly attractive methodology. It does not require knowledge on input or output prices, nor does it require specific behavioural assumptions about the institutions under consideration, such as cost minimization or profit or revenue maximization.

This methodology has been applied in a number of service industry contexts, including (among others) healthcare, financial services and insurance. Some studies of the education sector also use the Malmquist index approach, examining productivity changes.

Research focus

The promotion of so-called third-mission activities at universities might be seen as one of the major strategies adopted in recent years. A large debate is ongoing about the consequences of including third mission activities within the institutional missions of universities of research and teaching. This issue could be framed as a problem of complementarity vs substitution in output. Universities' activities should be seen as a vector of the jointly produced outputs, based on the vector for inputs. From this perspective, both positive and negative effects are plausible. In general, studies that examine single scientific areas find a positive correlation between classical indicators of scientific activity and involvement in third mission activities, while studies that examine aggregate effects at university level more often find mixed results. Therefore, this system evolution is placing increasing emphasis on the relevance of assessing university performance.

This paper aims to provide some insight into the analysis of the trade-offs between the different universities' activities.

Methodology

In this paper we apply the Malmquist non-parametric approach to analyse productivity changes and trade-offs in Spanish public universities from 1994 to 2006. We consider a three-input, three-output, general model. Four different specifications were used for that purpose: 'general', 'teaching-only', 'research-only' and 'industry-only' models.
Findings

The general-model shows that across all Spanish public universities the slight improvement in productivity over the period is the result of improvement in technical efficiency, rather than expansion in the frontier relating inputs and outputs.

Focusing on 'teaching-model', the improvement in teaching only productivity in Spanish universities was sustained by improvements in efficiency rather than by the expansion in the frontier. With regard to the 'research-model', the shifts at the frontier level appear to be neutral. With respect to the 'industry-model', we observe that annual productivity growth was sustained by expansions in the frontier and movement towards the efficiency frontier.

Contributions and implications

The results indicate that overall annual productivity growth was attributable largely to efficiency improvements rather than technological progress. It suggests that most universities are not operating near the best-practice frontier.

The separate analyses suggest that most productivity growth is associated with improvements in industry and research rather than teaching. It seems that some of the gains made by universities in the provision of electronic library services and learning materials, online student management systems, etc., are not well dispersed across the Spanish university system.

Moreover, the results indicate that the promotion of highly performing researchers, and the emphasis placed on increased income from external funds have resulted in underperforming teaching activity. It is possible that the high productivity growth rates achieved by some Spanish universities through high numbers of publications and research contracts have been at the expense of student completions and may also be affecting graduate quality. If this is the case, there will be serious problems in the transition of graduates to the labour market.

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O-123 Technology Transfer Process in Public Brazilian Universities

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The importance of the technological variable for social and economic development has been motivation for effective changes in collaboration process among national players in innovation. In Brazil, the Federal Innovation Law was launched in 2004 looking for and establish a legal framework for public research institutions and companies interaction based on innovation and economic incentives for collaborative innovation projects as well.

The most of resources invested in R & D in Brazil are public, representing about 53% in 2007 (MCT, 2009). Public universities with massive research activity is the main destination of this investment, strengthening its role as the main generator of knowledge as Etzkowitz and Leydesdorff (2000). As a result, Brazil is responsible for 2.63% of world scientific output, but with significant difficulty in generating wealth from that knowledge. In this context, the technology transfer from universities to industry is a significant mechanism for raising the technological level of enterprises. Focusing on the use of academic intellectual property, technology transfer mentioned in this work can be defined as the process in which an invention or intellectual property rights of academic research is licensed or conveyed through use rights for profit-making entity and eventually marketed (Friedman and Silberman, 2003). The licensing of university patents is a recent practice in the Brazilian context, even as the protection of inventions came to be diligently observed after 2004. Therefore, the aim of this paper is to present data showing the growth of patenting activity in Brazilian universities and highlighted map to analytically by means of specific cases of technology transfer in these universities.

There was developed an exploratory and descriptive research and study was developed under the assumptions of the qualitative method because it was searched for understanding in depth. The research design is multiple cases that focused on understanding the dynamics of this recent events (EISNHARDT, 1989) and contemporary phenomena embedded in a real-life context in which the researcher has no control of the variables (Yin, 2001). For multicase study, we used various tools for data collection, since qualitative research are characteristically multimethodological. The multicase study refers to three public universities in the State of Sao Paulo, Brazil's most populous and accounts for 52% of the national scientific production in 2002 (FAPESP, 2005). The study focused on licensing agreements, patents o f the following universities: University of Sao Paulo - USP, University of Campinas – Unicamp and Federal University of São CarlosUFSCar. The data were collected mainly through primary documents and interviews with managers of the process in businesses and universities and the academic inventor as well.

The results showed a strong patenting activity of universities in the period 1999 to 2006, considering the reality of Brazilian universities. 371 Unicamp, USP 166, UFSCar 30. We noticed that the steps which constitute the technology transfer were similar, except the step regards identifying organizations for intellectual property commercialization, which in the case of USP was the company that sought the university, at UFSCar the inventor is one who initiated the negotiations and in the case of USP unicamp's invention the research was developed as a collaborative research. In all cases, the process was structured starting from the invention, from the intellectual property protection technology through the Innovation Agency of the universities, identify partner interested in commercialization, after follows a legal process patent licensing, holding deposit / payment patent and royalties to the universities. The facts of the case highlighted key aspects of the role of actors in different stages and analysis of literature as an influence and neutrality in research directions raised by Geuna and Nesta (2006).

In conclusion, based on secondary data from Brazilian universities and concrete case studies, we can noticed growing attention and measures in the sectors of government, business and science for technological innovation, highlighting advances in Brazil and the management of innovation view of propositions as complementary theoretical and Leydesforf Etzkowitz (2000) with the triple helix model focusing on the actors of the innovation system and Chesbrough et al (2006) regarding the open innovation model aimed at internalizing and externalizing of technologies . In all three cases the universities had their own structures for technology transfer as named as Agencies for Innovation and the companies were structured for cooperation, noting that one has for this specific sector and elsewhere to share ownership of patents resulting from collaborative research. The major concerns were the length of proceedings in particular within the university and specific issues such as technology valuation in the case of UFSCar and procurement procedure in the case of USP. Looking for a wider reflection, although the methodology does not allow to assert challenges for technology transfer so extrapolated to other cases, it can be suggested from this study that aspects of attachment of human resources for innovation management in universities, the non international protection for technologies and marketing strategies are the subject of attention to broader discussions and proposals for improvement. CHESBROUGH, H.; VANHAVERBEKE, W.; WEST, J. Open Innovation: Researching a new paradigm. Oxford University Press: USA, 2006.

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Triple Helix VII) Conference Madrid, October 2010

O-035

The role of universities in the creation and development of firm specific innovative capabilities within the tripe helix model of innovation

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The Irish Government has committed to a significant programme of investment and support for university/industry collaboration. The aim of these programmes is to build the innovative capacity of collaborating firms. Contentiously, some (Jordan and O'Leary, 2007) believe this expenditure has represents a negative effect on product and process innovation in collaborating firms, more researchers (Freeman, 1991, Hagedoorn, 1993, Powell et al., 1996b) however believe the opposite to be the case. This paper does not solely engage in the debate as to whether increased university collaboration leads to increased new product and process innovation but investigates how a firm's innovative capability is created and developed through university collaboration. The paper theoretically contributes by bridging the previously unexplored nexus between university/industry collaboration (within the triple helix model of innovation) and innovative capabilities. It also empirically reports on several important issues for industrial firms, policy makers and university managers, by applying an innovative capabilities framework to university/industry collaboration.

The paper builds upon macro innovation systems literature to develop specific contextual factors that have influenced Irish universities over the past number of years. The triple helix model of innovation (which views the innovation system as the interplay and interaction between three main domains or actors of Government, university and industry) will be employed as the lens upon which to concentrate the research due to the centrality afforded to the role of the university. With this foundation one can clearly answer the micro firm specific question related to the development and emergence of innovation capabilities through university/industry collaboration.

Little empirical research has been undertaken to highlight how industrial partners may develop and create the capacity for innovative potential as a result of collaborative partnerships with universities. Thus, a gap in the literature exists that links university/industry collaboration and the innovative capabilities that may be created and developed through such ventures. Romijn and Albaladejo emphasise this gap (2002) "despite several innovation surveys... there is still little empirical evidence about how companies improve their innovation capacity."

Many Irish policy makers have also highlighted the need for closer ties between universities and industry. There have been numerous Irish Government policy documents promoting the need for increased university/industry interaction, for example The National Development Plan (1999), Ahead of the Curve: Ireland's Place in the Global Economy (ESG, 2004), Building Ireland's Knowledge Economy - the Irish Action Plan for Promoting Investment in R&D to 2010 (Forfás, 2004) and Promoting Enterprise–Higher Education Relationships (Forfás, 2007). The then Minister for Education, Mary Hanafin outlined that:

"Closer interaction between public knowledge institutions and enterprise is widely recognised as being increasingly important, as global competition forces companies to innovate more and strengthen core areas. Collaboration with knowledge institutions enables companies to gain access to new knowledge, specialist skills and the latest technologies. Higher education should, therefore, be underpinned by a coherent policy approach that includes the public and private sector" (Forfás, 2007).

The primary focus of this paper is at firm level and in particular that of the individual enterprise in collaboration with a university. As a secondary focus, it also explores various macro level environments that help give the research an increased contextual understanding. The main research vehicle for this paper is the Centres for Science, Engineering and Technology (CSETs). These multimillion research projects span six of the seven Irish universities and all nine CSETs have a considerable industry presence. These world-class centres for research are all based in Irish universities and have significant ties with industrial partners.

The specific research question that this paper investigates is: How universities can create and develop innovative capabilities? The main research subthemes are the seven elements of the innovative capabilities framework which comprise: External Environment and Networking Intensity; Path Dependency, Prior Related Knowledge & Learning; Resource Endowment and Ability to Reconfigure Resources; Culture, Structure, Climate & Trust; Creativity, Idea Management & Opportunity Recognition; Human Resources; and ultimately Company Vision and Strategy. These seven elements were then qualitatively tested in the Centres for Science, Engineering and Technology (CSETs). It was found that three of the elements (External Environment and Networking Intensity; Path Dependency, Prior Related Knowledge & Learning; and Idea Management & Opportunity Recognition) allowed the university greatly influence the collaborating firms innovative capabilities.

This paper employs a multiple case study approach to the Centres for Science, Engineering and Technology (CSETs) in Ireland. This research is also supplemented by an empirical investigation into transformation of Irish universities (mainly through data mining of patent and publications records and interviews with Technology Transfer Officers). As such the paper is unique in its focus, which employs semi-structured interviews to the three main spheres of industry, university and Government. In total 28 interviews were undertaken (3 pilot interviews were also carried out and are not represented in the research) with 9 from collaborating firms; 9 from university managers and liaison managers; 5 Government agency representatives; and 5 Technology Transfer Officers.

This paper makes a number of contributions. Firstly, this paper represents one of the largest studies of industry/university collaboration in Ireland, with an added emphasis on the triple helix stakeholders of university, industry and Government. Secondly, it facilitates a unique blend between the macro innovation systems and triple helix literatures and the micro innovative capabilities perspective. Thirdly, the paper builds on the innovative capabilities literature to formulate a testable framework for the development of innovative capabilities. Finally, it gives policy makers and practitioners a unique insight into how partnerships such as industry/university collaborations may affect the collaborating firm's innovative capability.

Triple Helix VID Conference Madrid, October 2010

O-077 Methodology for researching radical industry-university innovation

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Radical innovation holds great potential for businesses as well as for economic growth, and there is currently an increasing interest in improving our knowledge of firms capabilities for radical innovation (see e.g. Birkinshaw et al., 2007). Based on a quantitative analysis of the data from a representative national Danish survey we found that relative few firms (approximately 4%) had developed a product that was new-to-the-world (which may be defined as a radical innovation (Leifer et al., 2000)), and we found indications that industry-university collaboration significantly affects the likelihood of launching a new-to-the-world product. This finding is in line with a growing body of literature on the potential of university-industry relations (Etzkowitz & Leydesdorff, 2001; Geunam et al, 2003; Mowery & Sampat, 2005) and it goes hand in hand with the development of practice and the political interest in knowledge transfer from universities to industry applications to spur change and growth of economy.

However, we still lack knowledge on how industry-university collaboration should be performed in order to increase the likelihood of successful radical innovation as an outcome. Such innovations are risky and arguably difficult to promote, but if successful they hold greater potential for creation of new business areas (Ettlie, 2000) with favourable impact on growth and employment. Thus, although more incremental innovations are by far the most dominating and indeed necessary to sustain competitive edge, the competitive advantages created are shorter, which call for increasing the level of innovation, and increasing the propensity of radical innovation.

In order to improve the understanding of industry-university collaboration and its relation to radical innovation, a pilot project has been initiated in order to study successful and non-successful cases of collaborative radical nature. The pilot project sets out to investigate operationally what works and what are the barriers when local companies collaborate with a Danish University (Aalborg University). However, studying radical innovation imposes a particular set of methodological challenges due to the nature of this type of innovation.

Based on literature studies this article discusses and suggests a methodological, qualitative framework for coping with the challenges of studying radical innovation through industry-university collaboration. The pilot project will identify 3-5 cases of industry collaboration with Aalborg University which led to successful radical innovation, and 3-5 cases of collaboration which did not lead to radical innovations. Qualitative case-studies will hereafter be conducted to identify key success factors of collaboration. In the article a pre-understanding is established through previous experience and literature studies of radical innovation. Deductive reasoning provides the basis for discussing terminology and conceptual understanding of the field, the identification and sampling of cases, case-study design, interviews, inductive reasoning/ analysis, which leads to the desired findings. The article will also elaborate on the difficulties such as (little) availability of potential cases, larger time-span between the actual innovation processes studied and the time of the study (call for retrospective studies). In the context of collaboration between industry and university parties radical innovations issues such as uncertainty, serendipity, unpredictability, complexity, is expected to be enforced other well-known collaborative issues such as sharing of workload and outcomes amongst partners in network or bilateral collaboration. Based on this the article suggests a methodological framework for coping with the challenges of the study of radical innovation through industry-university collaboration.

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O-081

Entrepreneurial Intentions & Mobility: An Exploratory Study of Chinese Exchange Students at Halmstad University College

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In order to extend the literature on predicting entrepreneurial intentions this study aims to test a model incorporating cultural, social, and psychological factors. We investigate the factors behind the entrepreneurial (i.e. starting-up their own business) intentions of Chinese Exchange Students (CES) at Halmstad University College, Sweden. We specifically question "to what extent individual (personal) backgrounds, preferences and knowledge/perception of CES about the Swedish industrial/business environment may play a role in their entrepreneurial intentions". CES share generally similar views on motivations and barriers to entrepreneurship, but with some interesting differences. Further, while cultural and social dimensions explain only a small portion of intentions, psychological self-efficacy (skills, competence) overcoming the local barries are seen as important predictors. The study was restricted to university students. It generated focused conclusions and recommendations which may not be more widely generalizable. Yet the study suggests directions for continued work on the relationship between cultural and psychological factors in entrepreneurship.

Keywords

Entrepreneurial Intentions, Scientific Mobility, Chinese Students, Sweden

1. Introduction

Along with the development of the global economy, better standards of living and quality of life, higher salaries, access to advanced technology and more stable political conditions in the developed countries attract talent from less developed areas (Dodani and LaPorte, 2005). Many people start to think about to have a job or start business in abroad for high quality life, high salary, better benefits and favorable living environment. According to Özden and Schiff (2006) international migration, i.e. the movement of people across international boundaries, has enormous economic, social, and cultural implications in both origin and destination countries. It is estimated that some 180 million people (3 percent of the world's population) are living in countries in which they were not born (UN, 2002). Immigration to the EU is likely to continue to increase in the near future, as a result of both the demand for labor and low birth rates in EU countries (Horvat, 2004).

A specific issue in international migration is the mobility of highly skilled work force, e.g. scientists and students. The term "brain drain" designates the international transfer of resources in the form of human capital and mainly refers to the mobility of relatively highly educated individuals from developing to developed countries (Beine et al., 2006). Recent comparative data show that during the 1990s, the number of skilled immigrants residing in the OECD area has increased by 70% against only a 30% increase for unskilled immigrants, with the vast majority of the new skilled immigrants originating from developing and transition countries (Docquier and Marfouk, 2006). Nunn (2005) categorized reasons behind this phenomenon under 'push' and 'pull' factors. Pull factors are those factors that attract skilled labour from developing countries and relate in the main to conditions in countries that receive skilled migrants. While the push factors may cause people feel unsatisfied with their life in homeland.

Yet, there have been always concerns about the migration of skilled people from developing to developed countries. Empirical studies showed that high and generally increasing poor- to rich-country emigration rates for tertiary-educated workers has heightened concern about brain drain (Docquier and Marfouk, 2006; Dumont and Lemaitre, 2005). Nevertheless, Wadhwa et al. (2007) pointed out students/scientists from India who have started up their business in the US have also contributed to the development of innovative activities back in India. The brain drain may result in a new set of work force in the form of immigrant entrepreneurs. Such imigrant scientists-entrepreneurs may contribute to the destination countries as well as to the development of their home countries. Kuhn and McAusland (2006) pointed out the importance of brain circulation. It means migration to more supportive environments raises global innovation, and some gains flow back to the poor country through the imports of products with improved technology or lower cost, and may strengthen socio-economic development in the future.

Since the early 1960s like many other European countries (Germany, Belgium, France, the Netherlands, Denmark) Sweden had always attracted and invited industrial workers from other countries (e.g. Finland, former Yugoslavia, Turkey) to meet the needs of intensive industrializations. During 1990s Sweden had also received immigrants on the basis of humanitarian reasons from the countries in war, conflicts and crisis, (e.g. Bosnia, Kosova, Somalia, Chile, Iraq, Palestinian, etc.). Another wave of migration is on the basis of education and research. Among other European countries due to several favorable conditions, Sweden has become an attractive destination for many students and scientists/researchers. Hitherto Sweden has not charged foreign students for high tuition fees, government provides free education almost all. Government agents (like SIDA, Swedish Institute), provide scholarships for foreign students. It has also relatively more liberal migration-residence permit rules unlike the UK, US, Denmark, or Australia. At the same time, Sweden's traditionally strong image in several large-scale industrial sectors (e.g. automotives, electronics pharmaceuticals, light manufacturing) and many large companies (like Volvo, Ericsson, IKEA, SAAB, SKF) as well as the working conditions and labour rights attracted both academic and corporate researchers from different countries.

Among other countries, the flow of migration from China both on the grounds of higher education and employment has been on the rise. There are 9441 Chinese people live in Sweden in 2008. Nevertheless one can argue Sweden has not tapped the potential of the scientific immigrants as much as, e.g. US. While some barriers may remain between Swedish and Chinese bilateral business relations, networks between China and Sweden has been intensifying over the years. It is reported that one company sets up subsidiary in China every four days. Overall, relations both at the individual levels (e.g. through student mobility) and organizational levels (corporate and university) are expanding. Therefore it is important to understand what potential role that mobile Chinese students in Sweden can play both in Sweden (as host country) and China (as home country).

Like other immigrants, exchange students who accepted, searched for education and research positions in foreign countries. While they might be attracted to (expected) to have advantages in their new destinations, they also have to adapt to a new and uncertain environment. This process of searching new options, then learning and living in a new culture and society stimulates opportunity recognition and increases entrepreneurial interest. In the expectation of having higher living standards as well as realizing their scientific and business ideas under better working conditions, it is likely that Chinese students would like extend their residence, e.g. by continuing their academic education, looking for jobs, or starting up their own businesses.

However despite their wish to stay and work in Sweden, Chinese students (like many other immigrant groups) may face several problems. They may not be as informed (aware) of the business life and working conditions, bureaucracy as much as a native (local) may know. Moreover they often lack networks and credibility. Therefore foreign students' intentions to start-up their own firms may not be only related to their individual desires, skills and abilities, but are also related to their awareness and knowledge about the foreign environment they are in.

In the light of this brief Introduction, the aim of this paper is to investigate the factors behind the entrepreneurial (i.e. starting-up their own business) intentions of Chinese Exchange Students (CES hereafter) at Halmstad University College (HH hereafter), Sweden. We specifically question "to what extent individual (personal) backgrounds, preferences and knowledge/perception of CES about the Swedish industrial/business environment may play a role in their entrepreneurial intentions, what are the differences among Chinese students who have entrepreneurial intentions and who does not have".

In order to frame our research, the findings of previous studies on entrepreneurial intentions (see Davidsson, 1995; Autio et al., 2001; Wong et al., 2010) have been used as points of departure. However different from these studies, which basically explored entreprenerial intentions among the natives (locals) in their national context, we instead focus on a "non-native group, i.e. Chinese students in Sweden". The results may therefore inform us the role of contextual factors on the entrepreneurial intentions rather than a sole focus on individual (personal) factors. It can also inform us whether adaption processes enhance entrepreneurial capabilities and interest as well as the ability of recognizing entrepreneurial opportunities. The results of this study also reopens the discussion on how and to what extent organizations and countries can benefit from circulating and hosting international students.

2. Literature Review: Scientific Mobility and Entrepreneurship

Migration has been debated in both sociology and economics for many years. Generally, people believed that the migration, especially those skilled migrations, make a remarkable contribution to the destination countries. Although many benefits can be acquired by the host countries, they have limited capacity to adopt all the skilled people who have migration intention. Countries set different migration rules to prevent the excessive migration, or attractive those skilled people they are lack of.

2.1. Brain Drain & Mobility

In this study, brain drain is a product of the aggregate effects of choices of rational individuals seeking the most advantageous result for themselves. In developed economies rational actors cluster toward higher paid, higher value jobs. This then allows foreign labor to move toward places of high labor demand where there are wage differentials between countries. The propensity for migration then is simply shaped by the potential for employment and the differential wage rates between countries (Massey et al., 1994). High skilled migration from the developing world move to the developed world can take up posts that cannot be filled because of a skills shortage (where markets have failed to incentivize domestic skill production). Nunn (2005) pointed out that the 'brain drain', is the flow of skilled professionals out of developing countries, which marks a potentially serious barrier to economic growth, development and poverty reduction. The loss of skilled labour is of vital importance for development and development potential, and academic labour is even more.

An OECD report (1997) on the movement of the highly skilled identifies, and distinguishes between, two main outcomes for their mobility: "Brain exchange" and "brain waste". A "brain exchange" implies a two-way flow of expertise between a sending country and a host country. Yet, where the net flow is heavily in one direction, the terms "brain gain" or "brain drain" is used. A "brain waste", however, describes the waste of skills that occurs when highly skilled workers migrate into forms of employment not requiring the application of the skills and experience applied in the former job (OECD, 1997).

In contrast, destination countries, which attract and received these people will benefit a lot. Wadhwa et al. (2007) found that there was at least one immigrant key founder in 25.3% of all engineering and technology companies established in the US between 1995 and 2005 inclusive. These immigrants come to the US from all over the world to take advantage of the business, technology and economic opportunities in the country. The immigrants have in return become a significant driving force in the creation of businesses and intellectual property in the US. Skilled immigrants are one of US' greatest advantages.

Ackers (2008) argued that mobility is one of the achieving international research collaboration and knowledge transfer. The traditional view that equates mobility with living abroad for length periods is neither the most common nor necessarily the most effective approach. In some contexts people may exercise very high levels of mobility and effective knowledge transfer through repeated very short term stays including research visits and attendance at conferences. Ackers (2008) proposed that mobility has to be able to adapted to different types of careers, different disciplines and different types of family and lifestyles because you may have a family so mobility has to adapt to that diversity.

2.2. Reasons behind Scientific Mobility

There are a variety of approaches to understanding the reasons for high skilled migration. Nunn (2005) classified these reasons into two category: 'push' and 'pull' factors. Pull factors are those factors that attract skilled labor from developing countries and relate in the main to conditions in countries that receive skilled migrants. These include: (1) higher wages, (2) Job opportunities, (3) Relatively good working conditions, (4) Freedom from political instability or oppression, (5)The use of selective immigration policies designed to attract high skilled workers, while deterring others seen as less economically beneficial to receiving countries. And the "Push" factors include: (1) A lack of life chances, (2) Low living standards, (3) Political and social instability or repression, (4) A lack of opportunities to utilize skills, (5) Natural disasters and environmental or ecological deterioration.

In addition, it is also reported that the number of skilled workers waiting for visa is significantly larger than the number that can be admitted to the United States. This imbalance creates the potential for a sizeable reverse brain-drain from the United States to the skilled workers' home countries. The benefits from immigration may flow back to the developing country via returnees with enhanced skills, personal connections, and ideas for innovation (Wadhwa et al., 2007).

Li (2003) found that the changes in immigration regulations in Canada facilitate the entry of business immigrants with large surplus capital. Cervantes and Guellec (2002) indicated that governments can do quite a lot to protect their human capital, for example, the developing centers of excellence for scientific research and framing the conditions for innovation and high tech entrepreneurship can make a country attractive to highly skilled workers, both from within the country and from outside.

2.3. Entrepreneurial Intentions

Immigrants, especially skilled immigrants (scientists, students) contribute to the destination country's development. In general immigrants have three ways to sustain their own life in the foreign country: i) find a job; ii) become entrepreneur (self-employed); or iii) marry to local people. Among these, entreprenuership may be the most valuable as they will create new jobs and services. The degree of entrepreneurship has a significant influence on the economic development of a region or country (Wennekers and Thurik, 1999). Successful entrepreneurs create job opportunities for others and thus contribute to business prosperity and society in general.

While the push and pull factors provide a general understanding about why people may migrate, in order to examine skilled or academic people's intention to create business, it is also necessary to pursue a more micro level investigation. We therefore give a brief overview of literature on entreprenuerial intentions. Entrepreneurial intention is a driving force of the entrepreneurial behavior, which plays an important role in the growth and development of the world economy (Wu and Wu, 2008). The following part we will list theories related to entrepreneurial intention in different section.

2.3.1 Affective environmental factors

Among many factors that influence one's entrepreneurial intention, Nasurdin et al. (2009) highlight the importance of affective environmental factors such as role model and social identification. It means that individuals who experience a positive view on entrepreneurship among their immediate contacts are more likely to have a greater intention to become entrepreneurs. Specifically, self-esteem, approval of family, availability of strong role models, and appreciation of friends were important in influencing a person's intention to engage in self-employment (ibid). However, Pruett et al. (2009) suggest cultural values associated with country and family support can explain entrepreneurial intentions but the influence is modest. They argued that the most influential predictor of entrepreneurial intentions is individual's perceptions of his or her own entrepreneurial spirit.

2.3.2 Planned behaviour theory and Expectancy theory

Ajzen (1991)'s theory of planned behavior pointed out three factor that influence one's behavior intention which is attitude toward the behavior, subjective norm, perceived behavioral control. The attitude toward the behavior means the degree to which a person has a favorable appraisal of the behavior. The subject norm refers to the perceived social pressure to perform the behavior. The degree of perceived behavioral control refers to the perceived ease of performing the behavior and to the perceived control over the outcome of it. In the view of Ajzen (1991), the more favorable the attitude and subjective norm with respect to the behavior and the greater the perceived behavioral control, the stronger the intention to perform the behavior should be. While Shapero (1982) use expectancy theory argued that the perceived feasibility, perceived desirability, and propensity to act influence entrepreneurial intention. Based on these theories, Autio et al.(2001) pointed out that perceived behavioral control and attitude toward entrepreneurship are close to perceived feasibility and perceived desirability which play an important role in entrepreneurial intention. Wu and Wu's (2008) study can also partly support this point which found that Chinese university students' entrepreneurial intentions are influences by the combination of personal attitude and perceived behavioral control while subjective norm does not contribute significantly.

2.3.3 Education and entrepreneurial intention

Wu and Wu (2008) showed that educational level and background has impact on entrepreneurial intentions, or in another word, influences one's attitude towards entrepreneurship. Specifically, students with postgraduate degree or majored in engineering showed more positive than those with higher degree and in other major.

Entrepreneurship education should pay attention to entrepreneurial skills as well as inspiring students' interest in entrepreneurship. This view is also in line with Pruett et al. (2009), which indicated that the entrepreneurial intentions can be educated in addition to give students practical managerial tools and knowledge about entrepreneurship, we should also foster their sense of confidence and initiative, because education can change one's knowledge as well as individual's way of perceive himself and the world.

Furthermore, Nasurdin et al. (2009) indicated that the government could perhaps design programs that help promote a more positive image of entrepreneurship in the minds of the targeted group, as well in the minds of one's family members or close friends.

Higher education is the major possibility for international mobility, however, internationalization of higher education and training of local students not only means to work overseas, and foreign students will also work in the local labor market (Mahroum, 1999).

A 1998 survey of European graduates, the Swedish human resources consultancy Universum had found that 82% of European students state that they are interested in an international career and 88% are interested in working and living abroad for at least one year.

2.3.4 Network and Entrepreneurial Intention

We mentioned the importance of network because sometimes entrepreneurial ideas are couraged or inspired by their friends, relatives and other contacts, which we call it "network" in briefly (cf. affective factors, e.g. Nasurdin, 2009). Salaff et al. (2006) identified four types of immigrant entrepreneur social networks: (1) family entrepreneurship, (2) collegial, organizational and work ties, (3) transnational networks and (4) ethnic "enclave" or ethnic community networks.

Effective networking can help people more easily start their business and have a high possibility to gain successful, because they can get more information and other support from their networking, have more partners and investors. Many experts notice that there is an increase of the importance of creating, maintaining and developing fittingly networks which makes it much more important to understand the process of networking (Christie et al., 2007).

2.3.5 GEM Model

The Global Entrepreneurship Monitor (GEM hereafter) model is another framework helpful for us to investigate the factors that may influence scientists/or students entrepreneurial intentions. GEM was conceived in 1997 by Michael Hay and Bill Bygrave and a prototype study and was funded by the London Business School and Babson College (Bosma et al., 2009). It is a concept framework which can be used as a link between entrepreneurial environment and entrepreneurship. The assumption is that the framework conditions make up the general context in which new venture creation is stimulated or constrained, and more favorable framework conditions encourage the blossoming of entrepreneurial activity within a country and region (Clercq et al., 2004).

Entrepreneurial environment will influence the trend of entrepreneurial intention, directly or indirectly. These dynamic transactions occur within a particular context, which is referred to the GEM conceptual model, in which nine dimensions of entrepreneurship are defined, and which mainly include the following factors (Deschoolmeester and Jun, 2006):

" Education and Training

Entrepreneurship skills can be successfully taught and trained, which will promote better business practices, increased revenues and profits (Karlan and Martin, 2006). In another words, if people received appropriate education about how to start business, they may have stronger intention to have their own business.

" Cultural and Social Norms

Culture is a complex factor that influences one's entrepreneurial intention in different aspect especially for those immigration. Lipartito (1995) pointed out that one of the contributions of culture is that it offers a new way of appreciating the relationship between the firm and its environment.

" Financial Support

Financial support is a basic requirement to start a business to a large extend. Grilo and Thurik (2005) argue that financial constraints have a negative impact on the decision to become an entrepreneur, and lack of financial support is an obstacle to starting a new business, which has a direct effect on the fact of being self-employed.

" Government Policy

In order to develop economies, many policies are devised by government to support small businesses, which usually take the form of direct financial payments and free or subsidized advisory services.

" Government Program

Government programs include not only financial support and policy supporting projects, but the organization of government with services, support and assistance for starting a business (Gao et al., 2006).

" Research and Development Transfer

The smooth transfer of technology from the source of knowledge to commercial market will cause people's more interesting to start business. (Gao et al., 2006).

" Commercial, Legal Infrastructure

Both infrastructure, and access to physical infrastructure, are important to build up the entrepreneurial environment.

" Market Openness/Barrier to Entry

Both external and internal barriers reduce productive entrepreneurship in an economy (Sobel et al., 2009); They argue that these barriers, through their impact on reducing the number of new resource and goods combinations, result in reducing the rate of entrepreneurship.

" Entrepreneurial Intention

Entrepreneurial intention is a driving force of the entrepreneurial activity, which plays a central role in the growth and development of the world economy (Wu and Wu, 2008).

3. Method and Data Collection

Empirically we focus on CES at HH, Sweden. The reasons for our choice can be summariezed as follows. Sweden has been traditionally an attractive country for migration. Sweden been a typical host country for migrants who are seeking for better and improved life and working conditions. However the immigration rate is still low when compared to other advanced countires such as U.S., Canada. It can be argued that despite its liberal and open attitude towards migration, Sweden hitherto has not been able to harness the potential of its scientific immigrants as much as e.g. US, Australia, Israel had benefitted.

On the other side of migration flow, China is a typical sending country for a long period where a substanstial amount of Chinese people are living abroad and continusly seeking for education and job opportunites abroad. As two Chinese student we want to focus on CES at HH to make this research feasible given the limited time and resources. However this research should be taken exploratory and as a first step of a more comprehensive study that is planned to include other exchange students.

Surveys and empirical findings of previous studies have been used to design the specific survey for this study. In line with the literature review, the survey is divided into six sub-groups which is 1.professional intention, 2.entrepreneurial intention, 3.socail valuation, 4.entrepreneurial capacity, 5.entrepreneurial environment, 6. individual background.

Before sending out the survey, a small pilot study had been done to control and refine the questions. As CES who accepted to participate in the pilot study had difficulties in answering survey in English, we have to translate our English survey into Chinese. The translation from English to Chinese has been also controlled and edited.

3.1 Data collection

The survey is designed online while printed copies were available for those who prefer. The link to the survey link (both in English and Chinese versions) have been sent out to all CES at HH via International Office of HH. Some of the questionnaires in paper version were distributed via students.

3.2 Data analysis

All the data description and analysis work is assisted by the statistics software "SPSS". Firstly we get the general information of our respondents such as their gender, age, major and their intention. We then use Cronbach Alpha value to confirm these data's reliability. Coefficient of correlation was also used to reflect the relationship between each item and entrepreneurship intention. For deeper understanding for the factors affect respondents' intention, we use ANOVA analysis to compare each item's score between those who have entrepreneurial intention and not.

4. Data Analysis

4.1 Profile of respondents

In this investigation, a total of 76 respondents completed the survey. However due to so many missing responses we excluded 3 respondents. This makes 73 of the respondents usable. Among these respondents, 33 (45.21%) have stated they have an entrepreneurial intention, i.e. they want to start-up a business. 40 (54.79%) of the CES didn't consider (have intentions of) becoming an entrepreneur.

The male respondents were 41 (56.0%) while the female were 32 (44%). 50% of females showed entrepreneurial intention while 41.5% males showed entrepreneurial intention. The age of the participants in this survey were 51 (69.9%) within 19-24 years old, and 22 (30.1%) within 25-30 years old. In terms of education, 37 in business program and 36 of them in engineer program. However, there are some differences between engineering students and business students. 59.5% students who study in business program interested in becoming an entrepreneur but only 30.6% students who study in engineer program considered becoming an entrepreneur. We assume while business students are much more affected by the discussions on starting-up business or much more inclined with the idea of becoming entrepreneurs, engineering students might have more "cautious expectations" concerning the difficulties of starting-up a business. They may also think it is less likely to start-up an engineering firm just after graduation without necessary professional experiences.

4.2 Respondents' general intention

The critical question in the survey is to find out the professional intentions of CES in general. CES were asked what they are planning -intending to do after their graduation (completing their studies). The result shows that "finding a job in China" is the most attracted future plan of CES, and ranked in a significantly higher level when compared with other options like, finding a job in Sweden, staring-up their business, or pursing an academic career. Most CES prefers to find a job after graduation. When comes to start business, their home country still be their first choice which higher than both Sweden as well as other countries. We assume respondents still think find a job or start business in China is more feasible for them. We then investigate what sort of problems CES are envisioning during a start-up process.

Table 1 Professional Intentions

Mean Std. Deviation

P1 Find a job in Sweden 2.56 1.225

P2 Find a job in China 4.29 .825

P3 Find a job in another country 2.23 1.137

P4 Start my own business in Sweden 2.07 1.018

P5 Start my own business in China 2.90 1.249

P6 Start my own business in another country 1.79.942

P7 Search for academic jobs in Sweden 2.07 1.206

P8 Search for academic jobs in China 2.03 1.213

P9 Search for academic jobs in another Country 2.12 1.290

4.3 Entrepreneurial intention

In order to better understand the CES' entrepreneurial intention, we asked what are their main motivations to start-up their business. This question can also reflect their intention in different aspects. The Cronbach's Alpha values for these variables were 0.893 (see in Table 2), signifying the reliability of the data. Other group questions' Cronbach's Alpha is above 0.7 except the group of "social valuation" and "ambition for freedom" (see in table 2). The average of each item (see in table 2) showed that our respondents' entrepreneurial intention is slight higher than median. It is interesting because that the response to the yes/no question showed that there are only 33 (45.2%) interested in becoming an entrepreneur.

Table 2 Mean of each group

Group Cronbach's Alpha Mean Std. Deviation Entrepreneurial intention .893 3.2397 .74616 Social valuation .545 3.3041 .52821 Capacity .847 2.3699 .66912 Skills .770 3.0634 .55906 Ambition for freedom .688 3.7342 .66421 Self-realisation .785 3.3630 .69074 Feasibility .856 2.3630 .73353 Attractive factors .843 3.8938 .80571 Network .815 2.8982 .73250 Barriers .772 3.8014 .70801 After calculating each questions for testing their entrepreneurial intention (see in table 3), clearly that our respondents hold interesting in self-employed although more than half of them choose "no" as their answer. It should be noticed that the answer to option: "if I had the opportunity and resources, I'd like to start a firm" is obviously higher than other questions, which indicated us that if government provide more opportunities and resources, these Chinese students will more interested in start business. Table 3 Perceptions about Entrepreneurship Mean Std. Deviation E2 My professional goal is becoming an entrepreneur 2.68.926 E3 I will make every effort to start and run my own firm 3.07 1.122 E4 I've got the firm intention to start a firm some day 2.90.945 E5 Entrepreneurship means more advantages than disadvantages to me 3.29 1.034 E6 Entrepreneurship is attractive for me 3.33 1.042 E7 If I had the opportunity and resources, I'd like to start a firm 4.03.781 E8 Being an entrepreneur gives me great satisfactions 3.63 1.099 E9 I am determined to create a firm in the future 2.99.905 21 of respondents left a short reason for their choice these -most of them believed that the most possible choice for them is to find a job in China. Two of our respondents said that the lack work experience make it impossible to start business especially in Sweden. These reasons in line with their answers to entrepreneurial capacity-our respondents do not possess capacity in self-employed and perceived a low feasibility in start their own business (see in table 3). 4.4 Regression analyse for CES' entrepreneurial intention As mentioned above, respondents' capacity and perceived feasibility seems play an important role in shaping their entrepreneurial intention. Correlation analysis is done by using SPSS to test their relationship (see in table 4). We used Spearman's rho to reflect relationship between respondents' entrepreneurial intention (from yes/no question) and other group questions. From this table, a positive correlation can be found between entrepreneurial intention and motivation (ambition for freedom, self-realization), skills, feasibility, attractive factors and network. Table 4 Correlations of each group E1 Sm Cm Km Fm Am Nm Bm Fhh Shh Mm Gd 'ence E1 1.000 - .113 - .176 - .322** - .319** - .252* - .316** - .096 - .290* - .024 - .295* - .085 Sm -.113 1.000 .179 .124 -.073 .203 .119 -.081 -.080 .177 .174 .169 Madrid, October 2010 Cm -.176 .179 1.000 .486 ** .390 ** .004 .264 * -.274 * .026 - .148 .187 - .317 Km -.322 ** .124 .486 ** 1.000 .344 ** .185 .519 ** .029 -.022 -.111 .398 ** -.028 Fm -.319 ** -.073 .390 ** .344 ** 1.000 .185 .584 ** .091 .275 * -.237* .139 .030 Am -.252 * .203 .044 .185 .185 1.000 .370 ** .204 -.046 .027 .155 .015 Nm -.316 **.119.264 * .519 ** .584 ** .370

** 1.000 .053 .230 -.093 .355 ** .050 Bm -.096 -.081 -.274 * .029 .091 .204 .053 1.000 .236 * -.061 .109 .267 Fhh -.290 * -.080 .026 -.022 .275 * -.046 .230 .236* 1.000 .098 .098 .319 Shh -.024 .177 -.148 -.111 -.237 * .027 - .093 - .601 .098 1 .000 - .028 - .173 Mm -.295 *.174.187.398 ** .139 .155 .355 ** .109 .098 -.028 1.000 .108 Gd -.085 .169 -.317** -.028 .030 .015 .050 .267 *.319 ** -.173 .108 1.000 **. Correlation is significant at the 0.01 level (2-tailed). *. Correlation is significant at the 0.05 level (2- tailed).

For further understand to what degree each factors influence CES' entrepreneurial intention, binary logistic regression analysis was done at SPSS. The predictor (independents) variables were social norm, feasibility, barriers, capacity, attractive factors and participants' motivation, skills, capacity, network, gender, their department in HH and study level. Table 5 shows the logistic regression coefficient, Wald test, and odds ratio for each of the predictors.

Table 5 Variables in the Equation B Wald Sig. Exp(B) Step 1a Sm -.700 1.020 .313 .497 Cm .484 .546 .460 1.622 Mm -.487 .722 .396 .615 Km -1.946 4.187 .041 .143 Fm -.769 1.891 .169 .464 Am -.599 2.011 .156 .549 Nm .330 .337 .561 1.391 Bm .386 .555 .456 1.471 Gender(1) -.208 .087 .767 .812 Facultyand DepartmentatHH(1) 1.709 5.444 .020 5.525 StudylevelinHH(1) .141 .041 .840 1.151 Constant 10.092 5.551 .018 24150.908

Conference Madrid, October 2010

According this table, we can draw the regression equation as following:

The model was able correctly to classify 75.8% of those who have the intention to start business and 85% of those who did not, for an overall success rate of 80.8% (see in table 6). Hence we think this model can explain each factor's effect on CES' entrepreneurial intention on a high degree.

Table 6 Classification Table Observed Predicted E1 Have you ever seriously considered becoming an entrepreneur? Percentage Correct 1 2 E1 Have you ever seriously considered becoming an entrepreneur? 1 2 Overall Percentage 25 8 75.8 85.0 80.8 6 34

a. The cut value is .500

Back to Table 5, employing a 0.05 criterion of statistical significance, respondents' department and skills has significant partial effect. CES who possessed entrepreneurial skills will have a high possibility to start business. In the other hand, students in business department showed significant stronger intention (59.5% versus 30.6%) of start business, which mean that HH's business education successfully influenced these CES' attitude toward entrepreneurship. We can conclude that individual's entrepreneurial intention can be influenced by their education, which indicated that government and school can provide entrepreneurial/business curriculum to all students in order to arouse students' interesting to start business. If government/ school provides some entrepreneurial curriculum for non-business student, these non-business students will have stronger intention to start business in Sweden.

4.5 Differences between CES who have entrepreneurial intention and not

For further understanding the factors affect CES' entrepreneurial intention, we compare the group of respondents who had entrepreneurial intentions vis-à-vis those who do not have entrepreneurial intentions. At the same time, since students from different faculty showed significant differences in terms of entrepreneurial intention, a comparison is also done according to respondents' educational area (business versus engineering).

Table 7 One-Way ANOVA: Motivations to Start-up

Mean of each group Entrepreneurial Yes (Mean) Not-Entrepreneurial (Mean) Sig. Engineering Business Sig Social valuation 3.38 3.24 .256 3.3611 3.2486 .367 Capacity 2.52 2.25 .081 2.3472 2.3919 .778 Ambition for freedom 3.9 3.60 .048 3.6444 3.8216 .257 Self-realization 3.55 3.21 .040 3.2685 3.4550 .252 Skills 3.28 2.88 .002 3.0313 3.0946 .632 Feasibility 2.61 2.16 .009 2.1852 2.5360 .040 Attractive factors 4.08 3.74 .068 3.9176 3.8716 .813 Network 3.16 2.68 .006 2.7381 3.0541 .065 Barriers 3.84 3.77 .688 3.6157 3.9820 .026

As can be seen from table 7, there is a significant difference between respondents who showed entrepreneurial intention and not in terms of ambition for freedom, self-realization, skills and feasibility and network("Sig"?0.05). On the other hand, this table shows that students in business department perceived a more positive entrepreneurial environment in Sweden than nonbusiness students. CES in business department have significant stronger ability in network building. It indicates us that government can encourage school to set some entrepreneurial/business curriculum for students not in business department which will raise some attitude and the overall entrepreneurial intention.

For further understanding the differences between these two groups, One-Way ANOVA was also done by SPSS for each answer (see in appendix), the questions acquired significant different respondents from these two group are shown in Table 8 (see in table 8). hor adrid ctr

Table 8 Questions received significant different answers from student's who have entrepreneurial intention and not Mean F Sig

Yes No P5 Start my own business in China 3.30 2.58 6.623 .012 E2 My professional goal is becoming an entrepreneur 3.03 2.40 9.347 .003 E3 I will make every effort to start and run my own firm 3.27 2.90 2.023 .159 E4 I've got the firm intention to start a firm some day 3.24 2.63 8.521 .005 E5 Entrepreneurship means more advantages than disadvantages to me 3.73 2.93 12.650 .001 E6 Entrepreneurship is attractive for me 3.76 2.98 11.729 .001 E7 If I had the opportunity and resources, I'd like to start a firm 4.33 3.78 10.447 .002 E8 Being an entrepreneur gives me great satisfactions 4.06 3.28 10.446 .002 E9 I am determined to create a firm in the future 3.42 2.63 17.289.000 S2 My friends approve decision 4.15 3.78 5.830 .018 MF2 Be one's own master 4.45 4.05 4.195 .044 MF5 I want to develop my hobby in business 4.39 3.58 14.434 .000 MS2 I wanted to put myself to the test 4.09 3.60 4.964 .029 MS3 I want to command and motivate others 3.52 3.03 3.994 .049 K1 I can recognize opportunities 3.64 3.20 5.310 .024 K2 I am innovative-creative ideas 3.88 3.10 18.060 .000 K3 I have leadership and communication skills 3.64 3.15 6.231 .015 F1 It is possible for me to start my firm in Sweden 2.79 2.13 7.433 .008 F2 It is easy for me to get information about how to start business in Sweden 2.15 1.80 4.329 .041 F4 The new firm will be able to get all the permits and licenses during a week if I start a business 2.61 2.05 6.870 .011 F6 If I have my firm, it is easy for me to recruit people in Sweden 2.91 2.38 5.079 .027 N2 I am working on to create a large network with business community (firms, industrial actors, investors...) in Sweden 2.30 1.85 5.060 .028

N3 I am working on to create a large network with business community (firms, industrial actors, investors...) in China 2.67 2.15 5.865 .018

N4 I am planning to keep my relations active in China even if I start to work in Sweden 4.12 3.40 8.034 .006

N5 I am planning to start business/work in China and keep my networks in Sweden active 3.55 3.03 4.084 .047

N6 My networks (family, friends, public, private, academic) in China will help me to start my business in Sweden (or somewhere else) 3.15 2.75 4.357 .040

Clearly those students who have entrepreneurial intention give a distinct high soccer in the statement of "find a job in China", it indicated that China is their first choice whatever they want to find a job or start business. It can be seen that student's with contrary entrepreneurial intention showed different characteristic such as seeking freedom, self-challenge. Furthermore, students who have entrepreneurial intention possessed of higher skills and network building/maintain talent. A significant difference can also be read in their perception of feasibility. It indicated a strong relationship between "perceived feasibility" and entrepreneurial intention which is also supported by Table 4's figure.

5. Concluding Remarks

The aim of this study is to the aim of this paper is to investigate the factors behind the entrepreneurial (i.e. starting-up their own business) intentions of Chinese Exchange Students (CES hereafter) at Halmstad University College (HH hereafter), Sweden. We specifically question "to what extent individual (personal) backgrounds, preferences and knowledge/perception of CES about the Swedish industrial/business environment may play a role in their entrepreneurial intentions". The findings of previous studies on entrepreneurial intentions (see Davidsson, 1995; Kruger, 1999; Autio et al., 2001; Wong et al., 2010) have been used as points of departure. However different from these studies, which basically explored entreprenerial intentions among the natives (locals) in their national context, we instead focus on a "non-native group, i.e. Chinese students in Sweden". The results may therefore inform us on the role of contextual factors on the entrepreneurial intentions rather than an exclusive focus on individual (personal) factors.

The survey reveals that most Chinese students want to find job in China although they admit that Sweden is attractive for them. Even for those who are interested in becoming entrepreneur, they tend to start business in China but not in Sweden. Over half of Chinese students are attracted in self-employee. However, due to the lack of social and work experiences, they still prefer to find a job first. The respondents' a low level in entrepreneurial capacity and network building ability can explain this result to a great extent. In addition, familiar with Chinese environment (culture, language etc.), existing network in China and the obligation of take care of parents also contribute to their decision.

As we expected, CES' skills, education background, network and to what extent they want self-realization have a positive relationship with their entrepreneurial intention. However, we cannot observe significant influence from CES's study level and gender.

However, individual's characteristics such as ambitious of freedom and self-realization have limited effect on their entrepreneurial intention when compared to skills and education background. Respondents who have intention to start business are more confident in their skill and perceived a high feasibility in terms of start business. Thus we proposed that entrepreneurship education may serve students better by increasing its focus on creativity and confidence-building. Further, curricula should be adapted to specific cultures - for example, problems faced by Chinese students would be further discussed in detail.

Maaria,

Limitations & Further study

This is an exploratory study where we can only cover the factors that may influence the decision of Chinese Exchange Students to start-up their business or not. An important limitation is concerning the finalization of the empirical analysis. Due to time constraints (as the survey of CES has been just completed during 2010-05-15) we have not used the data and the results to a desired level. The aim is continuing to analyze the survey results, some of which are reported in the Appendix, in the light of the literature review and submit it as a conference paper. Another limitation is the focus of this study. Due to time and resource constraints we have limited ourselves to the Chinese Exchange Students as Halmstad University College. We expect a larger study that compromises other exchange students and scientists (e.g. from India, Europe, US, Japan...) at other universities will be very interesting. Moreover a complementary qualitative study of a smaller sample of students will reveal further factors concerning mobility and entrepreneurship, which had not been discussed in the literature so far. 6. References List

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Appendix I

Questionnaire in English and Chinese version will be available upon request.

P-005

Management of Intellectual Property at universities - how to get closer to industries and profit from public policies

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Although the relevance and importance assumed by Intellectual Property in a connected world in the last thirty years, the theme in Brazil is still less divulged than it will be necessary to promote technological and economic development, and the protection it can give is hardly known by the various segments of our society, because the dissemination of its characteristics and rules have been, only in the last decade, receiving a comprehensive approach by the government agencies entitled to execute the law, in order to achieve best results concerning human creations. But as Brazil strives to increase his local and international competitiveness, some policies are being implemented in order to strengthen the innovative capacity of the country.

The institutions of higher education in Brazil present a particular scenario concerning the aspects of science and technology and, in consequence, the use of intellectual property system. On one hand they are competent and efficient in their role for the formation of qualified human resources, putting Brazil in the 15 position in the ranking of scientific articles published in specialized international magazines, with something near 2% of all the papers published, according data from 2006 (OECD, 2006). Nevertheless, the appropriation of the technologies generated internally at universities does not cope with this rhythm, especially because of the enormous obscurity of Intellectual Property themes and, especially, the patent system. But this reality is deeply damaging when we verify that the biggest investment effected in research in the country comes from government funding and, worse, the money invested does not return to society by means of technology transfer, the establishment of new enterprises, creation of new jobs, modification of quality of life for all the citizens, expansion of communities and integration of regions.

Within this context the aim of the study is to present data about the search for patents effected by the Brazilian institutions of higher education in the period comprised between 2000 and 2004 and how innovation public policies, such as the Innovation Law, enacted in 2005, and the creation of mechanisms to develop partnership between universities and enterprises could stimulate the appropriation of technologies generated by researchers at universities and the transfer of results to society, in order to modify the pattern and quality of life in the cities around the institutions. One second aspect to be analyzed and shown in a complete form is the example of Campinas University – UNICAMP, in São Paulo, and the Federal University of Minas Gerais - UFMG, both universities created agencies to manage not only the process of appropriating the technologies generated inside but also the process of licensing for diverse private sectors, mainly enterprises located in their neighborhoods. Besides, these agencies also help in partnerships between university research groups and private sector companies and carries out other activities such as the search for financing and company incubators. These two universities knew, for old experiences, that the integration university/enterprise needed a special interface to cope with the different missions, visions, languages, expectations and limits carried by these actors. And the results of this new approach can be seen by the appearance of new firms, poles of technology and competences, not only of researchers but also new entrepreneurs, who came from incubated junior companies.

The methodology of this study was based in collecting patent data at the database of the Brazilian Institute of Industrial Property (INPI/BR) in the period comprised between 2000 and 2004, using proper keywords to recover the higher education institutions owning patent applications filed in Brazil, the data being analyzed using a software developed in-house, which turned possible to construct graphics and tables disclosing some elements extremely important regarding future public policies and design of priorities.

Some important conclusions have been derived from this study as the technological concentration area of the researches implemented at the universities, the regional distribution of the patent applications filed within INPI, the identification of the biggest owners of patent applications beyond the institutions of higher education, as well as the relation between researcher/ patent and the existence of partnership. Another relevant conclusion that could be drawn is the existence of positive intellectual property management policies implemented by the institutions, turning into concrete actions the transfer of technology to enterprises and carrying benefices and life improvements to the cities of their neighborhood.

It is definitely important to recover patent data and use it in order to build public policies aiming to strength partnerships between universities, enterprises, government institutions and society organizations and, thus, creating opportunities for the benefit of researches and teaching activity and contributing to the economic, technological and social development of the country and, specially, the regions where the universities are located

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O-040

Porto Digital Incubator: an Innovative Model of Incubation to Promote Technological and Economic Development

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The Brazilian incubation movement, despite having grown 25 percent in the last ten years, is going through a phase of stagnation due to lack of harmony between their structures and services to the new demands of society and the economic moment. Due to this fact, the Porto Digital Management Unit (NGPD), the institution responsible for the Porto Digital Technology Park governance in Recife – Brazil, launches an innovative model that mainly aims at tackling the main weaknesses in existent incubators that prevent quality work with businesses stat-ups and, consequently, better spin-offs.

Porto Digital, regarded by the american consulting firm AT Kearney [2] as the largest technology park in the country, is a result of the coordinated effort of the university, the productive sector and government, in order to insert the industry of Information Technology and Communication - ICT in the economic matrix of Pernambuco state. Being a sector with high growth potential, ICT is also the basis for increasing the competitiveness of a region in any contemporary economic development strategy.

Therefore, the new incubator must not only investigate what are the main causes of start-ups failure or premature spin-off's closure, but also investigate the market niche of higher value in order to identify the best focus of marketing performance. It should also identify the way of working to ensure the enterprises success, as well as providing regional development. The incubator structure aims to stimulate the emergence of new business software development in Porto Digital, whose main characteristic is the high degree of innovation. Based on relevant issues in development regions of Pernambuco state, the businesses should show feasibility to climb nationally and internationally.

To identify some bottlenecks to be worked out by the enterprises, it was decided to be based on a survey, [4], that was carried out in three clusters of greater relevance in the state economy and carrying out research in two stages. The first consists of interviews and meetings with business clusters to identify the bottlenecks that, in view of these actors, prevent a better economic performance of productive activities in the regions concerned. And the second step of quantitative basis, with field research with samples calculated on each universe considered in order to statistically assessing the degree of occurrence of these bottlenecks in the interviewed companies.

Thus, the idea is to have an incubator that escapes some of the patterns of existing incubation. Its conception believes that the success of a business comes from ideas and people. Thus, according to their conceptual model, the incubation process on a list of problems related to clusters of Pernambuco State, so that possible solutions are envisioned to try to minimize the bottlenecks identified in these regions. It is expected that the proposals submitted contain a deeper investigation on the problem in question and a previous idea of the solution to be developed during the incubation period.

The incubator of Porto Digital will act in a situation in which the death rate of firms within two years of existence is very high. A survey of 377 incubators throughout Brazil held in 2006 by Anprotec [1] - National Association of Science Parks and Incubators, entitled Business Incubators and Technology Parks Outlook, reveals that the mortality rate of companies that go through an incubation process is 20 percent. Moreover, according to the Brazilian Ministry of Science and Technology (MCT) [3], the American and European statistics indicate a reduction of 70 percent to 20 percent in the mortality rate of companies that go through incubation, compared with the developments born out of that environment. Given this, Porto Digital incubator aims to foster enterprise start-ups sustainable, whose mortality does not exceed 10 percent at the end of the second year of life after the spin-off.

Given the model that reconciles the development of entrepreneurship tied to reducing bottlenecks in the productive sectors in a region to promote economic development, structured and homogeneous, one can see that this solution is shown not only important because it can be applied elsewhere but mainly because it can be replicated in other regions of the world.

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O-005 Innovation systems in Norwegian fisheries

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Bjørn Hersoug (2005) describes Norwegian fisheries regulation as a movement from open access within publicly determined time periods and total quotas to quasi individual tradable quotas to accepted fishers. That is a movement from public to market based management of fisheries. That movement did not simplify the administration of the national fisheries. It was a system that developed incrementally from one problem situation to the next, based in the relative power of the different stakeholders and with the actual regulation as a compromise.

Christensen/Hallenstvedt (2005) argue that the Norwegian state already in the 1920's wanted a national interest organisation that could participate with one voice in policy making. State and organisation merged to a semi-corporate system. In 1964 government subsidies to fisheries were channelled officially through the Norwegian Fishermen's Association (Main agreement). The Association trained and delivered personnel into leading positions in the fisheries segment of the Norwegian government at both ministry and directorate levels. Subsidies reach maximum in early 1980's, 3,5 billion NOK, then petered out over the next 10 years.

The purpose of this paper is to investigate the structure and power of networks in the triple helix that were active in the formation and change of regulation regimes in Norwegian fisheries. That change can be defined as 'from open access to the commons to private ownership of quotas'. The rules of those regulation regimes over time, their formation, content and their regulatory power are described in Hersoug 2005, from the standpoint of a university based investigator and in Christensen/Hallenstvedt 2005 as seen from the major interest organisation, the Fishermen's Association. The paper contributes to the understanding of national and regional innovation systems and the organisation and functioning of them in Norwegian fisheries, both in wild fisheries and fish farming. The problem is how the IS in its triple helix context affects the balance between work places and profits in fisheries and the sustainable use of the natural resources in the sea. Through comparisons of a) national regimes and b) regulation regimes in other north Atlantic communities, Scotland, Iceland and Newfoundland, the study tries to indentify traits of those innovation systems, given their context, that are best at striking a viable balance between profits and sustainability (Gran 2008). The paper looks at the innovation system from three angles: 1) from the vantage point of Searlean decision-making theory, suggesting that obligations are the main materials for finding desire-independent reasons for action; 2) from the Freeman/Perez/ Reinert (2008) perspective that innovativeness is the prime capability of the modern western societies and that a conscious, wilful government in the limited public sector is a key sustainer of that innovativeness; and 3) the the Tyre/von Hippel (1997) perspective suggesting, with Chesbrough (2003), that open innovation, allowing new participants into decision-making and a networking with all three nodes in the triple helix is usually the best condition for sustainable and efficient problem solutions/ regulation regimes.

The finding is that regulation of Norwegian fisheries has continuously been biased towards overfishing, prioritising private sector large fishers and fish producing firms and international markets, with the effect of weakening and even destructing local coastal fisheries communities in Norway. The hypothesis is that the degree of bias is a product of the relative power of public and private sector actors in the democratic system, modified by the ability of local communities, environmental organisations etc. in permeating into the innovation systems networks.

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P-046 Innovative Opportunities beyond the Norm

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- From Political Ambitions to Practice

Introduction Innovation is per se often seen as something good in our society. Innovation is perceived of as stimulating economic growth which is considered, not only as good, but essential for development. Economic growth is, as opposed to gender equality, often presented as a self-evident policy-goal. Rönnblom states that growth in policy is considered as such an obvious policy goal that it is impossible to question (2009).

At the same time it has been shown in research that what is considered of as an innovation is often a technical innovation within certain sectors of the industry (Blake & Hanson, 2005; Pettersson, 2007; Lindberg, 2008). What is considered of as an innovation can hence be critically assessed from different perspectives - an environmental perspective, a socially sustainable perspective as well as a gender perspective.

The Lisbon strategy is meant to influence the policy for economic growth in the European Union's member countries. In the follow-up of the Lisbon strategy the EU Commission proposes to refocus the Lisbon agenda on actions that promote growth and jobs in a manner that is fully consistent with the objective of sustainable development. Sustainable development usually refers to a development that is sustainable from the three perspectives economic, ecological and social sustainability. In the follow-up it also stated that: "the actions falling under this strategy should reinforce the Union's potential to meet and further develop our environmental and social objectives". Hence, the need for sustainable development and social objectives are emphasized. As we understand the Lisbon strategy it includes gender aspects as well. The gender perspective can in addition be used as perspective on all three dimensions of sustainable development, besides viewing gender equality as a prerequisite for economic growth (Löfström, 2009).

State of the art about the topic Several recent studies on innovation policy focus on how gender is constructed in innovation policy. Lindberg identifies two prioritized areas of technology in the Swedish innovation policy and connect them to two types of masculinities and discusses the "co-production of gender and innovation" (Lindberg 2008). Pettersson, in her study of innovation strategies in some of the Nordic countries, states that production of gender can be seen as creating male and men as the norm. Science, innovation and technology are connected to masculinity (Pettersson 2007). The co-production of gender and science, technology and innovation results in a interpretation of men as technically or scientifically skilled and women as unskilled in these areas (see also Nyberg 2002; 2009). These intertwined and mutually reinforcing constructions cause that women and "female" connoted technical areas become invisible and that men and their interaction with technology and "male" connoted technical areas gain attention. Similar conclusions are found in Granat Thorslund (2009) who discusses how the individual is made invisible in the discourse in Swedish innovation policy and how the structural level is emphasized. This seemingly gender neutral discourse does not hide the fact that the strategy focuses on male coded production before female coded reproduction and competiveness before co-operation. The overall focus on the aggregated level also causes a contradiction as the strategy makes a 'black box' out of innovation and learning (ibid).

Lombardo et al discusses how gender equality is shrunk, stretched and bended in policy making (2009). Rönnblom (2009) discuss gender equality in the discourses in Swedish regional growth policy. In regional policy the gender equality discourse have shrunk to mean "only women", but at the same time the concept of economic growth have stretched to such extent that the ecological and social dimension are also described in terms of growth - sustainable growth.

Our approach is partly the contradictory. We take our point of departure from a narrow innovation policy as described above and explore how to 'stretch and bend' and re-construct the discourse in innovation policy towards a more gender inclusive practice. Research focus In this paper we use a gender perspective to challenge the limited ways in which innovation is commonly understood in Swedish innovation policy and how it is implemented in practice. This is a challenge which reveals innovative opportunities. The overarching issue that we raise in this paper is how innovation is commonly understood, focusing on Swedish innovation policy and how it is implemented in practice- and how that understanding can be broadened by applying a gender perspective.

Methodology This paper builds upon empirical studies of two innovation policy programs, partly overlapping each other. Both programs are funded and managed by the Swedish innovation agency Vinnova. Some concrete ideas and examples of a broadened perspective on innovation and innovation policy are presented in the paper. We analyze lessons made from recent and ongoing projects integrating a gender perspective into innovation policy activities in Sweden. The meaning of gender in the innovation processes have been studied primarily via interviews and through in-depth analyzes of different program documents.

Findings, contribution and implications Systems and processes of innovation are to a large extent masculine gendered, something that reduces their efficiency. The use of a gender perspective in the study of innovative systems and innovation policy practices reveals that what could potentially belong in the current blank spots of the theoretical landscape. Gender can be used not only to analyze but also to re-construct, broaden and improve innovative processes and practices.

322.00 Amita Sahaya

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Amita Sahaya is the Founder-Secretary of Women Work & Health Initiative which has the mandate for the Asia Chapter of Women Work and Health. She is a writer with three published books, her focus being gender issues and fiction. She is the editor of 'Selected Readings ' She is on the Editorial Board of Women's Link a gender magazine. She is the Conference Secretary of the International Conference on Gender & Development in the World of Work- Jhansi, U.P. March 25-27, 2010. She was the Head of the Symposia Committee of the IV International Congress on Women Work & Health 2005,

She is the Co-founder of BINDU "Building Initiatives & Networking for the Development of the Underprivileged". These are adult literacy centres for women from the underprivileged sections of society, which are established in Jhansi and Delhi. She is the Founder Member of Findia Foundation - a forum promoting cultural, design and academics. As a part of an Indo-Finnish cooperation under its aegis, she has facilitated an intervention amongst the weavers in Maheshwar (Madhya Pradesh) with the Ministry of Textiles, Govt. of India. Through WWHI she has initiated a second intervention in another weaver cluster with approximately 5000 workers and working on their rehabilitation through formation of women headed SHGs and upgradation of skills and capacity building.

She is presently the member of the International Scientific committee of WWH. Amita Sahaya is a core committee member of the Advisory Board of the School of Gender and Development Studies (SOGDS) IGNOU- University, New Delhi.

Triple Helix VI) Conference Madrid, October 2010

O-155 Understanding Cooperative Research Centers: Learning from Success and Failure

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According to Boardman and Gray (in press) cooperative research centers (CRC) are "organization(s) or unit(s) within a larger organization that performs research and also has an explicit mission (and related activities) to promote, directly or indirectly, cross-sector collaboration, knowledge and technology transfer, and ultimately innovation". As such, CRCs are "triple helix" organizational innovations that have been deployed by national and subnational units of government around the world to help foster closer collaboration among various collaborators industry-university-government (Etzkowitz, 2008). CRCs are interesting vehicles for collaboration for a number of reasons: they are widely deployed in almost every nation and region with a significant S&T investment; applied social science research suggests they are effective in achieving their goals; they embody elements collectivization of research, cross sector research and open innovation, each a transformative developments in how R&D is conducted; they are complex and adaptable organizational structures that can be configured to address very different scientific, technical and social goals.

While applied social science research suggests that they are effective, research has been less informative in explaining why and how CRCs work. In our view, one factor contributing to this state-of-affairs has been the unwillingness of the policy and scholarly community to pay attention to and learn from programs, centers, and tactics that do not work as well as so-called "best practices". Overwhelmingly, evaluations of cooperative research centers (CRCs) tracked success indicators (Gray, 2000) and success stories (e.g., Scott, 2007) more than failures. Yet considerable evidence points to prospects for learning at least as much from technological (Petroski, 1994), social-organizational (Coelho & McClure, 2005), and personal (Shepherd, 2009) failures as success. Toward this end, the main purpose of this thematic workshop will be to shed new light on CRC policy, program operations and tactics by paying attention to factors that contribute to both success and failure.

The session will include five papers. Fostering Team Science: Innovative Leadership Practices in NSF Industry/University Research Cooperative Centers will examine practices that encourage and discourage effective team processes within CRCs. An Assessment of Sustaining and Non-Sustaining Cooperative Research Centers: What Happens to Triple Helix Partnerships When Government Funding Ends? will report on the findings of the first comprehensive follow-up assessment of CRCs that no longer receive government funding. To Join or Not to Join: Individual and Sub-organizational Factors Affecting Industry Membership in University-based Cooperative Research Centers will report findings from a multifaceted effort designed to understand why and how firms join or do not join CRCs. Developing an Applied R&D unit in a small HE Institution will report on an extensive assessment of efforts to create effective higher education-small enterprise technical partnerships. Finally, When Triple Helix Unravels: Learning from Failure in Case Studies of Industry-University Cooperative Research Centers will explicitly examine the circumstances surrounding the closing of a number of previously viable CRCs. Discussion will highlight implications for policy makers, program managers and other stakeholders including industry representatives.

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W-23 When Triple Helix Unravels

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Learning from Failure in Case Studies of Industry-University Cooperative Research Centers

Government-led industry-university cooperative - "Triple Helix" - research organizations (Etzkowitz & Leydesdorff, 1997) continue to spread (Etzkowitz, 2008). Some use multi-level evaluation (Gray & Sundstrom, 2009) for continuous improvement and learning (Gray, 2008). Overwhelmingly, evaluations of cooperative research centers (CRCs) tracked success indicators (Gray, 2000) and success stories (e.g., Scott, 2007) more than failures. Yet considerable evidence points to prospects for learning at least as much from technological (Petroski, 1994), social-organizational (Coelho & McClure, 2005), and personal (Shepherd, 2009) failures.

Toward learning from failure, we present 4 mini-cases from the U.S. National Science Foundation (NSF) Industry / University Cooperative Research Centers (IUCRC) Program. Analyses focus on IUCRCs that successfully launched, operated at least a few years with NSF funding, then failed.

Our goals are to identify: 1) Likely factors in IUCRCs and their environments that contributed to failure; 2) Common themes in IUCRC failures; and 3) Points of learning for Triple Helix.

NSF IUCRC Program

From the 1970s NSF offered small grants, research oversight, and on-site evaluation for IUCRCs; University scientists conduct cooperative, pre-competitive research, funded and directed by representatives of industry member organizations who share scientific knowledge. A NSF evaluator documents Center history and collects data for a national database.

Since inception, the Program funded 110+ IUCRCs with initial 5-year awards, and many, second 5-year awards. McGowen and Gray (2010) tracked IUCRCs no longer NSF-funded, and found very different success rates at Centers with less than 10 years of NSF funding (about one-third continued operating) than those funded 10+ years (about two-thirds continued). Cases of Early Failure

Center L. Launched in the mid-1980s at 3 research-intensive universities in close proximity, Center L served the biotech industry. A local government agency successfully brokered its operation. It peaked at 20 researchers, 7 member firms, and about \$750K in funding. After 5 years of government funding and declining membership, it sought no further NSF funding.

Likely failure factors: 1) Ample, single-investigator funding opportunities from government agencies; 2) Member firms' unwillingness to share research and potential IP with competitors; 3) Member turnover; 4) Turnover in center leadership; 5) Widespread opportunities to work with scientists one-on-one.

Center X. A multi-university IUCRC in the early 1980s at a U.S. research-intensive university and two smaller universities nearby, Center X served the pharmaceutical industry. All 3 Universities had excellent relationships with surrounding pharmaceutical firms. However, Center X only operated four years before declining memberships and other factors led to its closing

Likely failure factors: 1) Participating universities had limited or no doctoral programs; 2) Potential member firms were primarily manufacturing operations with little control over R&D; 3) University politics undermined support for the non-tenure-track director.

Cases of Late Failure

Center C. Launched mid-1980s at one research-intensive University, Center C served the chemical industry. As 10-year NSF funding ended, it had 12 members, \$500K+ annual budget, 11 projects, and 9 scientists. Four years later Center C received another IUCRC award for 2 University sites, then struggled with declining membership for 5 years and closed.

Likely failure factors: 1) Industry members rejected a proposed University site and wider research agenda; 2) Turnover of Center director, site directors, and staff; 3) Research agenda misfit with member needs; 4) Cheap, non-voting memberships; and 5) Member attrition.

Center P. After 5 years a single-University IUCRC serving plastics, defense, and aerospace industries partnered with two Universities for a second 5-year IUCRC award in 2002. In its 10th year of NSF funding, Center P had a \$1M annual budget, 26 industry members, 12 projects, and 14 scientists. Unable to assemble a post-NSF organization after 2+ years, Center P dissolved.

Likely failure factors: 1) Departure of founding director and resulting leadership vacuum; 2) Cheap, non-voting memberships; 3) Turnover of member representatives and organizations; 4) Loss of administrative support at lead University; and 5) Economic pressure in member industries.

Common Themes

These cases offer learning from failure, and share 3 common themes: 1) Multiple failure factors: The IUCRCs developed problems in 2 or more key areas: internal organization; University relations; member organization relations; and economic environment. 2) Advance notice: Trouble became apparent years before failure. 3) Vicious cycles: Compounding, mutually intensifying problems brought accumulated, unmanageable strains.

Learning Points for Triple Helix Organizations

For IUCRCs and other Triple Helix organizations, learning points include: 1) Importance of continuity: Failures incorporated discontinuities of leadership, membership, and/or staffing. 2) Need for effective University hosting: The IUCRCs lacked key forms of University support at critical junctures. 3) Value of early intervention: Earlier action might have mitigated vicious cycles. And 4) Wider, deeper knowledge of failure factors can promote longevity in Triple Helix organizations.

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P-041 Climate for Innovation: a study about the creative climate in companies from

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It is growing the importance given by society for the role that innovation plays in the competitiveness and development of the companies. The existence of indicators in this context is characterized as an essential instrument for better understanding and monitoring the production processes, communication and knowledge, technologies and innovation use. The present article proposes an awareness about innovation importance in the companies from region of Vale do Rio Pardo, Rio Grande do Sul, Brazil, a region that needs diversity in its production. It also extends its proposal for companies linked with technological Incubator of the University of Santa Cruz do Sul - ITUNISC, and it will analyze which research methodologies exist, as well as which one is the more appropriated one to be used in fields researches with the companies. A bibliographical review was carried through, gathering the main elements of the innovation process, which focuses the history and the innovation types. We aim to present historical origin of innovation through authors as Francis Bacon, Adam Smith, Nikolai Kondratiev, Robert Solow, Michael Porter and Joseph Schumpeter, as well as theoretical approaches about the innovation and the innovation systems contributions, highlighting the learning process role in the dynamics of such innovative processes. So, the methodology for field research about creative climate was based on studies done by Göran Ekvall and others. Considering that in Brazil there are a few researches about creative climate, a questionnaire headed for the innovation indicators focused on three main areas which can join Ekvall's dimensions: resources, motivation and exploration. The dimensions can be grouped into three areas of Resources, Motivation, and Exploration as follows: RESOURCES: Idea Time; Idea Support; Challenge and Personal Involvement; MOTIVATION: Trust and Openness: Playfulness and Humor; Absence of Interpersonal Conflicts and EXPLORATION: Risk-taking; Debates about the Issues; Freedom. This research evaluation consists on describing characteristics of certain companies as for innovation, through the use of a questionnaire. By revising the dimensions we consider as the best innovative the one that uses creativity. The least appropriated environment for innovation is the one characterized by prostration and impediment of creativity use. After applying the questionnaire in large and small companies - there are other ones in which it is still in progress- we observed that there still is a resistance and the unknowledgement of law and the incentives for innovation in the country in such companies. With the research, we observed in which dimension degree it is the innovation in the company and also which the priority is concerning to innovate, as well as which companies use innovation in products, services and processes as opportunity for growing, and which of them ask for help in university and government, as well as partnerships with other organizations. With the data analysis of each company we considered the possibility for the company to create and develop new strategies to improve innovation, giving the chance for an open innovation that searches partnerships in several knowledge areas and technologies. Market fluidity and intense competition make that actions are developed and practices are adopted. In order to reach and keep a highlight position in the market, the universities, industry and government need to interact aiming to incentivate research and development, making it possible the creation of technological parks, the creation of more companies and in this way, the Business Incubator, receiving such rising companies for research projects generation aiming to increase the competitiveness and improving life quality of its community. It is the University's responsibility to enable young enterprises promoting generation knowledge and technologies incorporation to the company. However, it is the company's responsibility to support the insertion of innovative products, processes, and services, planning and analyzing the capital and hiring creative employees. But, the Federal, State and Municipal government must organize events and make them public, and also assign greater tax incentives for the innovation and technology in the companies. Therefore, it is essential the interaction among University, Industry and Government for production and development of infinite strategies exchanges according to the market necessity.

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P-056 "Hands on for a sustainable change"

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- mainstreaming gender competence and practice in a technically advanced innovation system

This contributtion draws on our experiences from an ongoing three years gender integration and competence research- and development project in a complex and technically advanced innovation system. The project is integrated in the Faste Laboratory a Swedish VINN-excellence center. The innovation system incorporates 8 industrial companies and 6 academic divisions at Luleå university of Technology. The project is part of the VINNOVA TIGER programme (Applied Gender Research for strong research and innovation environments). A strategy to strengthen the fulfillment of gender mainstreaming in strong research and innovation environments.

Our experiences show that combining gender science with participatory action methods are necessary to promote an increased mainstreaming sustainability. The strategy is to use both gender science and participatory action oriented methods. Researchers and actors in the innovation system together work with joint reflecting learning processes to enable the system actors to increasingly own and take over the mainstreaming process. A strategy to create a greater sustainability and survival of the process when the project is finished.

Triple Helix VI) Conference Madrid, October 2010

O-112

Is it possible for the developing countries to catch up technologically in the nanotechnology field in a Triple Helix Model? The case of nanomaterials in Mexico"

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Introduction

The aim of this paper is to show the importance of the government's role in supporting the university regarding the scientific research to be adopted in the entrepreneurial environment. Particularly, we want to analyze the articulation of these three sectors in the nanomaterials field in a developing country: Mexico.

The main questions we set out are: Under what conditions is it possible to develop frontier nanotechonologies in developing countries? What are the main implications of failure and success in these cases?

Hypothesis: Since the nanosciences and nanotechnologies are considered as a technological change, the role of the government is crucial to fostering a virtuous circle where universities, firms and government institutions could interact to innovate. Particularly in the developing countries, characterized by a lack of financial resources, the new knowledge generated by the research teams could be appropriated by the multinational firms (without having benefits for the country) if there is no financial support, alongside institutional policies to develop a new local industry based on the nanotechnology paradigm.

Among the fields of knowledge where technological change is more intensively manifested is nanotechnology, applied to information processing. Over the last few decades, nanostructures have been present in the manufacturing materials of the electronic devices sector. In particular, systems based on the chemical element Silicon (symbol Si) have already dominated the world of information technology for more than forty years. However, not until a few years ago were those nanostructures, composed of ultra thin films of silicon oxide (SiO2), clearly characterized, as was its real scope and limitations.

The scientific community now warns of the decadence of the silicon era so as to make way for new technologies and materials to improve the control of logical nanocircuits, to continue reducing the size and increasing the capacity of computer processors and improving the performance and speed of nanochips for data transmission and communications. Among the new systems proposed t boost the technological leap towards a new era for information and communication technologies (ITC), hafnium oxide (HfO2) stands out among other alternatives, by virtue of it advantages in terms of efficiency, stability and manufacturing costs.

Nowagays, global firms such as IBM and Texas Instruments are betting on multimillion investments for the research and development of systems based on HfO2 and, have even begun to launch the first innovative hafnium based products onto the market.

State of the art of nanotechnology for manufacturing information and communications devices

The speed at which the new era of hafnium could displace older technology based on silicon will depend largely on the accuracy and precision with which ultrathin films can be elaborated and used for manufacturing the computer processors, hard drives and the other MOS devices.

The only way to predict the stability of hafnium oxide systems is through a high-precision analysis of the composition of the nanostructures that form them.

In Mexico, such an analysis (called stoichiometric analysis of nanostructures) has been located at the forefront of science and technology through the application of methods of angular photoelectron emission spectroscopy (ARXPS) and new probabilistic models for the determination of the accuracy of the spectra parameters.

Research focus

The benefits of such developments are only being used by global companies and research centers in the developed countries. There is no regional innovation system for extending the benefits of local achievements to the rest of the developing countries of the region.

In this article we show how, despite the importance of patents in the field of nanotechnology and because of their impact on the development of a wide range of scientific and technological disciplines, both Mexico and the rest of the developing countries are likely to extend their technology gap in the field of nanotechnology after the imminent arrival of the new era of hafnium.

In order to analyze the possibility of Mexico of being able to carry out the necessary technological catching up in the nanomaterials field, we adopt the national (Freeman, 1991; Lundvall, 1992; Nelson, 1993; Metcalfe) and sectoral (Edquist, 1997; Breschi y Malerba, 1997) innovation systems focus, the technological gap (Posner, 1961; Gomulka, 1971; Cornwall, 1977; Abramovitz, 1986; Fagerberg, 1987) approach and the Triple Helix framework (Etzkowitz, 2008; Etzkowitz et al 2005)

Methodology

We try to identify the technological gap in nanomaterials using R&D expenditure and USPTO patents as indicators of input and output innovation in Mexico, compared with some industrialized and developing (emerging) countries. We consider the United States, Japan, Korea, Taiwan, Brazil and Mexico. Once we have identified the technological gap, we carry out a qualitative and a quantitative analysis. On the one hand, regarding the qualitative analysis, we propose a taxonomy in which we set out the factors characterizing the National System of Innovation, the Nano material sectoral innovation, identifying the dynamics of regional innovation systems. On the other hand, we test the hypotheses through the use of quantitative analysis.

Findings

Mexico is characterized by a disarticulated NIS with minimal efforts in R&D and patents fields. In the nano material sector, the poor performance of these two innovation indicators provides evidence of the important technological gap that Mexico has vis a vis the industrialized countries, and even with some other developing (emerging) countries. Nevertheless, there is some strength in the frontier scientific research of the universities. Even if the international scientific leadership of some research teams is atypical, it provides a technological opportunity to develop a local industry that could be the beginning of a converging path. In the absence of active, institutional and supportive government policies, the innovative efforts of research teams could be appropriated by multinational firms, without having any local benefits, or the rest forgotten.

Contributions and implications

The role of government policies is crucial to fostering the development of the entrepreneurial activity in nanomaterials applied to information processing. The government's policies will be addressed to build technological capabilities so as to assure the linkages between firms and universities as well as assure financial support. All this, in order to make profits, from the technological opportunities resulting from the scientific progress of the research teams, leaders in this kind of knowledge. By considering the important amounts of R&D investment, the Mexican government has to consider the possibility of promoting some technological cooperation agreements with international firms, but, at the same time, making sure that Mexico can be a beneficiary of the innovation activity carried out by university researchers.

Policy implications

By identifying the relative scientific strength of some university research teams on the innovation of nano materials field applied to the ITC in the context of a weak NIS and a sector few developed, the government must facilitate the communicating vessels between universities and local enterprises in order to foster the local firms investment (demand factors), the technological collaboration, the absorption of knowledge spillovers and probably the strategic alliances with foreign firms, leaders in this field. The government has to play a crucial role in this process of technological innovation, where the R&D of the raw material hafnium oxide (HfO2) stands out as an important technological opportunity, which could improve efficiency, stability and manufacturing costs in the ITC sector.

Madrid, October 2010

O-027 Triple Helix and EU Funding - the case of Latin America, especially Mexico and FP7

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The seventh European Framework Program (FP7) is the world's largest (2007-2013: • 50 billion) global-scale program promoting research and development with an international focus. For a large number of countries progressing in their development, this program represents an interesting opportunity to participate in global research and innovation projects. Latin America, as a political and social space, has strong relations with Europe due to its socio-economic and historical development, and has a special position within the innovation policy of the European Union. In FP7, a great number of Latin American countries are "target countries". The FP7, amongst other comparable programs, is also a very attractive financing option for projects in the area of the Triple Helix (up to 100% recoverable costs - compared to other programs which only provide a contribution). If we compare the potential opportunities in Latin America in FP7 (and in previous programs, e.g. FP6) with the actual participation of these countries in this program, we will clearly see a great potential. The optimization of these options would require more funding to support advisory activities for the actors of the Triple Helix in Latin America for which an active participation in FP7 is strategically important. This "missing link" of the program communication and its preferably large-scale presence (not only for the already well-networked actors), can be considered as an essential optimization tool. In order to promote a sustainable analysis of this necessary instrument, the focus will be first placed on an important Latin American country: Mexico. As a first step, Mexico's active participation in FP7 will be analyzed (Analysis of the ongoing project participation in FP7) and from this data the qualitative status quo will be developed for that particular country (beyond purely quantitative statistics). As a second step, a concrete solution will be developed containing the opinions of experts, the needs of actors and the potential project approaches for completing the "missing link". This method mix should present a representative view that will bring conclusions to the problem in Latin America.

The question of communication and the possible solutions in advising FP7-projects is the focus of the research interest. The political dimension of the problem is no less important than the research design, as it has a complementary role in the analysis of the possible intervention models. Mexico, as a leading model country in Latin America, gives us the possibility to carry out an exploratory study of an innovative nature. It is essential to consider the FP7-oriented "establishment" of a Triple Helix in Mexico if we want to show the model of optimized communication and institutionalization of optimized access to the FP7 (and successor programs) not only from the theoretical point of view, but also with the aim of realizing it successfully.

The analysis not only seeks to develop potential and new intervention models; a detailed analysis of the existing problems with regards to communication within the actors of the Triple Helix (especially in Mexico) is also shown. The special situation in Latin America with regards to the existing corruption, the unequal distribution of power between the government and the private sector, the economic dependence on other economies and other social issues will be analyzed in accordance with the main focus of the investigation. The subsequent linking of potential partners and the development of an initiative for submitting a future Triple Helix/FP7 Project represent an important contribution in order to give a longer-term perspective to the previous investigation. These potential project partners between Europe and Latin America (plus other possible world regions) will create an initial project draft within the scope of the conference.

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O-057

Unraveling a large-scale innovation process; A focus on the dynamic interplay within the Triple Helix

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1. Introduction

Increasingly we hear that government ministers "adopt the phrase 'what matters is what works' as their leitmotiv" (Martin and Sanderson, p. 245, 1999). Evidence of what works is to be provided through substantially increased research and evaluation programmes in government departments and greater use of pilot projects to test out new approaches (Sanderson, 2002).

This paper is about a large-scale project on innovation in SME's, and strives to deconstruct 'why it worked'. The project under study, named 'Strategic Innovation in the Euregion Meuse-Rhine' (SI EMR), ran from 2004 to 2008. It was considered a success by all participating actors in the political, academic and business arena. The research focus is directed to the dynamics on the management level and particularly zooms in on the interactions between government, university and industry. Deconstructing this project is a legitimate exercise since a large amount of public money is spend on innovation programs and little insight is gained in the effectiveness of actual projects carried out. Many EU programmes to assist SMEs seem especially prone to failure (MacDonald, Assimakopoulos & Anderson, 2007). We have the opportunity to learn from the design and implementation of Strategic Innovation in order to identify the aspects in the project developments that contributed to the perceived success. Empirical data on this large scale policy project is available and allows to unravel the actual dynamics of processes in changing contexts. Evidence-based knowledge of this kind supports policy learning and thereby adds to effectiveness of future innovation programs. It meets "the need for more 'policy intelligence' in this complex field" (Nauwelairs and Wintjes, 2003). 2. Deconstructing Strategic Innovation

SI EMR was designed to strengthen innovation initiatives of 650 SMEs, in order to support regional welfare. The project coordinator (MERIT, University Maastricht) and its partners (UHasselt, AGIT, Spi+) assigned 189 consultants to assist each SMEs individually, by means of a tool, to make strategic choices in innovative performance. Unravelling the dynamics between the actors and contexts on the management level of this project concerns process research that focuses on how things evolve over time and why they evolve in this way. Process data consist largely of stories about what happened and who did what when - that is, events, activities, and choices ordered over time (Langley, 1999). The analysis of process data requires a means of conceptualizing events and of detecting patterns among them. Most common pattern is linear sequence of "phases" that occur over time to produce a given result (e.g., Burgelman, 1983; Rogers, 1983). Tsoukas (1989) argues that while data themselves can yield empirical regularities, abstract conceptualization is required to imagine the "generative mechanisms" that are driving them. For him, understanding comes from the combination of the two. Visual graphical representations are particularly attractive for the analysis of process data because they allow the simultaneous representation of a large number of dimensions, and they can easily be used to show precedence, parallel processes, and the passage of time. Project developments can be analysed as a change process (Pettigrew, 1987) which implies a study on mechanisms and processes through which changes are created. The point of departure in this analysis of strategic change, is the notion that formulating the 'content' is inherent connected to its 'context' and 'process'. The 'content' category marks out the precise areas of transformation under examination. The 'context' assists to outline the environment in which the project is situated. And the 'process' of change refers to the actions, reactions, and interactions from the various parties as they seek to move the project from its present to its future state. These theoretical insights are used to construct the organizational map of SI. It presents key-aspects in the program developments and thereby legitimates and validates the learning process in SI.

3. Visualizing the process and identifying generative mechanisms

In the case of SI EMR data are collected from project documents, meeting minutes, training material and other forms of information and communication documents. A crucial nuanced feel for management interactions was gained through interviews with different key players on the political, managerial, business and consulting level. The findings on the actors, activities, nature of exchange material and influential contextual aspects are visualized and presented in a timeline. The most prominent processes in the management of SI EMR are identified and abstracted to the meta-level of generative mechanisms.

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P-011

Inside the Pandora box of the academic researcher portfolio: a structural equation equivalent model exploration

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In some OECD countries, such as Canada, the interactions of the economic actors are in a period of mutation (Inzelt 2004). A new kind of configuration of these interactions is emerging and can be modelled with a Triple Helix. Within this configuration, the essential economic actors, called meta-actors are among three, representing the Government, the Industry and the University (Etzkowitz and Klofsten 2005). None of these three meta-actors prevails on the others, each of them influences his own trajectory of actions and every trajectory is also influenced by the other meta-actors (Leydesdorff and Meyer 2006). Never in the past, has the University had such a place. This one has been motivated by external pressures, such as the emergence of the knowledge economy within which the importance of knowledge actors is increasing (Cooke 2005), and pressures in the rationalisation of public research financing, which increases the competition for public funds (Etzkowitz and Brisolla 1999). In this context, the academic researcher appears as a predominant actor as he participates in research which gives opportunities for innovation, in teaching which develops highly qualified personnel, and so plays a major role in developing absorptive capacities in firms, and in entrepreneurialism, which represents the transformation of knowledge in a more usable form and so, another opportunity for innovation. The way that academics assume their roles and the relationships between them are thus in the middle of numerous academic and public debates (Gimbel, Cruess et al. 2008).

As it was noticed by Walckiers (2004) and Braxton (1996), there are three possible perspectives of relationship between the roles of the academic researcher : 1) the null perspective (no relationship, see for example Robertson and Bond 2001), a conflict perspective (a negative relationship, see for example Fairweather and Beach 2002), and finally a complementary perspective (similarities, see for example Meyer 2006). According to Vidal and Quintanilla (2000), the relationships between the roles should be considered with a more dynamic perspective, within which, instead of complementarities, substitutions and independence, it would be considered different pattern of direct effect between the roles. No empirical evidence has yet supported this dynamic perspective, because scholars, like Lowe and Gonzalez-Brambila (2007), studied the relations between academic roles by analyzing bidirectional tests, instead of analyzing patterns of regression between the roles.

Research focus

This paper addresses the following questions: what are the different patterns of effects between the researcher's roles? What are the theories which support those patterns?

Methodology

This exploratory investigation relied on a data regarding 1554 researchers funded by the Natural Sciences and Engineering Research Council of Canada. To represent the academic researcher's roles, the paper works with a portfolio of activities based on seven series of measures: 1) percentage of time dedicated to teaching; 2) Articles in peer review journal, 3) percentage of time dedicated to research, 4) number of patent, 5) a five Likert scale regarding consultation activities, 6) a five Likert scale regarding spinoff creation and 7) percentage of time regarding administrative activities. The methodology is based on the exploration of equivalent model in structural equation model (SEM). The use of SEM allow to identify and validate equivalent models, i.e. alternative models that fit the data equally well, thus producing the same covariance or correlation matrix (Henley, Shook et al. 2006).

Findings and contributions

Two major results were generated by this study:

1. The representation of a dynamic perspective of the researcher's roles relationships based on the identification of different patterns of direct effects between the academic researcher's roles;

2. The development of different scenarios of theories, which support the equivalent models identified.

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O-042

Interaction between Universities and Technology Clusters in Emerging Economies - Case Study of Cyberjaya, Malaysia - A Greenfield development and Cyberabad, India - A Brownfield Development

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Introduction

This paper tries to explore the nature and content of interaction among the university, industry and government in the Greenfield development of the Multimedia Super-corridor created by the Malaysian Government, and the Brownfield development of the software industry cluster in Hyderabad. The paper attempts to understand the composition of regional knowledge cities - Cyberjaya and Cyberabad, and in terms of the interaction among R&D institutions, industrial clusters, social, cultural and policy environment and their place in the global context and the consequent outcomes. Analysis of the interplay of these factors would shed light on the variations in the levels of interactions.

Literature on University and Industry linkages suggests that a wide variety of University Industry Linkages (UILs) can exist (see Basant and Chandra 2006) and can vary from labor market related, to the creation of spin-offs, to joint R & D projects and so on and these links are informal and formal. Universities play generative role and developmental role in their interaction with the industry. The universities contribute to the overall regional development. The developmental role of universities is more focused on the ways in which the university-industry interaction in a regional innovation system is organized. It results in a shift in the role of universities from passive knowledge and human resources production centers to a more dynamic and applied research centers useful to the industry (Chaminade C., et. al., 2007). In this context, the triple helix model emphasizes the process of formation of hybrid, recursive and cross-institutional relations among the trinity - university, industry and government.

Research Focus

Cyberjaya can be identified as a Greenfield cluster development, a fresh government initiative with no pre-existing R&D institutions in that region. Cyberabad in Hyderabad can be identified as a Brownfield development, where the Universities and other institutions existed before the initiative and the Government of Andhra Pradesh offered policy support to software firms to establish their units which led to the cluster formation in this region. Each of these regions exhibit specific social, cultural, economic and policy attributes. The formation of the University-industry-government linkages in these regions is the research focus of the present paper.

Methodology

The study relies on secondary data on both the cities and also on in-depth interviews with professionals in the universities and industry and bureaucracy in the government in Hyderabad and in Cyberjaya - MSC region. Interviews would facilitate an understanding of the processes underlying formation of UILs in the context of dynamic regional development and a nuanced understanding of the secondary data sources.

Tentative Findings

The factors that contribute to variation in the levels of interaction from a very preliminary level to a deeper level are policy initiatives of the regional and national governments, clustering of the industrial units, clustering of the R & D institutions. There is a specific pattern in the cities of Hyderabad - Cyberabad and Cyberjaya. The IT firms, both national and multinational incorporated outside India and Malaysia take benefits from policy concessions. However, in terms of outputs the national firms tend to provide software services and training whereas the development centers of the multinational companies tend to produce products and processes and patent them. In this context, the role of the universities in knowledge generation and development becomes minimal as the firms that provide services and training do not require new knowledge and the development centers of the multinational units tend to depend more on in-house R&D personnel and consult with experts abroad for developmental needs. The service and training providing firms are subject to the influence of the dynamic global demand for the services and training, which tend to be tool-based. The impact of this pattern of linkages has implications for the development of regions. This pattern also results in the minimal or no developmental or productive linkages between the universities and industry, in spite of the pro-active policies of the governments. Product development requires not only higher levels of investment but also a cultural ambience which attaches value to research, future gratification and a positive attitude towards calibrated risk-taking. The firms which specialize in providing services and training do not seem to internalize this culture of innovation. The UIL in this context is restricted to industry receiving human resources trained in using tools. Cyberjaya and Cyberabad offer interesting insights into the processes of knowledge production, knowledge consumption, knowledge creation and the emergence of knowledge intermediaries in the two countries.

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Triple Helix VI) Conference Madrid, October 2010
P-048 Government and public policy in the Triple Helix era

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Introduction

The aim of our paper is to discuss the gendered impact of the shift from government to governance in Swedish politics and the idea of network politics in regional development. The empirical case we investigate is in what sense the Triple Helix model is of use regarding gender inclusive regional networking in the policy area women's entrepreneurship. Our understanding of this policy area is that selfemployed women are either objects or subjects – a fact that we wish to investigate further.

State of the art of the topic

The conditions under which men and women run businesses have been acknowledged by the Swedish governments during the last fifteen years. Projects and programmes have been initiated, often on regional and local levels, to accomplish changes but there still seems to be gendered obstacles for women in starting and running businesses. The escalating political interest in entrepreneurship and self-employment is part of a shift within Swedish regional policy. In correspondence with EU policy, regional development policy has changed its focus from a national redistribution among regions to a decentralized economic growth policy with competing and independent regions (Frisk, 2008, pp.47-54). From a gender perspective one of the main concerns is how regional policy is implemented through partnerships. In our present research project we find that representatives of the sphere of women entrepreneurs are extremely rare (three persons) in three structural fund partnerships and their supervision boards (148 members). 1 The question is if informal networking on the level below, in the counties or "new" regions creates a space for women entrepreneurs as subjects. Triple Helix seem to be an often used model in different projects in the newly established regional partnerships in Sweden, NRP. Quatro Helix has been proposed as more gender inclusive model (Lindblom 2007).

Research focus and preliminary results

We will use a comparative method in the study of four different regions in Sweden being in different phases of the current regionalization process, Västernorrland, Jämtland, Halland and Jönköping. Our focus is to investigate what kind of networking seems to be in favour to create successful projects where women entrepreneurs are involved as subjects. The study is in progress and our preliminary findings show that women entrepreneurs are mostly objects of different projects defined by the political and administrative sphere. The individual women being involved as subjects seem to be crossboarders who move between the different areas of Triple Helix. The resource centers with a task to improve women's entrepreneurship are marginalized related to the writing of and implementation of EU regional structural fund programmes. The questions is if the resources centers and women entrepreneurs find a room of maneuvre related to Triple Helix or Quatro Helix on the county/regional level?

1 Research project EU:s structural funds and regional partnerships – a hindrande or resource for women entreprenuers? (2009-2011) is financed by VINNOVA, Sweden.

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O-048 Ideas production function on regional level: the case of Europe

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Introduction

In the paper we like to present on the conference we estimated a model of the knowledge generation function on regional level which might allow us to establish what are the determining factors of innovation, as well as the relative impact of them on the technological result of the EU-27 regions.

State of the art

Only a few studies on this subject are published. In our study we make use of a model based on the knowledge generation function, initially developed by Griliches (1979), which since then has been successfully applied to a whole series of empirical works, both at national and regional level. According to Griliches (1990), the flow of new knowledge (K) depends, on the one hand upon the innovatory effort made and, on the other, on a set of characteristics of the region itself, which would be encapsulated in a Zr vector, so that:

[1]

where Zr can be directly substituted by a linear combination of suitable regional indicators. Furman, Porter and Stern (2002) used such a production function on country level and in our case we adapted those models on regional level.

Methodology

We recollect regionalised data -offered by Eurostat- for 207 EU-22 regions for about 100 variables for a period of ten years. Afterwards we used 26 of those variables and based on a Factor Analysis they were merged in five factors or hypothetical non observable variables. From our point of view those factors do reflect better the reality of the regional innovation system and elements of the Triple Helix than each of the individual variables. Those new composite variables were used to estimate the ideas production function. In which the five factors are the independent variables and the patents are the dependent variables. (Number of Patents: Patents per capita using the total number of patents; high-tech patents and the patents by different technological fields).

We have modelled in the present work a knowledge-generating function the explanatory variables of which, unlike what has happened in previous works, have not been measured by means of individual indicators, but rather, by means of factors ("virtual" variables obtained by factorial analysis). The use of the five factors -specifically (1-RENV) Regional and productive innovatory environment, (2-UNI) Universities, (3-INNFI) Innovatory firms, (4-ADM) Administration and (5-NACENV) National environment-helps to solve partially various statistical problems. It permits to simultaneously a broad number of variables without having a problem of grades of freedom or multi-colinearity.

Our knowledge production function is defined by the five previously enumerated factors in accordance with the following equation: K = f (RENV, UNI, INNFI ADM, NACENV)

Findings

Our results are according to the theoretical expectations and show a important role of the accumulated knowledge and the firms and enables the following conclusions. The regional and productive innovatory environment- which measures the size of the system and the productive experience-proves to be the factor with the highest incidence on regions' technological output (or that of what could be considered as a type or mean European region). Not only in the case of absolute number of patents -which would be logical- however also in the case of the number of patents per capita patents, which shows the importance of the critical mass. Likewise a positive incidence of the National environment is detected, which includes variables referring to capital investment and the penetration of new communication technologies, and which registers those aspects linked to the national innovation system. In turn, it is appreciated that Innovative firms, the University and the Administration combine to aid the creation of new knowledge with a commensurate intensity with the fact that the latter two are essentially concerned with abstract scientific knowledge -basic research-, whereas Innovatory firms are devoted to production-linked technological knowledge. This fact is reflected in the noticeably greater importance of this latter factor-the second most important-compared to the other two agents in the innovation system. In this sense, it is worth highlighting that our findings essentially fit in with the postulates of the evolutionary approach, since at the beginning all the elements making up the innovation system are significant, as is the interaction between them, thus confirming the initial hypothesis of this study. This situation is seen particularly in the estimations from the TOBIT panel model, while for the case of the intragroup model estimations, we do not obtain unequivocal findings. This is because, depending upon whether we use the dependent variable in absolute or relative terms, either the Administration factor is statistically significant or the University factor is.

Contribution and implications

Our results shows that all the elements of the innovation system -and their interaction- prove important, although from our research it can be clearly deduced that their importance is of a different intensity depending on the factor in question.

Our results points out -as expected- that the most determinants of regional innovation in the European Union are mainly (innovative) firms and the environment in which the latter are situated (both the Regional productive innovation environment and the National environment). In this process the firms are supported -though generally in an indirect way- by the other agents of the R&D system, such as the Public Administration and the University. Finally it is worth highlighting that, like proposed by the postulates of the evolutionary approach, all the elements making up the innovation system as is the interaction between them are relevant to explain the knowledge production. However the production level is higher at least a short term, if the system is oriented to innovation activities. The long term impact of such orientation should be analysed more deeply.

Moreover specific attention will be paid to the role of the Universities and the public R&D system for different kind of patents (by technological field or high-tech patents)

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P-022 Measuring search regimes

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The dynamics of scientific knowledge are a complex matter. Recent studies on search regimes show that different scientific fields exhibit very different dynamics that evolve differently within a socio-economical environment (Bonaccorsi 2007). How can one understand these differences?

Numerous existing studies have focused on different dynamics of knowledge production. However, these studies have two major shortcomings. Firstly, only limited empirical work has been carried out to support claims of different modes of knowledge dynamics. Secondly, previous strategies to understand science have focused on only one level of analysis. The micro-level was addressed in lab studies. Kuhn's introduction of paradigm-led developments focused on the macro level, and in recent years attention has focused on the growing importance of the socio-economic environment of knowledge production

Addressing these shortcomings, the current paper aims at developing a conceptualisation of science as a complex adaptive system and using scientometric data to empirically investigate the emergence of 'search regimes' from interactions between the micro behaviour of researchers and emergent scientific fields within a socio-economical environment.

This paper takes an information-scientific perspective on knowledge dynamics. The starting point is that science can be considered a complex adaptive system. Millions of researchers around the world interact in both competitive and collaborative ways which are characterized by heterogeneity, with no overall direction. These local processes give rise to an emergent science system with limited predictability (e.g. Holland and Miller 1991). Science is adaptive and co-evolving because both the science system and its constituent researchers respond to changing environmental conditions such as shifts in research priorities of granting organisations or new discoveries. Science is recognisably a system, a collection of individuals and institutions contributing to a common body of knowledge (Wagner 2008).

According to Herbert Simon, the dynamics of systems can only be understood by taking into account both the vertical separation (hierarchical levels of analysis) and the horizontal separation of subsystems at the same hierarchic level (Simon 1973). In line with this view, we can understand the sciences as complex adaptive systems operating at three interrelated but analytically distinct levels; research, science and society (Rip 1990; Heimeriks and Vasileiadou 2008).

In our conceptualisation, researchers are the nodes that carry the science system. Research can be considered as geographically situated practices with specific skills, equipments and tools. At this level of analysis, field differences relate to mutual dependency between researchers and task uncertainty in formulating research designs, using infrastructures, data gathering, etc. Using scientometric data, we can develop indicators of patterns of interaction between researchers using the organisational addresses of scientific publications.

The dissemination of results through scientific journals translates the 'research output' into a 'body of knowledge' where claims are utilized (accepted, criticized, rejected) by other scientists. This process gives rise to an emergent science level. Path dependency in science is provided by the disciplinary landscape. These system dynamics can be made visible by measuring the growth of a field, the level of disciplinarity over time and the emergence of new topics (Van den Besselaar and Heimeriks 2006).

The contextual dynamics refer to the ways in which knowledge production provides resources for social and economic development. Science is an open system that is coupled to other parts of society; its development is caused by a complex interplay of internal and external factors, with an internal axis of intellectual organization. This latter codification makes the system relatively autonomous. However, in recent years increasing interaction with socio-economic developments in society has been emphasised. At this level of analysis, field differences relate to knowledge use in society, stakeholder involvement, and audience plurality and diversity that can be made visible by classifying each organisation by its institutional origin (university, public research organisation, company, government, NGO).

This study analyses several representative fields that will be delineated using journal-journal citation patterns (Leydesdorff and Cozzens 1993) for the period 1998-2008. These fields include turbulent new fields such as nanotechnology and more established fields such as biotechnology. Indicators will then be developed to map the micro behaviour of the researchers within these fields, as well as the emergent field dynamics and the societal interactions.

Recombination of three sub-dynamics—(1) geographically localized knowledge practices, (2) internationally published literature, and (3) social and economic valorization—generate various types of complex behaviour and can generate stable regimes by lock-ins between two of the sources if the third context is stable and compatible with the others (Dolfsma and Leydesdorff 2009). This observation is consistent with Kauffman's NK-model (Kauffman 1993). This insight enables us to further articulate the notion of search regimes by combining the three sub dynamics in a process of mutual co-evolutions. Here, we wish to explain how stable regimes emerge. The hypothesis holds that successful regimes require stable interactions and between local research practices, emergent scientific landscapes, and the field's relationship to its societal context.

Interest is growing in improving the understanding of how the sciences evolve and stimulate the growth and competitiveness of economies and contribute to societal challenges. There is a tendency across countries and regions to apply the same measures to stimulate the knowledge economy in an unimaginative way (Foray 2006). Not all regions are able to succeed in becoming world renowned centres of excellence. This paper contributes to insights that help to create unique locational advantages in relation to the global body of knowledge and the societal dynamics. This multi-level approach is additionally important because concrete actions and interactions add up to effects at more levels (Monge & Contractor, 2003; Simon 1973).

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O-067 The Boomerang complex: iterations and knowledge transfer in joint R&D projects

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SUBTHEME: S5 Government and public policy in the Triple Helix era **KEYWORDS:** knowledge transfer; joint R&D projects; competitiveness clusters

ABSTRACT

Since 2006, the Walloon government has been financing university-industry R&D projects within the framework of the competitiveness clusters of Wallonia (French part of Belgium). This policy complements the set of R&D instruments already deployed in Wallonia to sustain innovation through the linkage of companies and research institutions. While the support of university-industry relationships is a stable component of innovation policies (Behrens and Gray 2001) not only in Wallonia but worldwide, their actual effects are still opened to discussion and the public debate about the role of university is still topical (Audretsch et al. 2002). In particular, one may question the role of academic laboratories as knowledge suppliers in joint R&D projects that focus on different phases of the R&D process.

In this paper, I explore knowledge exchanges between academic laboratories and their industrial partners as the nature of their joint R&D activities varies between prospection, exploration and exploitation. This typology recognizes the distinction between exploration and exploitation which is usually proposed to characterize industrial R&D activities (Cesaroni et al. 2005; Chanal and Mothe 2005) or inter-firm R&D alliances (Koza and Lewin 1998; Rothaermel and Deeds 2004) and complements it with the insights from Stokes (1997) that address R&D activities undertaken by universities.

Building on Leonard-Barton (1990), results are drawn from an in-depth longitudinal case study combined with multiple replicated cases, in this case projects that are conducted through the same covenant and with common partners. The main case is an R&D project followed since June 2007. It combines data collected through semi-structured interviews, documentation as well as observation during plenary meetings and other events such as conferences and team building events. This approach allows studying iterations between prospection, exploration and exploitation if the project undertakes accelerations or on the contrary faces blocking points. It also takes into consideration the bilateral nature of knowledge flows between partners (Meyer-Krahmer and Schmoch 1998; Baba et al. 2009) and distinguishes four forms of exchanges: Know who, Know what, Know how and Know why (Lundvall and Johnson 1994; Johnson et al. 2002).

The goal of this work is to contribute to the empirical micro studies of what is learnt, how, and by whom (Johnson et al. 2002) in the context of publicly funded innovation networks like the Walloon competitiveness clusters. By documenting how R&D projects can take various forms and evolve along time – in this case from prospection to exploitation and backwards – it also contributes to the development of a dynamic view of knowledge transfer (Faems et al. 2005). As a matter of fact, findings highlight that exploitative, explorative and prospective projects imply specific knowledge flows. In other words, academic laboratories are not expected to play the same role in projects that differ in nature and have to negotiate their quest for understanding accordingly. Findings also show that the alignment between the nature of the project does not evolve as planned and when the partners are required to go back to more explorative work. Such iterations in the R&D projects act as boomerangs that deviate the team from its original – straightforward – targets, leading to frustrations and disinvestments in the project if the original alignment is not rethought accordingly.

From a practitioner point of view, those results should be of interest for various strategic actors involved in innovation networks and joint R&D projects: public authorities in charge of innovation policies, industrial and academic partners directly involved in joint R&D projects as well as the administrators of innovation networks as this study provides clues to enhance the management of their projects' portfolio.

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O-016 The third mission in nine cases: How Triple Helix dynamics vary across scientific fields

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The institutional environment of universities has changed considerably over the past three to four decades. In many countries, the allocation of research funding is increasingly based on promises concerning the practical impact of the proposed research. Universities are under pressure to develop their 'third mission', that is to contribute directly to economical growth or to other societal goals. Another significant development is the rise of pressures for accountability. Academic research is increasingly subject to evaluations that measure the performance of individuals, research groups or institutes. What are the consequences of these institutional changes for the nature of academic research activities? Will they be more strongly oriented towards practical applications? Do university researchers in all fields of science engage increasingly in 'Triple Helix interactions' (Etzkowitz and Leydesdorff, 2000)?

In this paper we address these questions based on an analysis of the 'Credibility Cycle' in nine fields of natural science. We analyze the impact of the aforementioned institutional changes on the steps researchers have to go through in the Credibility Cycle. The fieldwork includes qualitative document analysis and in-depth interviews with over 60 Dutch academic researchers.

The Credibility Cycle (Latour and Woolgar, 1986; Hessels et al., 2009) explains how struggles for reputation steer the behaviour of individual scientists. Its starting assumption is that a major motivation for a scientist's actions is the quest for credibility. Scientists invest time and money expecting to acquire data that can support arguments. These are written down in articles, which may yield recognition from colleagues. Based on this, scientists hope to be able to receive new funding, from which they buy new equipment (or hire staff) which will help to gather data again, etc. Conceived in this way, the research process can be depicted as a repetitive cycle in which conversions take place between money, staff, data, arguments, articles, recognition, and so on.

The changing institutional environment of academic research causes two profound changes in the Credibility Cycle. First, the acquisition of funding is much more connected to potential practical applications. A substantial share of all available funding sources demands research to contribute to a desired innovation trajectory, e.g. by the involvement of 'user committees' or 'dissemination activities'. Second, the attribution of recognition becomes formalized by the existence of performance evaluations. As a result, scientific recognition nowadays strongly depends on bibliometric criteria, such as the number of publications and citations.

These developments imply that Triple Helix relationships have become rewarding in terms of credibility, because they can help to secure funding. At the same time, it has become more important to pursue a research agenda that appeals to one's disciplinary audience. Engaging too much in application oriented research projects will decrease one's possibilities to develop an excellent publication record and to publish papers with a high scientific impact. In other words, the new Credibility Cycle appears to stimulate Triple Helix interactions at one point, but inhibits them elsewhere.

The results of our analysis indicate that interactions with government or industry are not increasing in all fields. In this paper we will discuss how the interplay between the two (possibly counteracting) forces varies across scientific fields and how this results in either more or less TH interactions.

In some fields, such as Catalysis and Animal Breeding, researchers simply sustain the existing fruitful and tight relationships with industry. These help them to acquire sufficient funding, without compromising the fundamental nature of the research agenda. In fields of a second category, including Paleo-Ecology and Molecular Genetics, the shifting funding situation did lead to an increasing interaction with 'contexts of application', like environmental policy circles or biotech firms. The fact that these societal stakeholders had developed a growing interest in fundamental knowledge enabled the researchers to acquire funding for relatively large research projects on basic issues that will lead to publications in high-impact journals. The third class of fields, however, is shifting in the opposite direction. In Toxicology, for example, the increasing pressure for publications has made it necessary to develop a more fundamental research agenda, which is less likely to yield direct practical applications. For this reason, interactions with industry and government have decreased rather than increased in this field. Finally, a fourth category can be identified consisting of fields like Cell Biology that traditionally work on very fundamental questions. These fields have not increased their TH interactions, because this would inhibit them to continue their basic research agendas. Collaborations with industry or government would require a shift to more practical issues, which could harm the researchers' academic status as measured in performance evaluations.

Our analysis shows that the supposed rise of the 'third mission' should be considered in the context of other institutional developments. The increasing pressure for publications and citations stemming from increasingly powerful performance evaluations is an effective counteracting force to the pressure for contributions to society and the economy. In all cases, the need for a fundamental research agenda that leads to prestigious scholarly publications turned out more powerful than the need to contribute to practical applications. Triple Helix interactions were only increased if wealthy stakeholders were available to provide substantial funding for research with a long-term perspective. Based on these results we recommend that public policy should stimulate academic researchers to conduct fundamental research focusing on areas with a high social or economic relevance, such as sustainable energy, ageing or safety.

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0-066

University-industry cooperation experiences in Latin America. An analysis from the obstacles perspective

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1. Introduction

This study, as part of the FP7 INCONET-EULARINET Project, tries to identify the issues of innovation and technology transfer that characterizes the cooperation between university and industry in Latin American Countries (LAC) as a first step in determining the EU-LAC cooperation in this field. The study discusses trends and challenges within LAC university-industry relationships and although is not intended to provide an exhaustive analysis, focuses on some of the key issues that characterize these relationships and the main obstacles which have to be overcome to improve this cooperation.

2. The state-of-the-art of university-industry collaboration in Latin America

Cooperation in R&D between universities, research centers and firms is a reality in Latin American countries. But, to what extent science-industry links are relevant? Is there a set of structural characteristics determining the probability of Latin American firms to engage in R&D with universities? Is there a difference between these factors and those affecting science-industry links in more advanced economies like EU countries? The present study tries to find the answer to these questions.

Postgraduate education and research do not belong to the core activities of many universities in LAC. Nevertheless, universities are changing rules to facilitate a closer relationship with industry, but available data does not show changes in the long standing private under-investment on R&D. LA firms have only imperfect knowledge of relevant technological options, and research demonstrates that they generally look for new solutions around their existing competencies. In Latin American countries, the circle of competencies is likely to be further from the knowledge frontier and therefore the pool of considered options may be limited. Moreover, the possibility of introducing new products and processes depends on R&D capabilities and skills that are often not there.

According to the World Bank, the perception of the main stakeholders in each country related to university-industry collaboration is 2,84 in a scale of 7 (Fig. 1). A low level of university-industry collaboration is also evident in firm-level innovation surveys.

3. Research focus

The research focus relies on the determination of the main obstacles which have to be overcome to improve the universityindustry cooperation in LAC.

4. Methodology

The first step was to design the information needs with the participation of relevant experts of the EULARINET Project from LAC and European participant countries. This information was structured according the structural framework of cooperation, the support cooperation mechanisms, the international dimension of the cooperation, and the obstacles that hindering the process. The second step was to collect the required information. The information gathered was based on secondary sources, taking into consideration the existing reports and studies about this matter in each country. Wanting to know if there were information gaps relating secondary sources, a gap matrix was developed for this proposal in order to identify non-existence information, taking the necessary steps to overcome the information gap. Four meetings of the EULARINET Working Group were organized in Mexico, Brussels, Buenos Aires and Lisbon in order to implement and check the methodology.

5. Findings

Among the main obstacles to closer ties among universities and firms in LAC we have found:

" Fragmented innovation policy and dispersion of instruments for technological cooperation.

" Firms lack a technologically dynamic domestic environment that stimulates their willingness to interact, and their search for innovation through external sources.

" In general, size, capacity to appropriate returns form innovation), internal capacities in R&D (i.e. absorptive capacity) and the importance assigned to costs and risks as obstacles for innovation are among the factors that result significant in determining the probability of firms to be engaged in R&D cooperation with the scientific sector.

" The lack of private sector confidence in the quality and the relevance of academic research.

" There is no full consciousness among the businessmen on the importance of innovation as a foundation of strategic competitiveness, and therefore of the convenience of working with the university.

" The ignorance of the commercial potentiality of the technologies generated by universities.

" R&D is not a priority for many universities, which in general suffer from budget and human resources constraints. The lack of motivation for the exchange of results, due to several factors such as the delay in publication of research results, the loss of confidentiality, the absence of innovation capabilities in the productive sector, financial and institutional barriers. 6. Implications

Strengthening university-industry collaboration in Latin America is a matter of building trust, improving communication and strengthening incentives. Stimulating excellence when funding research and, notably, changing incentives at the level of the individual researcher would go a long way in addressing this challenge. With few exceptions, universities and research agencies in Latin America have unrealized potential for changing personnel policies and practices to encourage faculty members to collaborate with external partners and pursue their entrepreneurial interests.

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O-074

Organizational patterns of innovation in industrializing economies: Patenting in selected Asian nations

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Introduction

The challenge faced by developing Asian economies is sustaining long term economic growth, necessitating catching-up with more advanced nations. In this, developing Asia can look towards the success stories of the Asian Newly Industrialized Nations (NIEs) of Taiwan, Korea and Singapore. Asian NIEs have made great strides in their economic development, achieved in part by rapid expansion of technological capabilities. In the catching-up process of these NIEs, Triple Helix dynamics have played an important role, with universities and public research institutes (PRIs) being prominent in the national innovation systems (Fagerberg & Godinho, 2005; Matthews and Hu, 2007). This paper seeks to ascertain if selected developing Asian economies are following in the footsteps of the NIEs by emphasising public sector science and technology in innovation and industrial development.

Research Topic & Focus

Five Asian economies are analysed and compared in this paper: the ASEAN4 economies of Malaysia, Thailand, Phillipines and Indonesia; and the emerging economy of China. The first part of the paper reviews the policy frameworks in these economies, focusing on how, triple helix interactions are fostered and promoted. Generally, there are policy initiatives in all five economies to implement triple helix-type systems for innovation and knowledge transfer. However, policy approaches are at differing levels of advancement and maturity, and have taken different forms.

Among the ASEAN4 economies, Malaysia and Thailand have placed specific emphasis on the innovation role of the public and higher education sectors, while the approaches in the Philippines and Indonesia prioritise the contribution of public organizations to the development of local enterprises and human capital. The Malaysian government has introduced various measures to strengthen university-industry links and to enhance commercialization of research from universities and PRIs in its National Innovation Agenda (Saad et al, 2008; Cheng, 2009). In Thailand, public sector reform that began in 2002 has granted greater autonomy to PRIs and universities, as well as led to implementation of schemes to encourage entrepreneurial and technology transfer activities by universities (Virasa, 2009). Indonesia's long term Knowledge-Based Society 2025 strategy incorporates elements of the Triple Helix model; however, current manifestations of Triple Helix interactions are most strongly seen in regional cluster development initiatives, with universities and government being essential sources of technical and infrastructural support for SMEs in specific localities (Irawati, 2006, 2007). The Philippines National Innovation Strategy 2007, Filipinovation, spells out specific roles for universities have not produced research with commercial impact and the innovation system is also hampered by lack of innovation and absorptive capacity in the private sector (Velasco, 2009).

In contrast to the ASEAN4 economies, China operates on a strong government-pulled triple helix model, in which government is the initiator and most important actor (Etzkowitz and Chu, 2007). Throughout the 1980s and 1990s, following the First National Conference on Science and Technology, universities and PRIs engaged heavily in research for regional development. In the Second National Conference on S&T, industry was called upon to achieve independent innovation, with universities and government providing support. This shift towards emphasising private industry's innovation capabilities is also seen in the reform of the university-owned enterprises (UOE) structure, which began in 2000 with government encouraging universities to de-link from affiliated UOEs (Dai and Xue, 2009).

Methodology & Data

We expect that these differences in policy approaches to organizational arrangements for innovation will be reflected in the innovation trends of these economies. Using patents granted by the US Patents & Trademark Office (USPTO) as an indicator of innovation output (Grilliches, 1990; Jaffe and Tratjenberg, 2002), this paper examines ownership patterns and the quality of patents from the Triple Helix actors, to establish the quantitative and qualitative contribution of universities and PRIs in developing Asian economies. This analysis allows for a comparison of the progress achieved by developing Asian economies with the experience of successful catch-up NIEs of East Asia. As has been found previously patenting trends show that Asian NIEs had drawn strongly on university and public sector innovation during the catch-up process (Wong et al, 2009).

The patents database used for analysis comprises USPTO-granted patents with at least one inventor who was resident in one of the ASEAN4 economies or China at the time of invention. A total of 12,960 patents granted between 1st January 1976 and 30th June 2009 are included. Patent assignees were categorised according to their Triple Helix sector: University, Industry or Government. Additionally, measures based on patent citations and non-patent references were computed as indicators of patent quality.

Findings

Ownership trends reveal three distinct organizational patterns of innovation among developing Asian economies. In Indonesia and Philippines, patents are overwhelmingly (97%-98%) industry-owned, and there are few instances of cross-Helix co-assignment. In Thailand and Malaysia, the recent period 2000-2009 has witnessed increasing share of patents from universities and PRIs (5% in Malaysia, 7% in Thailand). Cross-Helix collaborations have increased as seen in co-assignment of patents between industry and PRIs and universities. However, the quality of public sector patents remains low compared to industry patents. Chinese patents display very different ownership trends; in the 1990s, 14% of patents were from universities and 28% were from PRIs. In the 2000s, these shares had reduced to 5% and 4% respectively, as industry innovation escalated at great rates, reflecting state policy. However, university-industry collaboration has increased; post-2000, 30% of university patents are co-owned with industry, increasing from 10% in the 1990s. Public sector patents are also of higher quality than industry patents.

The findings show that Triple Helix frameworks in developing Asia are at different stages of maturity: very nascent in Philippines and Indonesia, early-stage in Malaysia and Thailand, evolving in China. The findings also highlight that these economies face different challenges in the catch-up process in terms of involving the two public Helices in the innovation system. These are addressed in greater detail in the full paper, in the context of more detailed presentation of the empirical results.

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P-012

The Third Mission - Academic Entrepreneurship and Economic Development of the South Swedish Region Blekinge

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Introduction

The university is becoming an ever more important and integrated part of the national innovation system, government institutions, and the business world. It is increasingly expected that the universities stimulate economic growth by innovation and commercialization; this puts the interface between university and industry into focus.

The Blekinge Institute of Technology (BTH) focuses on applied IT and sustainable development of industry and society. The institute exists in the context of the telecommunication and software industry, and has though different forms of interaction become an important driving force in one of the most expansive regions Sweden within this industry.

"Academic entrepreneurship" originates in the neo-Schumpeter approach of knowledge-based (endogenous) growth theory which considers knowledge as the main driver of economic growth and social welfare. Industries such as telecom and biotech are examples of the increasing importance of this ability for economic growth. The university is a venue where knowledge and technology is transferred driving economic and technological development (Acs, Audretsch & Feldman, 1994). This is why the university is considered to have substantial influence through academic entrepreneurship on maintained competition at regional as well as national level. More, Drucker (1985) holds that fast economic, demographic, social and technological change creates opportunities that universities must learn to handle by incorporating innovation and entrepreneurial spirit into the organization. The traditional role of the university has been to generate and transfer new knowledge though education and publications. The university is increasingly taking on the more complex role of "the entrepreneurial university" making active contributions to the local and regional economic growth and becoming an ever more important component in the national innovation system and its support mechanisms (Etzkowitz et al, 2000a, 2000b). Some also argue that the increased integration of universities with the business world might overemphasize applied research and shorten the time perspective (Mowery et al, 2000). It has also been stressed that knowledge-transfer is more efficiently stimulated by free publications rather than exclusive publications, and that the university focus will slip away from its true purpose as a knowledge generator. It has even been claimed that European universities are more entrepreneurial than their U.S. counterparts (Lindholm Dahlstrand, 2009). The role of the university in the knowledge based society is to contribute to the development of human capital, generate skilled labor to the public and private sector, to perform research, and to commercialize research results. The commercialization of research funded by public funds has increased with intense pace in the U.S. as well as in Europe. Lately, also the number of incubators, tech- and science parks has increase. An additional explanation could be that universities today have a tendency to start up businesses founded on new technology or to commercialize patents through licensing to small private businesses (Lockett, Siegel and Ensley, 2005). Studies show that university R&D commercialization efforts strongly correspond to the specific competence present in the surrounding industry (Lindholm Dahlstrand, 2004).

Purpose – The purpose of this paper is to examine the importance of academic entrepreneurship to the regional economic development and IT-industry of the Blekinge region, an attempt to uncover casual relationships and implications for conditions for academic entrepreneurship. The "third mission" of the university; the extent and development of academic entrepreneurship is surveyed.

Different aspects are considered and analyzed;

• clarify the link between innovation and academic entrepreneurship

• estimate the size, component interaction, and distribution of academic entrepreneurship

• better understand what impact academic entrepreneurship has on national, regional economy and industry in terms of innovation, and productivity and if it is at an optimal level

• clarify and optimize the "triple helix" conditions

Approach - A sample of researchers, business leaders, and local government representatives were chosen for an interview. Statistics of business start-ups, patents etc were also analyzed.

Findings – The empirical results indicate a web of direct and indirect flow of technology transfer to the business world for which social network and trust are important factors. This technology transfer flow has shown to increase business activity and so significantly contributes to the economic development of the specific industry in the region. This web of interactions can be understood by applying the "triple-helix" approach. To produce an overview with a satisfying level of accuracy of the way academic entrepreneurship may travel, one need to challenge the definitions of academic entrepreneurship, however this contributes to greater understanding of the same.

Research implications – The region has potential to increase academic entrepreneurship activity by creating the right conditions and so create more opportunities to economic development.

Originality / Contribution

Utilizing data collected from the sample group makes it possible to distinguish factors important to the triple-helix framework stimulating academic entrepreneurship to flourish and the economy to develop of the region of Blekinge This research contribute towards a deeper understanding of the interdependencies between innovations and economic growth and it supports not only the national Swedish research and innovation system policies but also the ones set up by the EU.

In addition, most research concerning academic entrepreneurship considers U.S. universities. The differences in terms of e.g. national innovation policies, IPR, and ownership (private vs. public) emphasize the importance to take a closer look at Swedish academic entrepreneurship under its own special conditions.

O-141 Strategic openness for successful innovations: the case of SMEs in the Chaudière-Appalaches region

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Current understanding: Recently growing attention has been devoted to the concept of Open Innovation which is described as: combining internal and external ideas as well as internal and external paths to market to advance the development of new technologies (Chesbrough, 2003). This concept redefines relations between the firm and its surrounding environment (Laursen and Salter, 2006), making it more prone to work with different actors such as universities, R&D institutes, technology transfer agencies, and so forth. The use of these institutions and others to leverage innovation inside firms were conceptualized by the concept of openness (Laursen and Salter, 2006). In this study, we are interested in the pattern of use of external source of information (ESI) by SMEs in the region of Chaudière-Appalaches in the province of Quebec (Canada). In fact, few studies have analyzed the openness in the context of SMEs (van der Vrande et al., 2009). There are many type of ESI to which firms could be open, notably, suppliers, customers, competitors, universities, etc. Given strategic choice, different openness to a variety of ESI is likely to exhibit differences in the process of innovation. This issue raise the question: how firms, especially SMEs, go open to a set of ESI to support their innovative activities? This is very important since SMEs have limited resources (OCDE, 2005). When considering innovation under theses circumstances, openness by SMEs will be dependent on their strategic use of ESI. Thus, two hypotheses emerge. The first, complementary hypothesis, suggests that openness to one external source of information is complementary to another source. The second, substitution hypothesis, rest on the idea that openness to one ESI come at the expense of openness to other sources.

Research question: This paper addresses three questions: to what type of ESI SMEs in the Chaudière-Appalaches region are open? Do SMEs in this region are simultaneously open to a set of ESI? Are there differences in the determinants of the openness of these SMEs to different ESI?

Contribution to the field: Studies on the openness of firms have been analyzed using a variety of ESI (Leiponen and Helfat, 2009). Other studies have been content to study the effect of a single source such as universities (Teixeira and Costa, 2006). Finally, some studies have studied more specialized source such as universities, research institutions, and private consultants (Tajar and Tether, 2008). The evidence of the openness of SMEs to a set of ESI in complementary or substitution ways is still scanty. To the extent to our knowledge, there are no studies documenting this type of hypothesis in the case of SMEs. This paper has two purposes. First, it explores whether a set of ESI are complementary or substitute (or conflicting). Second, it explores heterogeneities in the determinants of openness of SMEs in the Chaudière-Appalaches region regarding their innovative activities.

Methodology: To explore these research questions, first we use a survey database that was designed and collected by CHSRF/CIHR Chair on Knowledge transfer and innovation. The survey targeted a total population of 1214 of which 615 manufacturing firms have participated. Secondly, to distinguish the set of ESI that SMEs in this region are most open to, ESI variables are recoded. Third, in order to verify that SMEs in this region are open simultaneously to ESI previously identified a Multivariate Probit Model is used. This paper uses this model to reflect the fact these SMEs consider simultaneously whether or not to be open to a set of ESI. Finally, the same econometric model is used to identify the determinants of the openness of these SMEs.

Expected findings and implications: The main outcome of this paper is two fold: first level descriptive statistics will show that SMEs in the region Chaudière-Appalaches are open mainly to six ESI. Second, using Multivariate Probit Model, we expect the results to provide evidence of the existence of complementarities (positive correlations) or substitution (negative correlations) between the ESI. The implication of the statistics results will be discussed in relation to the formulation of supportive policies to SMEs in their openness to ESI.

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0-060

Successes and Failures of an Intermediary in Triple Helix Relationships in Developing Countries: the Case of Thailand's Food Industry

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Generally the extent of market and systemic failures in developing countries are much larger than developed ones (Leff, 1976 and Chaminade, and Edquist, 2006). Innovation systems and triple helix relationships in developing countries can be characterized as weak and fragmented because of high degree of such failures (Intarakumnerd et.al., 2002). To mitigate these failures, different government policies and more effort are needed. Market mechanisms and the standard government intervention in the forms of laws, regulations and incentives are not sufficient to solve these problems. The role of intermediaries is highlighted as an important actor instrumental in mitigating failures. Dodgson and Bessant (1996) indicate that intermediary organizations can facilitate innovation process by performing activities bridging user needs and supply side. They can help to identify specific needs of users, select appropriate options, link with external knowledge sources and so on. These intermediary organizations can take many forms such as research technology organizations (RTOs), industrial and trade associations, professional associations, private foundations and so on. Nonetheless, the actual operation and, hence, lesson learned from the work of intermediaries have not been seriously conducted, especially in the context of developing countries.

The aim of this paper is to study the roles of intermediaries in creating and strengthening triple helix relationships and mitigating systemic failures in a developing country. The role of Thailand's Industrial Technology Assistance Program (ITAP) under National Science and Technology Development Agency in the food industry will be highlighted as a case study. ITAP has been chosen as a case study because it has been operating since 1992 and has developed technical consultant projects with more than 1000 firms since then. Therefore, it has enough track record to evaluate successes and failures. ITAP's operating model was based on the "demand driven" and "sharing responsibility" concept that each participating company must pays the expenses of the technical experts who could be from within or outside the country. ITAP pays up to 50% of the expense (but not exceed 500,000 Baht) to the company, in the form of reimbursement. The reason behind this concept is to induce the SMEs to upgrade their technological capability in manufacturing and generates their product and process innovation, and at the same time to make sure that a participating company had the real need and commitment. Recently number of local experts from Thai universities has increased considerably. ITAP has played important roles in initiating and enhancing university and industry linkages which are normally weak in Thailand. Triple Helix relationships among universities, industrial firms and ITAP were formed.

Methodologically, we have taken two approaches. Firstly, we examined almost 100 projects in the food industry within the year 2007-2008 and draw general observations on factors determining successes and failures of these projects. Secondly, we selected a few success and failure cases for comparative purposes to verify our general observation and pinpoint detailed characteristics leading to failures and successes. With-in case analysis has been done as well, since we also investigated historical development steps of selected cases. Some began with failures but became successes later because they have learned the lessons well.

From our study, the successes and failures depend very much on:

A) The willingness, readiness, and learning and absorptive capacity of participating firms in understanding and prioritizing own problems, providing enough and continuous financial and human resources to work with outside experts from universities, gaining participation from relevant departments of the company, and subsquent execuation and follow up after the collaborative projects finished.

B) Capability and creditability of university experts, namely academic capability, relevant industrial experiences, degree of attention and time spent in the projects.

C) Capability and dedication of ITAs (Industrial Technology Assistants working for ITAP), namely, matching ability (enough ability to match expectations of firms with capabilities and limitations of university experts), monitoring ability (enough ability to set projects' milestones and monitor accordingly), and problem-solving ability (ability to solve problems emerged during the projects and fine-tune different expectations of both sides).

This study has policy and management implications on triple helix practices, especially on selecting the right participating firms and university experts and successful project implementations. The aforementioned capabilities of intermediaries themselves need to be enhanced, so that they can effectively functions. Government policies should pay attention on this aspect beyond standard polices addressing market failures.

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Triple Helix VII) Conference Madrid, October 2010

P-029

Alternative ways to implement the Triple Helix Model in Developing Countries. Experiences in the Pontificia Universidad Catolica del Peru

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In most developing countries, as is the case of Peru, the Triple Helix model has not yet begun to be implemented and there is no prospect of any implementation in the short or medium term. Representatives from business, government or universities agree with the idea of promoting cooperative activities between the three actors of the model but have not found yet an effective way to do it.

In fact, leaders of countries like Peru, do not invest much time or money to make it happen. There is a wide gap between rhetoric and reality.

The official explanation usually refers to lack of resources for research and development, but that's an excuse. With similar budgets, and similar conditions, some countries and regions show a clear desire to articulate and strength their innovation systems and others have no such desire.

The underlying problem in countries like Peru, is that each of the key sectors: business, government and university lives in an isolated world and oblivious to the other two. There is a lack of cooperation and interaction culture, there is a clear oversight of the importance of articulate a National Innovation System and is not understood that more important than money, is the practice of cooperation and interaction.

As the general ideas proposed by the Triple Helix paradigm seem so obvious and reasonable, the majority of studies on its application in developing countries do not take into account the lack of culture of cooperation, which ends stopping innovation initiatives.

In the Pontificia Universidad Catolica del Peru (PUCP), since fifteen years ago, we have been working on the creation and implementation of mechanisms to facilitate the application of the triple helix model ideas.

Comparative studies have been made between investments in developed countries and Latin American countries, we have studied the strategies of the different Latin American countries in order to articulate their national systems of innovation. In this way, given the scarcity of resources for it, we have tested various low cost strategies.

We have founded the following:

In disorganized countries, with weak institutions, as is the case of Peru, the universities have an excellent opportunity to become the catalyst mechanism to contribute in the articulation of national innovation systems and contribute to the effective implementation of the triple helix model.

The universities are very rich in initiatives, knowledge management and have all the components and relationships with business and with government to carry out this role of catalyst. However, as it happens with their countries, the universities develop their initiatives in research, development, innovation and entrepreneurship in a disorganized and disarticulated manner. They are plenty of tribes and isolated groups.

The universities in Peru, as in most of the world are, by nature, conservative institutions. Despite their potential, how could they foster innovation if they themselves are not innovative?

If the university wants to assume its responsibility to articulate a National Innovation System, it must first put the house in order. Therefore, universities should work to articulate their own University Innovation System.

In the PUCP we have observed that there are two areas on which we must work together in order to articulate an University Innovation System: the formal and non formal environments.

We have also found that it is essential to obtain a formal commitment of the highest authorities for innovation.

Armed with this support, and based on the experience developed by the Center for Innovation and Development (CIDE, founded in 1995), in year 2008 we begun to articulate formal space of the university. We are creating an Innovation Park, with the support of the Innovation Park Network (promoted by La Salle, Madrid).

The Innovation Park will focus first on the articulation of the activities of the seventy units that perform research, development and innovation at PUCP. Many of these units are involved with business and with government, so the idea is to strength the cooperative work and create a solid and robust system.

For non-formal environments, we have launched the E-QUIPU Organizational System initiative, which promotes the creation of Communities of Practice (CoP). The system has been developed with excellent results and now works regularly with about 80 active teams and 1,600 participants. Four Peruvian universities have requested installation of the system in their own communities, as well as the Pontifical Catholic University of Rio de Janeiro. Several teams have already generated interactions with companies, government agencies and civil society.

With these two initiatives we are generating a new method of implementing the triple helix model in developing countries as Peru and we hope we could replicate the experience in other Peruvian universities and contribute to the articulate and strength the Peruvian National Innovation System.

Finally, we hope to replicate our experience in other countries with similar conditions.

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P-032 Intellectual Property in Colombian Universities

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Colombian universities and most Latin American universities are becoming interested in Intellectual Property (IP). However, several weaknesses have been identified for the management of it in Higher Education Institutions (HEIs).

From this situation arises the research project "PILA NETWORK" Network of intellectual property in Latin America, project cofinanced by the European Union under the ALFA III program, which involves 22 Universities, 18 of them from different Latin American countries, and 4 European Universities. One of them is the Universidad Industrial de Santander in Colombia.

The main objective of the project is the modernization of IP management practices of Higher Education Institutions (HEI) in Latin America, promoting greater interaction between universities and their economic environment, and in this way contributing to economic and social development. To do this, this network of institutions of higher education in the field of Intellectual Property, pretends to be a learning platform, including the exchange of IP management practices.

Based on the activity of training needs analysis, carried out in the initial phase of the project, we have conducted an analysis of the level of awareness and use of IP in HEIs in Latin America. In this work, we present the analysis for Colombia according to the made among survey a representative group of Colombian Universities.

• State of the art about the topic,

The literature on IP in Colombia is scarce. However, we highlight the works "The impact of stronger intellectual property rights on science and technology in developing countries" and "The dynamics of publications and patents as a proxy for scientific and technological development of countries" made by Dr. Clemente Forero. In these Works, he presents the risk of strengthening the Intellectual Property System in Latin America. This is of special interest, given the fact that many developed nations reached this state under very weak IP System.

• Research focus,

We aim at establishing the current state of IP management capabilities in Colombian HEIs mainly because they are knowledge generating institutions.

For the propose, we analyze the level of awareness, use and management capabilities of Intellectual Property in Colombian HEIs in order to detect differences between some universities and others.

Methodology,

We use a quantitative approach based on adaptation of AIDA questionnaire for gathering the information regarding IP Knowledge & practices Colombian Universities. In order to do, the universe was restricted to the universities that have research groups registered in COLCIENCIAS (Departamento Administrativo de Ciencia, Tecnología e Innovación), under the premise that the universities that conduct research whose results could be protected, have research groups.

The methodology AIDA was developed by "Centre de Recherche Públic Henri Tudor" of Luxembourg, for analyzing the level of awareness of IP in SMEs in the project IPeuropAware (Nr. SI2.479203), funded by the 'CIP - Competitiveness and Innovation Framework Program' of the European Union. The procedure was adapted by the Fundación General de la Universidad de Alicante to study the level of awareness of IP in HEIs.

The method is based on the assumption that, schematically, the optimal exploitation of IP is developed in the following successive steps (levels of AIDA):

A Knowledge I Protection D Management A Exploitation

Each level contains 4 different sublevels.

For the purposes of the questionnaire, the Vice President for Research or directors of technology transfer offices of HEIs Colombian were contacted. They collaborated by completing the survey.

After gathering information from HEIs, we proceeded to perform analysis of the data and the preparation of the report using statistical methods and the SPSS software tool.

• Findings,

In the analysis of the data, we found differences among universities; a small group of HEIs have patented some inventions and are interested in beginning to commercialize these technologies. In a larger group of HEIs although the university offices University offices responsible for IP know the subject, their universities are only starting to become interested in the topic of IP. Also, it appears that a group of universities are starting to protect their creations but they are quite far from starting to exploit them.

One of the common concerns in the interviewed universities is that the IP knowledge is concentrated in the offices responsible for this issue, but most of the members, professors, students and administrative staffs don't know the subject.

The Colombian HEIs participanting in the analysis showed a high knowledge and confidence in the IP. Also there are very high interest in attending training and seminars on the subject.

• Contributions and implications.

The development of this study will establish the actual state of IP management capabilities in Colombian Universities. The results may provide strategies for the development of the next stages of the project intended to increase those capabilities. It is also an initial diagnosis and be expected to periodically measure the level of advancement of the universities.

Despite the requirement of the questionnaire, the Universities are interested in the subject. It has been noticed that the questionnaire, served as a self-examination on the level of development of IP and helped to raise awareness about the unknown subject.

The development of the activity training needs analysis, allowed to initiate contact with other HEIs in the country in order to link them to the network PILA, which seeks to become a platform for exchange and learning between different institutions.

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O-087 **INNOVATION POLICY IN TRANSITION:**

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Lessons from a Central and East Europen country INNOVATION POLICY IN TRANSITION: Lessons from a Central and East European country

Sub-theme: S5

Keywords: innovation, innovation policy, countries in transition

Abstract:

Two turning points have occurred in the modern development of Central and Eastern Europe: the first one in 1989/1990 - a collapse of a centrally planned system and the beginning of building of a free-market economy in most Central and East European countries (CEECs), and the second one in 2004 (1st May) - a formal membership of eight CEECs in The European Union.

By the end of the 1980s, a centrally planned system was functioning as the main regulation mechanism in most economies in Central and Eastern Europe. Market mechanisms played, generally speaking, an indirect role, although bigger - in some countries, and smaller - in other ones.

At the beginning of the 1990s, fundamental, economic and political reforms started in the majority of those countries. The essence of the transformations has been an introduction of free-market forces into national economies together with their deep restructuring. A crucial element of the economic transformation should be a technological transition aiming at the modernization of a given national economy. So, innovations are expected to play a key role in the economy's restructuring and modernization.

Moreover, global markets become more and more competitive. To compete globally, Central and Eastern European countries need world-class innovations. A level of a country's innovativeness is a resultant of activities of various actors in the modern economy. One of the actors is government.

So, the main aim of this paper is to show and evaluate major changes in public innovation policy in the period of transition (1989-2008). Poland here will be a case-study. The main hypothesis says that the government is significantly responsible for the present state of innovation in the country. The analysis will be conducted applying the author's model of the innovation scene based on the concept of Triple Helix by Etzkowitz and Leydesdorff (1995).

This paper's general conception was laid out in the author's Spotlight Article Innovation in transition: What role for government published in the web-site (www.triplehelixinstitute.org) of The Institute for Triple Helix Innovation, Honolulu, Hawaii, USA, 2008.

The paper will contain the following parts:

- 1. Introduction
- 2. How innovation in Central and Eastern Europe is perceived by Western researchers?
- 3. The model of the innovation scene as a method of analysis
- 4. Innovation in the period of transition: Poland 1989-2008
- 5. Who is guilty for the unsatisfactory state of innovation in Poland?
- 6. Innovation policy after the first turning point
- 7. Innovation policy after the second turning point
- 8. Has innovation policy an influence on innovation?
- 9. Policy recommendations: The concept of the six C's

10. Lessons for other countries in transition

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O-026 Collaborative Innovation in Triple Helix Networks

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Abstract. The importance of triple helix collaboration has been widely acknowledged; however, knowledge is increasingly specialized and trapped in discipline and sector silos. While elite knowledge is not easily blended, a rich exchange of ideas is essential to produced knowledge spillovers that lead to innovation. This current paper reports on research into the utility of the social network platform for trilateral collaboration. A virtual hetarchical social network was established with triple helix 'Knowledge Clusters'. Finding demonstrate the efficacy of the social network platform as a distributed incubator for trilateral knowledge exchange. Results further demonstrate the value of Knowledge Clusters for promoting knowledge spillovers that lead to collaborative innovation. However it appears that spillovers are narrowly absorbed back into their recipient's silos of origin and therefore do not fully realize their innovation potential. The utility of the social network platform for triple helix innovation is discussed, highlighting the need for adopting new tools and methodologies specifically engineered to align with the needs of translational science from discovery to commercialization.

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O-023 Third-Party Logistics Provider Cluster Initiation using iTAP Mechanism

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Introduction

Over the past 19 years, Industrial Technology Assistance Program (iTAP) has proven to be a successful mechanism that provides technology support and development to small and medium enterprises (SMEs) in Thailand. It was established in 1991 under the name "Industry Consultancy Services" (ICS) and formally changed to iTAP in 2001. Currently, iTAP is a unit under the supervision of National Science and Technology Development Agency (NSTDA), a national research agency that conducts research in various fields and also provides funding to other organizations in Thailand.

iTAP has a clear cut vision to enhance technology for Thai SMEs in order to increase competitiveness in world market. In order to fulfill this obligation, iTAP started building its network to other regions in Thailand, beginning in Chiang Mai in 2001. Right now there are iTAP networks located at nine universities nationwide. Suranaree University of Technology has been iTAP network since 2004. With tremendous help from all networks, iTAP has grown rapidly over the past several years. The number of projects that support the private sector has increased exponentially. There are more than 2,000 projects approved from 1991 to 2009. Most projects are product or process related such as product innovation, process innovation, product development and process development.

The introduction of ASEAN Free Trade Area (AFTA), which will be fully operational in six member countries in the beginning of 2010, has raised some concern to a lot of SMEs especially those in the service providing industry such as logistics and transportation provider. The influx of products from member countries and also China will increase market and price competitiveness particularly in reducing transportation and logistics costs. It is also iTAP's goal to put service providing industry into perspective and supply assistance to meet its needs. So SMEs in this section will be able to enhance their abilities to compete with foreign companies. It is an objective of this paper to develop an iTAP network expansion model to initiate third party logistic provider cluster under the tripartite cooperation among government agency, university and industry sector. It is also our goal to show that the impact of knowledge development and community expansion has been accented under this proposed model.

Motivation

In 2001, iTAP Suranaree University of Technology network was approached from one client, which is a leading logistics company in Thailand, to find an appropriate way to improve its suppliers. This client does not own the transportation fleet but uses thirdparty logistics providers as tools to fulfill transportation jobs. There are more than 300 suppliers under this client's network. Most of them have not developed any foundation for quality development. Their daily planning and operation are conducted based solely on past experience. Fleet maintenance has not been organized and managed properly. These factors contribute to higher operating cost and lower vehicle utilization. Client thought that quality standard system such as ISO 9000 system could help suppliers improve their management system. However, it is impractical to implement the system for these suppliers to be fully functional within a one-year time period. As we have known that most Thai SMEs have not had strong foundation and to put the complex system such as ISO 9000 would be way too much for these SMEs to handle and manage. iTAP proposed the basic quality system called Thai Foundation Quality System (TFQS) as an appropriate tool for these suppliers. The client decided to ask iTAP to implement TFQS to its five suppliers as a pilot study for 12-month duration.

TFQS-The Methodology

TFQS was developed by NSTDA to be a prototype for quality management in an appropriate level for SMEs who are not necessary or ready for ISO 9000 system. It has fewer number of auditing criteria than ISO 9000 and is not too difficult to implement. It can create a strong foundation for SMEs. Moreover, if TFQS has been implemented successfully, it is not difficult for SMEs to continue improving its process to meet ISO 9000 certification.

iTAP uses its support mechanism by using its network to administer the project. This TFQS project for logistics suppliers was conducted by the cooperation between iTAP central and iTAP Suranaree University of Technology (SUT) network, where the latter was the leader that managed this project. TFQS expert was provided to implement the basic quality system and iTAP provided auditor team. Besides, the client had actively involved in mentoring, supporting its suppliers as well as adding competition ambiance among five suppliers throughout the implement process. This factor is crucial to the success of the project.

Results

TFQS has been implemented successfully in these five suppliers within 13 months. These companies were audited and also passed the minimum requirements. The outputs of this project that can be measured are as the following: better work flow; improved communication within organization; more client-focus; reduced number of traffic accident; cost reduction; improved vehicle utilization; better check and balance system within company.

Impact and Contribution

This pilot study of five suppliers has been a good example for third-party logistics provider cluster initiation. It is a close cooperation among iTAP, university, client and its suppliers. All these five company decided to continue quality improvement process of their own organizations and are set as a prototype for the next 11 suppliers that applied for the TFQS implementation process this year. The collaboration for the second phase of TFQS implementation will be among other regional iTAP network in the north and south of the country. We believe that this initiation will create a strong tie among third-party logistics providers in the long run.

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ST-05 **The Regional Effect- a founding of a New Institute of Technology**

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Keywords; Regional Development, Role of University, Network, Social Capital

The regional effect- a founding of a new Institute of Technology.

The fact that universities play different roles, such as they have been shaped by the demands of the knowledge economy, has been put forward by the research field that study regional innovation systems (for example Etzkowitz 2002, Asheim 2009, Nilsson 2006 and others). This study will focus on the regional effects of founding a new university, highlighting the importance of social ties and relations.

This study will explore the ties between Blekinge Institute of Technology (BTH) and the surrounding society. The reason for choosing this example as an illustration, is that it contains a number of characteristics that will be interesting from a perspective of regional development, for example that Blekinge Institute of Technology was founded in order to develop the region. The university created an ICT-profile despite the lack of a developed ICT industry in the region. Therefore, my case will include the effects of the combination; new dynamic industry; higher education and research as well as political actors in a helix of innovative activities.

Blekinge, situated in the southeast of Sweden, has a history of harboring manufacturing industries and also famous for its naval base, had a decline in economy and high unemployment numbers during the 1980's. Activities during the 1990's came to transform the region with consequences in production as well as population. Besides the localization of big ICT companies, the founding of a technical institute had a major importance transforming the Blekinge region.

One of the reasons why it is fruitful to discuss this example is the character of the ties between BTH and the surrounding society. In this case it is not all about new technology, but about the introduction of what is virtually the introduction of a new culture. These different networks with its attached norms about entrepreneurship, higher education and so on, did create a new kind of social capital in the city that had not been present before. These new networks were made possible when a large number of people moved there in order to work in the ICT industry or to study at BTH. This created an environment with an international touch with strongly embedded relations.

The question and the purpose of this study is therefore aimed at discovering what role BTH and higher education played in network-relations with the surrounding society during the 1990's. How were these contacts upheld? What are their implications? How come BTH did not end up to be just another cathedral in the desert?

Looking at knowledge production, Gibbons et al for instance claims that knowledge is context-driven, problem-focused and interdisciplinary. In other words, this means that science is carried out in a context and not in an ivory tower. Etzkowitz and Leydesdorff (2000) argue that these features constitute the original mode of science, i.e. carried out in a context of application. Viewing science as a process congregates well with the view of innovation as non-linear. This dynamic perspective make up a conceptual frame for understanding in a great number of analyzes of ties between industry and the political administration. MIT and Stanford are two examples of universities who are often put forward as interesting cases to discuss. They are both widely famous for having developed a solid collaboration with the industry and the government; commonly seen as one of the determining factors for the development of Silicon Valley and Boston. One explanation for this, recognized by earlier research as important, is to be found in the organizational culture of the universities. That is, they have encouraged a close collaboration with the surrounding society, and created opportunity for a big number of spin offs. In addition, an important indicator that regional effect exists is that the profile of the university corresponds with the orientation of the industry. Conclusions from a recent study on the University of Lund's multiple roles in strengthening regional innovation system of Scania, stress (among other factors) that one of the most important roles the university has to play consist of participating in networks for direct cooperation (Asheim et al, 2009). The BTH-case will be analyzed and interviews will be conducted, where in a number of key-persons from the university, the industry and the government will report on how connections between BTH and the industry were constituted and maintained. Relevant examples will be highlighted in the study.

Some research universities can be described as "cathedrals in the desert", but this institute was dependent on its ties to the industry and different political establishments. One feasible interpretation of this could be that when the academic resources are fairly sparse (compared to other traditional and well established universities) this can be compensated by involving the surrounding society in the educational programs. Further on, the conclusion will discuss that the key actors representing BTH; the industry and the municipality, all had a lot to gain from collaboration. This came to create a local effect that was unique and context specific.

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Triple Helix VI) Conference Madrid, October 2010

P-023 Local government's role in local economic development

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Subtheme: Government and Public policy in the triple helix era

Keywords: Government's roles, local government, medium towns, knowledge economy, local leadership

Introduction

Point 1. Europe, countries and regions are developing new economy development policies. However, smaller areas, like mediumsized towns or, even, counties, are not specially targeted by those wider areas policies. Moreover, this national policies try, at best, to spread knowledge and technology infrastructures throughout their territory in such a way that most of the regions get a part of the funds and infrastructures. But, the result is, when you have a look inside each region, that, most of the time, there's a concentration of the relevant infrastructures -universities, science and technology parks,....- around one or two main cities in each region leaving most of the territory "knowledge-empty".

Point 2. Knowledge economy means that the new essential raw material is knowledge. And, fortunately, this new raw material comes from every human brain. So, that's a big opportunity for those territories which have no other sources of wealth.

Point 3. A knowledge economy means that a brilliant idea with an economic potential can appear and flourish anywhere. But this will be true only if some knowledge friendly environment is available at that place. And that means that every country should take advantage, as much as possible, of the raw materials it has.

Point 4. Finally, there's an evidence that you cannot have a university or a science park in every town.

State of the art: an example, Catalonia, a spanish region

Let's speak about Catalonia as an example: a Spanish region with 7,5M people, with Barcelona being the capital with 1,5M people and a metropolitan area close to 4,5M people. But there are 15 other towns over 75.000 people in Catalonia. It's clear that there's a point, for those local -town- governments, to see how they can work efficiently for the economic development of their "small" areas taking into account that there is so a big attractive center who tends to absorb most of the resources -talent, funds, infrastructures- addressed to Catalonia.

Therefore, we are in front of a paradox. The new economy is based on knowledge which is a resource available to every country. Countries just need to develop it -the knowedge-, spread knowledge infrastructures and stimulate innovation and entrepreneurship. But, in practice, this is done basically in the metropolitan areas of bigger cities, leaving most of the territory, and much of the people, out of this "knowledge economy evolution". How can we solve this paradox? Are we able to arise and grow up new initiatives to develop local economies in almost any place in a given country? Do the local government's have a special role in it? Which is this role?

Methodology, findings, contributions and implications

Local administration has a key role in answering this question. There's a need of someone stimulating the knowledge economy at the town or county level and this can only be the local administration -mainly, city councils-. But, as those administrations don't use to have funds for economic development, they need to use other means to get an efficient economic policy.

Some questions need to be answered: Which is the role of the local government's -city council- for those medium towns? How can they drive their towns economies towards a better and more competitive future? Which are the means they can use to reach their objectives?

They must work on each of the next items:

1. Leading their local stakeholders. Towns need to be able to join the forces of all their local stakeholders -Chamber of commerce, employer's organizations, professional associations, university and technology centers, savings banks and/or insurance companies, hospitals,....- and local government is the natural leader for this joint movement.

2. Leading the local strategy plan definition. Defining a strategical plan is a very good way to get all the stakeholders working jointly in the same direction. It's a good way as well to share and distribute functions, and assigning responsibilities to the different stakeholders.

3. Stimulating innovation in town. It's important to disseminate the idea of innovation amongst the population and telling that innovation is not only technology and that any person may be innovative.

4. Stimulating entrepreneurship is basic since most of the businesses that will be active in 10 years time are not existing today. We need new entrepreneurs with with new ideas to set up the local companies of the future. This work must start at schools by teaching young students that creating their own personal projects is a way for their professional career.

5. Promoting business creation and development, by providing a good support to any entrepreneur who wants to set up a new initiative. Incubators are a good way to provide this support.

6. Helping in setting up an attraction and landing service for talent and businesses. Once the local knowledge and business system is working and the area has found its fields of speciality, it needs a plan to promote the area and some service to attract talent and to help this talent to install in the area.

7. Helping in the funding of some key local projects promoted by other local stakeholders or entrepreneurs.

8. Finally, but not the less important, is higher administrations lobbying in order to get funding, knowledge and technology infrastructure,.....

Triple Helix VII) Conference Madrid, October 2010

P-016 **Gender and the Patterns of Economic Activity in the Informal Economy.**

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The paper will look at Gender and the Patterns of Economic Activity especially for women workers in the informal economy. The focus will be on paid and unpaid work. The difficulty in documentation of their activities which are mainly small, irregular, giving rise to occasional, small flows of income is a bitter reality. Policy makers have tended to ignore them. Hidden biases have been there mainly because these workers have met their basic needs with these 'small, intermittent' activities, including plans for a better future, through for example migration specially rural – urban migration. These plans for the future have been below the surface, practically invisible from the view of policy makers.

Labour force participation is often seen as the prime indicator (and cause) of changes in women's status. Social theory often focuses on women's employment because it determines their access to resources and their ability to make independent decisions. Gender issues in work gain significance, particularly as global economic restructuring due to rapid paced technological progress, internationalism of products and trade and growing in formalization of work have seen an increase in women's participation in the labour force while men's participation has decreased slightly.

In developing countries, industrialization tends to coexist with agriculture, rather than displacing it, and family businesses – from farms to small enterprises of women. There has, therefore, been not so much a movement of women 'into the labour force' as changes in the nature of women's work, except in some of the rapidly industrializing Asian countries. The changes have often involved a move from subsistence farming or other unpaid activity to labouring or informal income generation. A working life has always been longer, and more continuous, for most women in developing countries: girls may give substantial help in the home, be unpaid family workers or even wage earners; women – especially in rural areas – hardly interrupt their work routine to have a baby, and they keep working until the end of their lives.

At the same time, pressure has increased on women everywhere to make up or provide the family wage. A vicious circle of debt, inflation, economic stagnation and unemployment has increased the numbers of the poor, and has placed the heaviest burden on women. As prices rise and incomes fall, women increase their working hours and diversify their activities to ensure the family's survival – in rich countries as well as poor. The 'feminization of poverty' is an abstract- sounding term which means that more and more women are poor, and more of the poor are women.

Reflected in work as an unequal gender division of labour, it encompasses situations in which there is an unequal division of the rewards of labour by sex. The most obvious pattern in such a division of labour is that women are mostly confined to unpaid domestic work and unpaid food production, whereas men dominate in cash crop production and wage employment. Within paid work, women are more likely to work in the informal sector, for example in domes¬tic work and street vending. Despite the fact that women have entered the work force in unprecedented numbers, women's work remains chronically and systematically underpaid, many may work from their homes. Men form a larger component in paid work.

Women's access to paid work is crucial to their efforts for economic equality and to their sense of self and well being. But women's paid work is generally valued as less important than men's. Women still earn considerably less than men and often find themselves in low-status jobs with few benefits.

Some division of labour exists between formal and informal sectors on the basis of gender. The extent to which the informal sector is a 'female' sector varies geographically and over time, especially as unemployment rises; nevertheless, in most countries women's possibilities for entering the formal sector remain even more limited than men's and the informal sector may be their only option – not simply the last resort. However, some women tend to stay within the informal sector not necessarily because of a lack of choice, but because of the flexibility of working arrangements and diversity of opportunities.

Key words: Informal Economy, Paid and Unpaid work, Gender biases, Policy implementation, feminization of poverty. Suggested Readings

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P-015 **A discussion on the Triple Helix in regard to public utilities**

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Triple Helix from the stand point of the water utility works in Japan

This study looks at the issues arising on how the Triple Helix can be enhanced in order to produce effective results in a Japanese setting.

Triple Helix is the interaction among the three organizations with differing institutional composition•@in essence. Through the interaction, the gap between these distinct institutions is narrowed, consequently the collaboration that occurs between these institutions leads to the creation of products, businesses, markets, and new industrial structure. For this reason, a form of management is required in order to bridge the gaps that exist among these institutions.

This study sets out to find out in which areas do the gaps actually lie among in the Triple Helix, and what should be done to bridge the gaps, and how can this the mutual interaction be galvanized. This study also analyzes these points from the perspectives of the benefits derived from the Triple Helix. Specifically, this study investigates the benefits Government gains from the Triple Helix by examining the water utility works which is public works.

Up to today, a number of studies have already been done on Industry and University in the Triple Helix in Japan but not many have been undertaken including Government. Henry Etzkowitz (2008) said that we are bound to hit a limit if we try to build fruitful relations between University and Industry without taking into consideration the role of Government. Furthermore, in Japan, the public utilities market is opening up to private companies, hence collaboration between Government and Industry will become of paramount importance. Subsequently this study also investigates Government willingness to participate in collaboration with Industry and University in the public utilities works in Japan.

Based on prior studies, this study has come up with the following hypothesis: A harmonized orientation when it comes to collaboration, is important as a success factor in the Triple Helix; when the actors in each institution are strongly aware of the benefits that will come from the relations, it enhances their willingness to participate and work in collaboration. The harmonization of the direction of purpose among institutional actors is guided by whether they place more importance on the research aspect or on the business aspect that is brought about by the mutual interaction, which has an impacts on the extent of cooperation.

In this study, the concept of •eAutonomous and Cooperative Systems•f suggested by Nishimura (2004) is incorporated as a framework of the analysis. The autonomous and cooperative systems are defined as a complex body in which fundamentally self-directed people work together for a common purpose. The autonomous and cooperative systems are composed of the two domains: 1) the autonomous domain in which the key roles of each actor are played, and 2) the collaboration domain in which all actors work together. And the incentives derive from the involvement in the cooperative domain are categorized either as the •gIn-house incentive•h or the •gTake-out incentive•h. Nishimura also argues that, focusing on the interaction between the autonomous and cooperative domains, the •gTake-out incentive•h is the one that is important in terms of how it can assure the willingness of the members to work in collaboration. He also formulated the concept of explorative strategy and exploitative strategies for the reason being that the cooperative domain can fill the needs that the autonomous domain cannot fill, by solving meta-problems that cannot be solved in the cooperative domain.

The methodology used in this study was to conduct a survey using questionnaire that was given to 1477 water utility works in Japan, the data was used to analyze what benefits Government found in the Triple Helix in the Japan water utility works which is public utilities and also which factors (Take-out incentive, In-house incentive, Exploitative strategy or Explorative strategy) had influence on their willingness to collaborate with other institutions. Out of the 1473 water utility works to which the questionnaire had been sent, 740 (50.2%) works responded, among which 697 were valid responses (response rate: 47.3%)

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P-050 Academic Entrepreneurship as Local Discursive Formations - A Gender Analysis

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Traditionally, (academic) entrepreneurship has been equated with masculinity and men. Today, several universities have the ambition of broadening the scope of academic entrepreneurship in order to "include women" as potential academic entrepreneurs, i.e. academic entrepreneurship is at least partly included in the ambitions of working with gender equality issues in Swedish Universities.

The main purpose of this paper is to scrutinize how the local discursive formations of gender and gender equality are produced in four different research settings at Umeå university in Sweden. The analysis departs from a critical policy analysis approach; the "What's the problem represented to be? Approach" (the WPR Approach) developed by Carol Bacchi (1999, 2009) as a way of investigating how academic entrepreneurship is constituted and thus given meaning in these four contexts. Thus, academic entrepreneurship is regarded as produced in local settings, settings that also need to be contextualised in relation to more overarching discourses of academic entrepreneurship. Central questions coming from this approach are: How is academic entrepreneurship understood? What are the assumptions or presuppositions underlying these representations? And what are left unproblematized in this way of representing academic entrepreneurship? The paper particularly highlights how of academic entrepreneurship is constructed in relation to aspects like commercialization and innovation systems, thus these aspects are also scrutinised through the WPR approach. One issue of importance is if the researcher at all deals with these questions. In the process of commercialization one has to point out the commercial potential of a scientific development and next step in the process is venturing this in de academic bureaucracy (Rosa & Dawson 2006). To do this the innovations system support is needed. One other interesting issue is therefore if these innovation systems are known and if they serve as good support in different types of research settings.

The empirical material consists of focus group interviews in four different research settings at Umeå University. The ambition is to interview researcher in settings who already have established cooperation and networks with external entrepreneurs and those who haven't. Even though already established research settings have developed systems for these processes there methods can vary. These differences are also an interesting part of the study. The material further deals with policy documents and project document from DARE (Development Arena for Research and Entrepreneurship). DARE is a key project with purpose to strengthen commercialization at Umeå University and Luleå University of Technology in Sweden. **References**:

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O-125 Technology Transfer from Universities to Industry

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University in regional innovation and social development University technology transfer (Transfer of Technology from Iranian Universities to Industry: University Perspective)

ABSTRACT

This is a study about transferring the technology from Iranian university to industry. Although concentration was placed on inventions, new hardware or software, in practice it was necessary to accept some departures from this ideal.

Unlike developed countries the relation between university and industry in Iran is not so much. Most of the Iranian universities use the model of western universities which seems to be not practical to solve the problems of industry. The connection between university and industry is faded to some extent, because industry can't satisfy all of their needs based on universities potential. In comparison with other countries the statistics shows that the volume of technology transfer in Iran is low and Iranian industries are interested in absorbing their needed technology from foreign countries.

The emphasis of the study is placed on discovering the existing technology transfer process, organizations involved and the major decision taken during technology transfer from university to industry. In addition, The process of evaluating the technology, discovering the barriers of transfer, different ways of establishing contacts, benefits gained from university–industry collaboration and recommendation for promoting the current situation (for government, universities, industries and intermediary organizations)were considered.

For reaching above purposes numbers of interviews were conducted. Interviews include both quantitative and qualitative questions that were conducted with 23 professors, 5 liaison officers, 3 intermediary organizations and one representative of ministry of science, research& technology. The overview is as follow:

Results of the interviews revealed that in terms of establishing contacts companies were more proactive; mostly they approached the professors to initiate contacts. For professor's expertise, reputation and friendly relation with industrial people help for establishing contacts. Moreover we find that most of liaison officers had take reactive postures in terms of establishing contact. For professors, the level of satisfaction of the firm and for liaison officers, amount of financial returns for university are the most important criteria for measuring the degree of success. Also most important benefits that gained were defined. In terms of barriers we found that lack of knowledge about industry relevant needs is the most important barrier within the university from professor's view and they said that within industry the most important barrier is a poor knowledge about university research capabilities. Moreover, number of interviews with intermediary organizations and representative of ministry of science research and technology were conducted and they declared the general structures of their company and most important barriers.

Most of the technologies which were transferred from university to industry were based on four processes. In the first process which is "professor center", professors and industry contact with each other directly. In Iran about 52% of projects were transferred by this method. The second process which name is "university-center", the liaison offices are responsible for linking university and industry together and to show each of them the potentials and needs of the other one. Unfortunately in Iran there is no clear definition for the task of these offices and due to this problem the process of their job is taking such a long time and also it is quiet bureaucratic. These offices are not active, as is evident from the fact that only e 13% of transfers were conveyed by this method. Further these offices weren't successful to facilitate the problems of intellectual property right which the professors are faced with.

The third process is transferring projects through intermediary organizations. Intermediary organizations which were considered in this study are: Saffron research consortium, science and technology parks and internship centers. Results of this study show that about 26% of projects were conducted by this mode. The fourth process is university research center; about 9% of the projects were conducted in this way. Research centers are frequently located on university campuses. In many of these centers, members of both the university and industry work together on researching ideas and developing inventions.

In the last part of this study a number of recommendations for improving the effectiveness of technology transfer are given. These are mostly related to the promotion of government policy, university and industry policy, structure of university offices and intermediary organizations.

This study is considered as a first attempt to identify the major mechanisms of technology transfer from universities to industry in Iran. Recommendations for this research would be useful for the countries in the same stage of development. **Keywords:** University, Industry, Technology Transfer, Iran

ST-11 Technology Transfer from University to Industry in Iran

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Student work

The relationship between university and industry has a long history, especially in developed countries. The increase in industrial competitiveness among countries at the end of the 19th century led to the creation of technical universities that were related to industrial needs. The main goals of these universities were to train the workforce, create situations for collaboration between university and industries, increase the level of education, and improve the local and national economy (Halsey 1995; Mortazavi 2002).

In the last decade in Iran, efforts have been made to bring universities and industries together. This is evidenced by the emergence of intermediary organizations, such as liaison offices, research parks, and spin-off organizations. Universities have a strong potential for research, innovation, and internal development, but they do not understand fully how to use this potential and implement this ability. Additionally, industry has the perception that universities deal more with theories and do not understand practical problems.

The goal of technology transfer from university to industry, a collaborative process, is to benefit both the recipient company and the university (Daghfous and Hottenstein 1997). Although, find this benefit still is one of the main issue in this collaboration (e.g. see: Swamidass and Vulasa 2009). The various forms of technology include software, hardware, knowledge resting in people's minds, and written documents (Gerwin et al. 1992). For the purpose of this study, we define technology transfer as a process by which the new knowledge moves from a university to a recipient organization. Only technology in the form of software and hardware will be considered for this study, as tracing the technology in people's mind and written documents present varying levels of difficulty.

This research focuses on the process of technology transfer from universities, as inventors of technologies, to companies, as users of them. It examines the mechanisms of technology transfer, the methods of establishing contact, incentives and barriers to technology transfer, the criteria used for evaluating the success of technology transfer, and the role of intermediary organizations. Additionally, company size is considered as it affects barriers and incentives for technology transfer and the criteria for evaluating success. So the study will help to improve the understanding of the current process of technology transfer, while concentrating on the incentives and barriers to transferring technology from universities. The results and recommendations of the study will help universities and companies to improve the technology transfer process.

This study is based on the sample collected from 15 companies and 3 intermediary organizations in Iran. Both quantitative and qualitative data on the technology transfer projects were collected through a combination of personal interviews and a self-completed questionnaire.

To ensure accuracy in the questionnaire, three professionals who were familiar with the level of knowledge and vocabulary used in Iranian companies were consulted. In order to check and improve the accuracy of the translation, the questionnaire was then translated back into English and any discrepancies were verified and corrected.

Quantitative questions in the questionnaire concentrated on incentives, barriers, and success criteria of the technology transfer process. All questions were analyzed using a 5-point Likert scale. Qualitative questions inquired about the mechanisms of establishing contacts, intermediary organizations, and suggestions for improving the technology transfer process.

The information indicate that, in addition to the initiatives taken by professors or companies to contact each other, intermediary organizations (including consortia and internship centres) and university units (including the liaison office and research centres) facilitate these contacts. From the perspective of companies, the major incentive for companies in transferring technology from universities was improving product quality. The ignorance of faculty members in understanding practical problems and the real world situation was a major barrier in the process of transferring technology. This problem could be solved if universities revised their educational plan from theoretical to practical issues, especially in engineering. Some barriers and incentives were also found to be specific to the size of companies. Gaining competitive advantage over competitors was the most important criterion that was used by companies to measure the success of transfer.

Companies are more proactive than universities; in most of the cases that we studied companies initiated the contact with universities. University liaison offices are well positioned to play a significant role as a bridge between universities and industry. Intellectual property rights have an important role in establishing better links between university and industry and also in encouraging innovation. While the focus on commercialization increases, researchers are more concerned with protection of research output than with intellectual property (Fulop and Couchman 2006). The Iranian government has joined the World Intellectual Property Organization, but the rules have yet to be fully implemented, especially the penalties for breaking rules. Further, individuals and organizations do not have any guarantee that protects their innovation in spite of getting a patent. This situation is one of the factors that may hinder technology transfer.

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O-129 The Norwegian solar photovoltaic industry

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Introduction

The paper will address the development of interactions between key actors in the Norwegian solar photovoltaic industry and the Norwegian research system taking the triple helix perspective as a starting point. The paper will address different types of policy instruments to strengthen the interaction of the solar photovoltaic industry in Norway and research organisations.

State of the art

Etzkowitz and Klofsten applied the triple helix model on the analysis of the innovative region around Linköping in Sweden (2005), highlighting the three main elements of the triple helix model: the role of the entrepreneurial university, collaborative relationships between universities, firms and government and that each institutional sphere also takes roles of the other two spheres. Cooke has a slightly different approach when analysing regional innovation systems in a global context (Cooke 2005). He criticised the triple helix model that it would overlook the asymmetric knowledge problem and only concentrate on the best cases for regional interaction, such as MIT for example. Narula analysed industry development in Norway at a national level, dividing the Norwegian industry in two groups, the group of traditional industries and firms formerly protected by the government, and the group of specialised and technology-intensive firms (Narula 2002). Narula argued that lock-in may occur in a region where firms with a particular technological specialisation exist and persist and a whole industry cluster can be locked-in to a specific technological paradigm.

Research focus

The papers will focus on collaboration between firms in the Norwegian solar cell industry and Norwegian research organisations facilitated by different types of government interventions. We analyse the importance of interaction between firms, universities, research institutes and governmental policy for the further development of the Norwegian solar photovoltaic industry.

Especially the new funding schemes of the Research Council of Norway (RCN) will be explored, such as the User-driven research based innovation (BIA) and the Centres for Environment-friendly Energy Research (FME) will be explored. Both schemes have a long-term perspective giving funding up to 5 years (BIA) and 8 years (FMEs).

1. The BIA scheme was introduced in 2006. BIA projects are supplementary to thematic programmes and have the firms' own strategies in focus, such as capacity building and potentials for increased value added.

2. The FME scheme was introduced in 2009, and one of the FME centres is promoting Solar photovoltaics. It has the goal to give the Norwegian photovoltaic industry access to world leading technology and scientific expertise. It is concentrating the most important firms and research groups specialised in solar photovoltaics.

Methodology

We use three different data sources:

• Qualitative analysis of interviews with researchers and experts involved in recent projects co-funded by industry and the RCN;

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Document analysis;

• Quantitative analysis of project portfolio of the Research Council of Norway on solar photovoltaics (1996-2009).

We explore the development of funding by the RCN, technology specialisation, main firms and research organisations (universities/ research institutes) and in what degree they are collaborating, regional agglomerations/clusters, and international collaboration patterns.

Findings

We have identified 71 projects funded by RCN between 1996 and 2009. There can be observed an increasing diversity of actors: In the start of the period were only two firms active in the field, while now there are 19 firms (including subsidiaries). They apply different technology approaches for improved silicon based wafers and develop a more horizontal diversity, but less a vertical diversity in the value chain. Norwegian firms function as suppliers of wafers for international photovoltaic module producers, but there are also new segments in the industry specialised in – repowering and upgrading of degraded solar cells. The most important firms have also international networks where they are active in different parts of the value chain, such as the REC Group. The most central industry players with more than 10 projects each are REC and Elkem. They are engaged in a large variety of projects aiming at new technology development and capacity building in Norwegian universities and research institutes. Some Norwegian research institutes are especially engaged in solar photovoltaics, such as the Institute for energy technology (10 projects) and Sintef Materials and Chemistry (3 projects). A newcomer is NORUT in Northern Norway. Sintef is very close to the NTNU (3), one of the most active universities beside the University of Oslo (4), but the universities have different specialisation profiles.
Norwegian processing industry specialised in silicon has over many years developed its expertise and we argue that it is by no means dominated or even locked-in by low-tech technology. The industry could profit from low energy prices and developed very efficient process technologies. The high diversity of advanced technology approaches funded by the industry indicates this industry is advanced also in a global comparison. The research institute sector and especially IFE and Sintef are eager to serve this industry and have invested in infrastructure and people to enable this task. The only bottleneck highlighted by the industry is a lack of human capital from national universities. Research collaboration is addressing these shortcomings.

Contributions

This paper is rather novel combining data analysis of public funding on solar photovoltaic research and innovation with qualitative analysis of interviews. It will explore in what degree the triple helix model can explain recent developments in the Norwegian solar photovoltaic industry and will address shortcomings of this model. The Triple Helix model should also be adapted to explain dynamics related to important environmental issues and policy initiatives related to CO2 emissions etc.

Implications

The project will have implications for future analysis of the national and regional interaction between industry, universities, research institutes and government.

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O-072 The changing role of universities in the German research system: engagement in net-works, clusters and beyond

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Introduction and objective

In Germany, but in other countries as well, a trend towards a regionalization in technology and innovation policy is clearly evident. This triggers the expectation towards universities to estab-lish regional ties and networks and to exploit the advantages of spatial proximity to other re-search institutes, to industry and to policy and regional administration. The hypothesis is put forward that the evolution in the collaboration patterns of universities contributes to an increas-ing flexibility in the research system. It is the objective of this paper to analyze the changing role of universities as driving force in the development of new modes and models of collaboration both with industry and with other research organisations. Starting from the triple-helix and the entrepreneurial university approach (Etzkowitz et al., 2008) and the different ingredients sup-plied by network and cluster theory, future prospects in the appearance of new forms of bound-ary spanning roles of universities (Youtie and Shapira, 2008) in distributed research and innova-tion processes will be discussed, using Germany as a case study.

Focus of the paper

The German research system is well developed and consists of a manifold of different organiza-tions for both basic and applied research and industrial development. Technology transfer at universities started as early as the 1970s with the operation of the first transfer offices, still fol-lowing the linear innovation paradigm (Krücken and Meier, 2005). With advances in innovation economics research during the 1970s and 1980s, the understanding about the complexity and interactivity of innovation processes changed drastically. Especially with the increasing popular-ity of the system of innovation approach, regional innovation networking within and between the industrial and the research sector gained more and more importance during the 1990s. The 'network paradigm', as Cooke and Morgan (1993) put it, became the starting point for policy measures by which the effectiveness and the efficiency of distributed innovation activities should be promoted.

In 1995, the German Federal Ministry for Education and Research initiated the BioRegio contest which aimed at the strengthening of biotechnological research and increased international com-petitiveness in this field by supporting firms, universities and other research institutes collaborat-ing in close spatial proximity (Dohse, 2000). Together with an amendment of the German higher education framework law by which knowledge and technology transfer was introduced as third main objective of universities (besides research and teaching), other national programmes started in 1997 which explicitly promoted the role of universities in regional networks (e.g. the EXIST firm formation from universities programme). During the first decade of the new millen-nium, the freedom of universities was further strengthened by:

" the introduction of self-governance instruments and thus the increasing independence of universities from formerly strong public governance (Liefner, 2001)

" the abolition of the professor's principle in patenting of university inventions and the creation of university patenting and licensing offices

" the Bologna process which put strong pressure on the universities to reform their curricula

" the excellence initiative of the national government for the selection of 'elite universities'

" the formulation of the high-tech strategy as the comprehensive German technology and in-novation policy platform, addressing the universities as strategic research partner for enter-prises.

Besides these aspects, the regional level as platform for policy implementation was further strengthened by the diffusion of the cluster concept. These developments contributed to an increasing pressure on universities to diversity their tasks and engagements. It is expected to-day that universities are excellent in research and provide all necessary resources for good teaching, both on a national and international competitive level, that they have a high patent output and sufficient licensing returns, that they provide incubation facilities for spin-off activi-ties, and that they act as knowledge hub in their respective regional innovation system.

Methodology and findings

Drawing on recent examples from Germany in the form of case studies, the paper will analyze how German universities deal with these challenges and which forms of regional integration and collaboration patterns can be observed. It can be stated that the formerly clear-cut boundaries between the different research organizations become more flexible, e.g. in the way that first mergers between classical universities and classical national research centers occurred (the new Karlsruhe Institute of Technology as merger between the Technical University Karlsruhe and the National Research Center Karlsruhe), and that new actor constellations like new mod-els of science-industry research collaboration with a strong participation of universities open up new chances for a further development of collaboration models in the German research system. This can be in the way of an increased outsourcing of strategic ori-ented research activities into industry on campus models, both from large firms and from SMEs, but also in the way of strategic education and research alliances between universities and ap-plied research organizations like the Fraunhofer Society.

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Measuring University Involvement in Regional Economic Development: A comparative study in Argentina

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Abstract

Universities can become important actors in emerging regional innovation systems because they have the ability to understand existing technologies, have connections with external networks and are usually the main, if not the only, regional knowledge source (Schiller, 2006). In order to fulfill its role, universities have to provide for a qualified workforce, locally adapted research, appropriate services and technologies for their regional stakeholders. However, there is no comprehensive set of performance measures to evaluate the effectiveness of their role in regional development through their linkages with industry. We propose a set of measures for analysing the involvement of universities in the development of their regional systems of innovation.

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Introduction

Universities can become important actors in emerging regional innovation systems because they have the ability to understand existing technologies, have connections with external networks and are usually the main, if not the only, regional knowledge source (Schiller, 2006). In order to fulfill its role, universities have to provide for a qualified workforce, locally adapted research, appropriate services and technologies for their regional stakeholders. However, there is no comprehensive set of performance measures to evaluate the effectiveness of their role in regional development through their linkages with industry. We propose a set of measures for analysing the involvement of universities in the development of their regional systems of innovation. This paper presents a comparative study of the results obtained from applying a set of performance indicators in three different universities in Argentina.

The Role of Universities in Regional Systems of Innovation and Performance Measurement

University-industry linkages vary in their degree of institutionalization, which may range from the informal hiring of professors and ad-hoc services, to long-term partnerships and joint research centers (Giuliani and Araza, 2009). In this exploratory study, we concentrate on defining the performance measures of the following activities related to the level of engagement of universities in the development of their regions:

Training

New universities should be created with the explicit, central mandate to promote regional development through training people (Boucher et al. 2003, Karlsson and Johansson 2006). Training activity is key to enhance the capability of the region to absorb new knowledge and generate solutions to production problems.

Research

The role of developing and transferring knowledge is the subject of intense ongoing research. Gibbons et al. (1993) claim that the university is no longer the dominant institution developing knowledge. Nevertheless, Godin and Gingras (2000) show that the university is still a major source of economically important knowledge produced through R&D. The university engagement in research should be considered in a certain context. R&D processes in natural resource-based industries may follow two paths (Coenen et al, 2006): R&D processes that occur inside large multinational corporations, or research institutes with close ties to industry that are also established in such regions. In the first case, universities can be powerful engines for attracting R&D activities from multinationals. In the second case, universities can offer their facilities and faculty for establishing research institutions to investigate local specific problems in wine production.

Consulting/servicing

Mowery (2007) stresses that faculty consulting, although undocumented and under emphasized by universities, is generally regarded by industry as significantly more important for knowledge transfer than patents. In this case, the motivation of the industry is to solve immediate problems or realize opportunities. Looking at the relationships between universities and industry from this point of view, there is another activity similar to consulting, which is laboratory and testing services (Lester 2003). Laboratory services are examples of outsourcing functions strongly based on knowledge which require investments that exceed the available resources of SMEs.

Facilitating linkages

Lester (2003) examine different forms by which interaction takes place between universities and industry, stressing, among others, commercial ventures by universities and commercial activities by academics, technicians and students. Karlsson and Johansson (2006) find that entrepreneurship is an essential input to the growth of regions and in turn, dynamic functional regions develop a number of entrepreneurs. Universities can play a role of a multi-disciplinary, "honest broker" to build social capital in the region (Cooke 2002). Yusuf and Nabeshima (2007) assert that universities should consider building local innovation systems as central to their missions to promote the development of the region. However, the formation of linkages also depends on the strength of firms' knowledge base so this role is clearly interconnected to training and research roles.

Data was gathered from September 2007 to April 2008 using a structured interview divided into the areas indicated for universityindustry linkages. We chose structured interviews to make data comparable and avoid the "uniqueness" of each university in the minds of the interviewees as well as being the dataset comparative to Tiffin (2008). The use of structured interviews with performance indicators also helped us to realize the differences in terms of focus pursued by each university. Interviews were complemented with open questions and secondary data to triangulate and explain the results. The universities and their regions reviewed in Argentina are represented in table 1.

The evolution of the Argentine higher education system in the last 20 years has produced a heterogeneous structure (Garcia de Fanelli, 2008). Public and private universities coexist in different shapes, scope and range of studies, commitment to research, and their status in society but they share a professional orientation and concentration in only few professional fields related to the social and economic sciences. Argentina has one of the highest enrollment levels in higher education in Latin America (Garcia de Fanelli, 2008). However, increasing enrollment in a context of scarce financial resources led to a gradual deterioration in teaching and research conditions. Argentina has established many programs to improve the quality in the higher education, for example a program of incentives for research-teachers as well as an increased orientation towards applied research by fulltime professors or an Actthat defines processes of institutional assessment for all universities and periodic accreditation of professional programs and graduate studies. The structure of the higher education system consists of more than 90 public and private universities with an enrollment of more than 1 million students, and more than 1,500 non-university tertiary institutions (e.g., technical colleges) with more than 400,000 students (Garcia de Fanelli, 2008). Within the national university sector, there are widely differentiated universities from: research-intensive schools (mostly in basic sciences) in traditional public universities to primary teaching-oriented institutions in private universities devoted to professional training. However, more than 30% of the total enrollment is concentrated in one university: Universidad de Buenos Aires, which is located in the Argentine Capital and serves also to the Greater Buenos Aires. The undergraduate level of education includes both the "licenciado" degree after 5 years of study and professional degrees, with a longer duration, in fields such as medicine, engineering, architecture and law. Unfortunately for the economic development of Argentina, more than 50% of the students choose Social Sciences and Humanities as fields of study (Garcia de Fanelli, 2008). The majority of Argentine universities are organized into professional or academicbased schools that enjoy considerable autonomy (Garcia de Fanelli, 2008). Schools are run by a council comprising representatives from professors, students and alumni which also elect the dean of the school. Within each school, chairs are the main teaching units and the chair-holder also enjoys considerable autonomy. The academic positions in universities comprise two categories: professors and junior teaching staff in a full-, half- or part-time basis (Garcia de Fanelli, 2008). There is no exclusive contractual agreement for academic so they tend to work in multiple institutions simultaneously. However, professors in national universities should be appointed on the basis of periodic, openly competitive processes (Garcia de Fanelli, 2008). Most publicly funded research is organized by specialized research agencies outside the universities like CONICET (Comision Nacional de Investigaciones Cientificas y Tecnologicas) (Garcia de Fanelli, 2008). Argentina also has a number of R&D institutions such as CNEA (National Atomic Energy Commission), INTI (National Institute of Industrial Technology) and INTA (National Institute for Agricultural Technology), amongst others. Most of the researchers funded by the CONICET are also professors at national universities. From these universities, our study focused in the School of Agriculture from Universidad de Cuyo, the School of Engineering from Universidad de San Juan, and the School of Natural Sciences from Universidad Nacional de la Patagonia San Juan Bosco. The School of Agriculture has more than 1,000 students, the School of Engineering in San Juan has more than 400 students, and the School of Natural Sciences 1,300 students.

We note that coordination by the central university office is very strong, at least in Universidad de Cuyo and Universidad de San Juan, because the evaluation system requires that all full-time professors have to be evaluated every year in terms of their time employed in teaching and research. Although it is a requirement by law, there were not enough statistics to verify the productivity of each professor since our interviewees were not able to provide the data on publications. Another important observation is the low level of professors with Ph.D.

In two cases (wine and mining), there are at least some outputs of formal intellectual property to the cluster in terms of patents related to solutions to problems in the cluster. Given the tradition of the activity and the size of economic activity in both areas (wine and mining have almost 100 years and are concentrated in these regions), these results are very low. While there are a good number of instances for formal research diffusion mechanisms in the wine cluster like courses on soil and water management, this process is more complicated in mining because the environmental concerns with the activity. Interestingly, Universidad Nacional de la Patagonia has a scientific journal "Naturalia Patagonica" for this purpose even though it is smaller in size. The flow of research money into wine and mining is fairly similar and it is determined by the central government through the budget office and some scientific agencies like CONICET. Research-related endowments do not exist in Argentina and none of the

Argentinean universities has a formal fundraising office (or even seems to do this informally) to generate endowments. The numbers referring to financing are somewhat problematic. Some of the centers do not have the data readily at hand and no universities have research data available in a format that allows them to be linked to specific clusters. They do exist of course, in a fully accurate form, but require a major effort to go to original sources, project by project.

The other problem is the lack of standardization of categories of funding, such as endowments, and the difficulty in breaking apart long-term infrastructure grants from specific project grants. The research component of the scientific knowledge generation role is fairly well managed at a general university level, but it is more related to bureaucratic control than entrepreneurial exploitation of knowledge generation instances.

Universities are deeply involved in solving technical issues for resource clusters by consulting and lab services. Nearly all faculties are active in consulting; the number of consulting projects carried out by faculty is high. There are formal university consulting organizations since professors can not consult by law. The consulting activities are managed to only a minimal extent and the definitions of what is consulting and what is research are not always clear or consistent. It seem the Engineering Faculty at San Juan, and the Agricultural Faculty at Cuyo make the most effort to track this function. There are data on contracts carried out by all research centers and labs, but they are not in an accessible form that is useful for analysis or management. There are data gathered on individual faculty consulting giving the co-operative system implemented.

Laboratories are very involved with quality control and production analysis in Argentina. Again, the data are not reliable, because of the very different ways labs define contract units, but interviews showed this is a critical source of revenue for Argentinean universities. Laboratories in both Universidad de Cuyo and Universidad de San Juan manage contracts not only for local firms but also for firms outside the cluster.

The interviews show that universities make important efforts to promote their research capabilities to the cluster through consulting contracts. There are formal R&D Extension offices. We see from the data that most universities have promotional or informative magazines, but almost none of them relate knowledge infrastructure and staff to the cluster. Most of these mechanisms are for the general public, alumni and for researchers themselves. Overall, the universities and the institutes themselves try solving technical issues for cluster organizations but, given the economic instability existing in Argentina, there are not many instances to perform long-term strategic planning of the development of capabilities competitive in the global arena.

Students are a critical linking mechanism. There are important numbers of students who are placed in work term jobs through coop programs. Both Universidad de Cuyo and Universidad de San Juan have in their programs internships in the cluster for year 3 and 4, and its final thesis has to be based on a six-months internship at the end of year 5. Numbers for graduate placement are less reliable, but still reasonable. No data are kept to show if non-core graduates enter the cluster and no databases are sufficiently detailed to show in which part of the cluster (or even in which cluster) the alumni are employed. Trades and technical education is closely linked to university education. Two Argentinean schools are integrating forcefully into technician training. There is little movement of faculty between the university and the cluster in terms of employment. Mechanisms to place faculty in cluster organizations in a kind of sabbatical arrangement do not exist or are not used at all. In mining and wine, we note some movement out of the university, and it was noted that most of the faculty had left a decade or so ago. This happens because the salary differential between university and industry is so great and there are periods of boom when there is great demand for personnel from industry. Argentinean universities show somewhat more movement from industry to university, which is significant in mining. However, in Argentina, so many part time faculty means there is very high interlinkage with industry. Many of these faculties were employees, some are full time teachers, split among different universities, but a significant number are in other parts of the cluster. It was difficult to distinguish if a faculty member was an industry professional or the people were mostly industry professionals who had part time teaching. This has great strength for knowledge transfer in and out of the university, but a weakness in that it almost never relates to research. Mining and wine show a significant linkage with industry in research through co-authored papers, and in teaching, through invited industry lecturers.

Conclusions and Implications

The set of indicators seems to cover all the aspects of the linkages, except for the following, which should be added: curriculum design; identifying students who are part of the "general public" doing this for personal interest versus students who are doing professional training on a part time basis.

Measurement indicators should be collected over a 3 year period for research purposes or 1 for annual indexing due to important annual fluctuations.

Lack of standardization of definitions makes some measurements problematic like defining university functions. Most administrative offices have multiple functions (eg research management and research extension and technology transfer), so it is sometimes difficult to measure the number of staff relevant to each management indicator. There are no data kept by any university on consulting. All numbers reported in this research are very rough estimates. Courses can vary from full semester and focused entirely on the cluster topic, to an optional, very short workshop or seminar. If one has access to the course content, a reasonable judgment can be made on inclusion, but obtaining and evaluating it is time consuming.

There is a significant degree of judgement required to measure some indicators. Faculty involvement and research outputs are

rarely oriented explicitly to a particular sector. In practice, an expert (Dean or VP Research) can usually make this judgement without difficulty, but it will be a judgement that may not use the same criteria as the expert elsewhere.

The limitations of data discussed above and the design limitations discussed are not fundamentally different than any research project on clusters, innovation, entrepreneurship and management. Nevertheless, by focussing on the data and measurements as a major objective, we are confronted directly with the implications of their limitations

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Measuring University Involvement in Regional Economic Development: A comparative study between Argentina and Chile

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Universities can become important actors in emerging regional innovation systems because they have the ability to understand existing technologies, have connections with external networks and are usually the main, if not the only, regional knowledge source (Schiller, 2006). However, there is no comprehensive set of performance measures to evaluate the effectiveness of their role in regional development through their linkages with industry. We employed the set of measures to analyse two universities located in the hearts of Argentinean and Chilean wine regions. The set of measures suggests that in the Chilean case the role of the university needs to grow in importance in the region to become relevant for its economic development, but in the Argentinean case the university is a key factor in the economic development of the wine region.

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1. Introduction

There is relatively little awareness by university managers and regulators about the specific roles and techniques universities employ to participate in regional economies and promote their development; what universities are actually doing in this regard; and how to manage their involvement better (Gray 1999, Rowley et al.1997). Our goal is to address this gap between general public expectation and detailed management techniques of university involvement with regional industries. We focus on definition and measurement of linkages between universities and industries, following the suggestions of Cano (1998) and Lang and Zha (2004), to propose indicators aimed at measuring the existence of these links that can be comparable across countries and regions. This paper applies the framework to two universities located in different regions in Argentina and Chile but both regions share the same main industry: wine.

2. The Role of Universities in Regional Systems of Innovation and Performance Measurement

Doerfel and Ruben (2002) show that performance measurement and benchmarking applied to higher education is an emerging field and most feasible for mature areas like teaching, research and employee management but it is still difficult for new areas like university-industry linkages and regional development involvement. University-industry linkages vary in their degree of institutionalization, which may range from the informal hiring of professors and ad-hoc services, to long-term partnerships and joint research centers. For each activity selected for the framework, we have one or more indicators which are the items measured (e.g. number of licenses, number of entrepreneurship courses in current year). We have grouped the actions into broader categories and the resulting activity level determines the general level of involvement of the universities and the fulfillment of their role in regional development.

In this exploratory study, we concentrate on defining the performance measures of the following activities related to the level of engagement of universities in the development of their regions:

Training

The OECD (1999) has recommended that new universities should be created with the explicit, central mandate to promote regional development through training people (Karlsson and Johansson 2006). In the case of the wine industry, the increasing complexity of wine making processes implies the need to train people in sophisticated processes. Similarly, the use of diverse grape varieties, in many cases exogenous to regions, also implies more sophisticated viticulture practices including the knowledge of new varieties from different countries.

Research

The role of developing and transferring knowledge is the subject of intense ongoing research. Godin and Gingras (2000) show that the university is still a major source of economically important knowledge produced through R&D. The university engagement in research should be considered in a certain context. R&D processes in natural resource-based industries may follow two paths (Coenen et al, 2006): R&D processes that occur inside large multinational corporations, or research institutes with close ties to industry that are also established in such regions. In the first case, universities can be powerful engines for attracting R&D activities from multinationals. In the second case, universities can offer their facilities and faculty for establishing research institutions to investigate local specific problems in wine production.

Consulting/servicing

Faculty consulting, although undocumented and under emphasized by universities, is generally regarded by industry as significantly more important for knowledge transfer than patents. In this case, the motivation of the industry is to solve immediate problems or realize opportunities (Arvanitis et al. 2005). Looking at the relationships between universities and industry from this point of view, there is another activity similar to consulting, which is laboratory and testing services (Arvanitis et al. 2005). Laboratory services are examples of outsourcing functions strongly based on knowledge which require investments that exceed the available resources of SMEs. In the case of the wine industry, winemaking activities require numerous tests that make economic sense to be performed in a central location with specialized people like in universities.

3. Methodology and findings

The research methodology consisted of data gathering processes occurred between September 2006 and September 2007. Our interviews were with Deans and Directors of different areas in each university. The interviews were mainly structured around the performance indicators that we developed. The universities and their regions reviewed are represented in table 1.

Universidad de Cuyo (Argentina). The School of Agricultural Sciences of Universidad Nacional de Cuyo is located at 18 km from the city of Mendoza, in Lujan de Cuyo. Mendoza and the greater urban region have a combined population of 540,000. The School of Agricultural Sciences has 1,300 students. The School of Agricultural Sciences also has 103 hectares of occupied land with a farm, an experimental winery, experimental factory of olive oil and preserves. There are a number of institutes in the school: Institute of Animal Biology, Institute of Soil and Irrigation, Institute of Vine and Wine; and Institute of Food Science. There are two specific programs aimed at the wine industry in the School of Agricultural Sciences. One is a bachelor of science (BSc) in oenology and viticulture. The second program is a master of science in viticulture and oenology, where students can obtain a double diploma with Ecole National Superieure Agronomique de Montpellier (AGRO-Montpellier) and INRA-Montpellier (Institut National de la Recherche Agronomique). Wine is part of common undergraduate courses such as Agricultural engineering and Bachelor in Food Safety.

Universidad de Talca (Chile) has developed connections with the wine industry so it matches our criteria of location in the region and involvement with the industry. While the Universidad de Talca is immersed in a wine area, its strategies relate only vaguely to industry except with respect to the participation of a research consortium with industry and other universities in Chile. In engaging with the industry, there is a specific intent to decentralize operational decisions to particular specialized centres. This is the approach taken with regard to wine industry when it created the CTVV (Centro Tecnologico de la Vid y Vino). In Universidad de Talca, there are no specialized degrees in wine. The percentage of students in agriculture degrees getting jobs in the wine region is 50%: 30% of students works in activities related directly to the wine industry (vineyards and cellars), and 20% works in activities indirectly associated to the wine industry (irrigation, selling inputs from distributors, fertilizers companies, etc). In the area, there is also a strong production of apples, kiwis, corn seeds, rice that competes for students' attention and final job location. Some students move to other wine regions for their jobs.

We observe that Universidad de Talca does not develop its training function as intensive as Universidad de Cuyo when is measured through the number of courses and activities related to education specifically to the wine industry as Table 2 shows. Since most graduates in wine-related degrees come from Pontificia Universidad Catolica and Universidad de Chile, which are located in Santiago, there seems to be an attraction to external sources of training in wine industry in this region. Therefore, there seems to be a disconnection between the production of knowledge workers in Universidad de Talca and the requirements of the region in terms of wine industry while Universidad de Cuyo is highly engaged in this activity.

3.2. Research

The research indicators illustrate a conflicting picture. While there seems to be higher levels of research activity in Talca compared to Cuyo in terms of research funding and peer review publications, Cuyo seems to have more people doing research and more technology transfer instances. One explanation for this difference is related to the size of Cuyo compared to Talca in terms of faculty and the faculty performance review existing in Cuyo, which has been implemented by request of a national law, that measures faculty engagement with industry through agreements with firms and intellectual contributions. However, faculty activity in Cuyo is not supported by grants or measured in terms of peer review publications. In terms of the impact of these activities, Cuyo may be also more active than Talca as it has more technology transfer licenses with the industry. While Talca has most of its faculties with PhDs (66%), which is in line with recent trends in Chilean Higher Education, Cuyo has very few faculties with PhDs, which may be affecting its research outputs although we did not have information to confirm this appreciation

3.3. Consulting/servicing

While the consulting numbers seem to indicate a high level of engagement, most of the engagement is informal rather than formal long term relationships. However, in terms of laboratory services, Universidad de Cuyo has six laboratories for diverse subjects: molecular biology, soil, nematology, viticulture/oenology, cold, and waste management. In that sense, the laboratories existing in Universidad de Cuyo provide with full services to different actors in the local wine industry as well as projects in other areas of Argentina. In the case of Talca, most of their laboratory contracts come from the core wine industry not only located in Maule valley but also in Colchagua valley. Laboratory service contracts (1000 services per year) are widely required to Universidad de Talca due to issues such as appellation control and evaluation of vines clones to be free of virus (the main task of CTVV). Therefore, the high volume of activity is mainly driven by law requirements rather than the intention of exploiting unique and sophisticated knowledge. However, the laboratory services activities seems to be a good way of engaging with industry in providing value added services in areas where the industry does not have skills or sufficient economies of scale.

4. Conclusions and Implications

We conclude from the analysis of our performance measures that the Chilean wine region of Maule and Argentina's largest wine region are following two different paths in regional development. The Chilean wine region seems to focus on exogenous knowledge sources rather than local university-industry linkages. Argentina's largest wine region development seems to be more endogenously driven through local university-industry linkages (albeit the recent establishment of foreign firms is changing this situation) because of the high intensity of training activities leading to the existence of networks formed by graduates and professors embedded in diverse institutions. Universidad de Cuyo shows a good interaction at the regional level but it is not clear what is the value generated to the industry and the regional development, an aspect that we need to control through an additional set of indicators.

Second, our exploration of university-industry linkages measurement left a number of suggestions to develop performance measurement systems in Higher Education. The importance of clear performance measurement systems cannot be overstated since they are not neutral as they define issues that have not necessarily existed before and can cause very negative distortions to university strategy, especially in their interactions with industry. For example,

- Differences related to university degrees and diplomas reduce the meaning of standard categories for graduates and knowledge worker development.

- Define university functions in a standard way since most administrative offices have multiple functions (e.g. research management, research extension and technology transfer) so it is sometimes difficult to measure the intensity of the engagement of university with their regional industry.

- Within a single number there can be a great deal of variability of the phenomenon measured like courses can vary from full semester and focussed entirely on the industry to an optional, very short workshop or seminar or research publications have great differences in their importance with respect to patents and licenses. Therefore, counting events like courses and seminars or publications and patents as equal is convenient, widely practiced, but it may be misleading

- Some data are not gathered by universities in activities related to their role as promoter of the region like consulting activity or it is impossible to tell from data bases exactly where alumni are working.

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O-047 **Do foreign authors strengthen South Korea national research system**

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With globalization accelerating, a nation₁⁻ s competitiveness in terms of its knowledge base increasingly depends on international dimensions. In an age of globally networked research, national institutions can no longer be considered as unique components of an international system of research, technology, and innovation. Exchanges increasingly take place across national borders. Hitherto, the Triple Helix (TH) perspective of university-industry-government (UIG) relations has been particularly useful for examining how effectively institutional actors in a national science system work together across institutional boundaries and the consequential status of the interaction-based knowledge infrastructure in a national research system (Etzkowitz & Leydesdorff, 2000).

The most salient development witnessed these days regarding TH indicators is the role of international co-authorship relations. The significance of these foreign authors in the formal literature as covered by the Science Citation Index (SCI) lies in their ability to mediate between traditional knowledge holders and seekers in national system. In a recent study, Leydesdorff & Sun (2009) found that foreign authors have been emerging as arguably the important mediator in the national innovation system of Japan. This paper traces the underlying patterns of collaborations between Korean researchers and their international partners, using longitudinal data obtained from the SCI. More specifically, the paper investigates the connection between Korean institutional actors (University, Government, and Industry) and international co-authorship relations. A network-based system indicator is used to measure the evolving network of co-authorship relations among national and international actors of the TH in South Korea.

Development of Korean Science System and the Role of Overseas Actors

Since the early stage of the development of Korean science system in the 1950s and 1960s, overseas institutions (particularly in the US) have been critical to provide highly-qualified training for Korean researchers. During the period, like other public science systems in the developing countries, the main role of Korean science system were limited to the education of standardized industrial labor and to the technical support for industry rather than implementation of scientific research (Kwon, 2009). Due to various government policy efforts, the university system has expanded in the 1980s and the academic research has been revitalized in the 1990s. Therefore, international actors have emerged as an important research collaborator for Korean academics as well as for other domestic actors (i.e. scientists in public research institutes and industries). Recently, the government has strongly encouraged high-quality cooperative research at the international level through WCU (World Class University) and WCI (World Class Institute) programs inviting prestigious international scholars.

Figure 1 shows the longitudinal trend of publications of domestic actors, overseas actors, and domestic actors with foreign actors. During the last several decades, Korean universities have been a main collaborator for overseas actors in terms of scientific publication, as shown in the figure. As the high-quality academic research encouraged in the late 1990s, the publications with overseas actors has increased steadily. In particular, after decrease in the mid-1990s (Kim, 2005), the share of papers co-authored with overseas actors has resumed from 21% in 1996 to 26% in 2006.

Figure 1 Number of publications of domestic actors with foreign actors in Korea

Results

Figure 2 visualizes the results for the national TH system without considering international relations. The longitudinal trend shows the reduction of uncertainty among academic, public, and industrial research actors in the Korean publication system from 1970 to 1990. Interestingly enough, mutual information among the three institutional agencies is relatively stable during the early 1990s but decreased during the last ten years (For the detailed investigation of national TH system in Korea, see Park, So, and Leydesdorff, 2009)

Figure 2 Mutual Information in trilateral domestic TH relations in Korea

Figure 3 extends this analysis with the international dimension. It shows a very noticeable result about the different TH dynamics in Korea with the emergence of the new important nodes added, that is, foreign authors. The trend line shows that mutual information in bilateral relations between university and foreign sectors has been in a rapid increase since 1990. Government-foreign research collaboration (Tgf) is the second strongest and industry-foreign relation (Tif) follows in the recent decade.

Figure 3 Mutual relations between university, industry, government, and overseas actors in the domain of articles with Korean address

Figure 4 shows the longitudinal trend of three and four dimensional indicators. An interesting path among the three and four institutional spheres has emerged. First, the TH dynamics of UIGF relations in either three or four dimensions had varied considerably until mid-1980. Next, mutual information among the four agencies (Tuigf) began to increase in 1987 but remained increasingly stable during the 1990s. However, there is some reduction of uncertainty among academic, public, industrial, and foreign research actors in the Korean publication system during mid-1990s. Overall, the system has been stable since 2001. Only university-industry-foreign eroded in the period. This is not due to bilateral relations (UF and IF) which both increased, but the synergy between the international relations of industry and academia can no longer be harvested from these relations at the national level.

Figure 4 The mutual information in three and four dimensions among Korean articles

Conclusion

The Korean government has sought to strengthen the national research system in order to narrow the wide gap with Western countries in the short term. However, the government has relatively neglected public interventions in fostering the knowledgebased innovation capacities across the country. The significance of international authors in the national TH system is growing due to changes in the knowledge environment. The interdependencies of complex technological changes and advanced in scientific disciplines is rapidly increasing and a competitive advantage can be secured through cooperative partnerships. The findings of this research show that the effectiveness of national research capability can be boosted beyond the three national helices by including the international relations into the perspective and new developments can be driven at the network level.

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O-007

Technological collaboration and R&D alliances: an assessment of the impact on the economical performance of EU regions

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This paper investigates the impact of technological alliances on regional economical performance in the EU27 area. Firms are increasingly looking outside organizational boundaries for new ideas and knowledge in order to increase their innovative performance (e.g., Chesbrough, 2003). In this regard, Etzkowitz and Leydesdorff (1998) highlighted a complex and dynamic process of interactions between University, Industry and Government instrumental for transferring and creating new knowledge among the organizations involved. These processes can influence innovation performance and act as sources of competitive advantage for private firms while at the same time resulting in an increased performance on the level of innovation systems as a whole. Indeed, Schumpeter (1942) already conjectured that innovation - resulting from the creation and application of new knowledge – should be seen as the engine of economic growth,

Several empirical researches have focused on the impact of knowledge and technology transfer between different types of organizations on local economic development. Many of them have considered industry-science interactions and found that they affect regional economic growth positively (e.g., Jinyoung et al., 2005, Bramwell and Wolfe, 2008).

At the same time, it can be noticed that limited attention has been paid to the whole spectrum of interactions (alliances) that could be present within a (regional) innovation system. Besides industry-science linkages, alliances between firms (see Romer, 1986, 1990) as well as collaborations involving governmental agencies (including Public Research Organizations) might be beneficial for the innovative – and hence wealth creating – performance of regions.

Within this contribution we analyze the occurrence and nature of technological and R&D alliances on the level of NUTS2 regions across Europe (EU-27). Building on data contained in the EPO Worldwide Patent Statistical Database (PATSTAT) and in the Cooperative Agreements and Technology Indicators (CATI) database, we obtained exhaustive information on co-patents. Applying sector allocation algorithms allows distinguishing between different types of actors (firms, universities, PRO's, individuals, governmental agencies) involved in the alliances (see Van Looy et al., 2006), resulting in differentiated indicators depicting the local inclination to perform collaborative technological and R&D activities. These data have been complemented by R&D alliances data (CATI) which have been allocated to the NUTS2 level. We constructed a panel dataset covering a 10 year time period (1996-2005); besides indicators pertaining to alliances and collaborations (co-patenting), economical and RDI indicators have been collected and introduced as dependent variable (GDP, GDP increase) or control variables (Investments in R&D; Human Resources in Science & Technology; source: Eurostat regional indicators). Applying fixed effects regression models allows assessing the distinctive contribution of collaborative activities towards economical performance. Preliminary findings clearly indicate positive effects of technological alliances (measured by means of co-patenting), while the effects of commercial alliances (CATI) are less outspoken. Our findings with respect to the nature of partnerships (Industry-Science; Industry-Industry) suggest distinct albeit complementary roles.

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O-094

Academic entrepreneurship in developing countries: the case of an Entrepreneurial Department

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Introduction

There is a marked trend toward entrepreneurship in the mission and performance of more and more universities (Rod, 2006). Such trend has been explained in the national innovation literature by factors like an increasing demand for knowledge transfer in knowledge-based economies, reduction in public moneys to finance teaching and research, and the pressure to maximize the returns on social investment in research (Etzkowitz and Leydesdorff, 2000). Those forces push universities to diversify sources of funding and research activities.

In order to embrace entrepreneurship, universities design and implement entrepreneurial plans. The entrepreneurial university described by the triple helix model can be difficult to establish in entities that tend to be bulky and difficult to transform, where culture is often risk averse, and the vision of embracing a third mission is often criticized (Armbuster, 2005; Washburn, 2005). Also, the identification of entrepreneurial universities tends to be based on the activity of smaller units like research centers, spinoffs, technology transfer offices, but not necessarily the whole university.

The present article proposes to study smaller units inside the university, like the academic departments, which can be more flexible and manageable to define and implement strategies for academic entrepreneurship. Academic departments present limitations given by the scope of its operations, access to corporate resources and responsibilities; however, being a smaller unit can facilitate the implementation of strategic elements identified by Clark (2005) for the entrepreneurial university. Those elements are important in the developing countries, where public universities are not only constrained by governmental supervision, but where organizational culture tends to be comfortable with stability rather than with the risks of innovation.

It is our claim that even with minimal resources and against all odds, a department can successfully become an entrepreneur, and yet, spread the entrepreneurial challenge in larger organizations, firstly a faculty or college, then the university. Such statement is supported and documented by the case of the Department of Management Control and Information Systems (DCS), at Universidad de Chile.

The concept of the entrepreneurial department will be developed by analyzing in depth the case of DCS, which changed from being a vanishing unit to one that grows in prestige, faculty body, publications, students, income generation, and diversification of income sources, moving quickly from Mode-2 to Triple Helix model.

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DCS at Universidad de Chile

DCS was founded in 1991 in Universidad de Chile, which is public, and the oldest university in the country. The university's operations are currently financed by the state in about 14%, and to cover the remaining 86%, each Faculty and Department execute first and second-mission activities; however, those traditional activities may not suffice. Additional incomes can be generated by third-mission activities (executive education, consulting, sponsored research, and services for private and public institutions), allowing the departments to subsidize teaching and research, and promising growth in prestige and business opportunities.

Until 2002, DCS obtained funds from the college of business and economics for M\$180, and generated other M\$120 to cover operational expenses. In the period 2003-2008, DCS gradually increased its own income generation by 2.500%, as well as the number of students from 200 to 2.700 every year. Such increases are explained by the definition and implementation of an entrepreneurial strategy.

The entrepreneurial strategy of DCS, was designed and implemented as a three-stage plan. A first stage aimed to assure the Department's survival. The second stage started right after stabilizing and securing DCS' survival. It proposed a consolidation of its faculty body, academic production, and financial stability, in a four years period. The third stage is currently in execution, and pursues to expand the scope and visibility of DCS' operations.

At the time this manuscript was written, stages one and two concluded successfully by detecting executive education opportunities, generating financial resources, and working as a marketing strategy. The educational relationship between DCS and several companies is being established as a network that facilitates consulting activity and sponsored research. Additionally, visibility and prestige of DCS increased in the media, consolidating DCS as a referring department.

Conclusion

The major contribution of this article is to demonstrate that small units like entrepreneurial academic departments can embrace the entrepreneurial vision and challenge. The implementation of such approach, if well planned, has the potential to strengthen the relationship with industry and government, spread the entrepreneurial vision to the larger organization, and generate virtuous circles in revenue generation and academic production. It is remarkable in the studied case that even under strict regulation DCS is an innovator in strengthening the relationships with Government and Industry. The implementation of the entrepreneurial strategy is not risk-free. In fact, there have been difficult decisions to make in designing a coherent plan, with a business model fitted to the outcomes pursued. At present, DCS has a larger and diversified faculty body, which, on the one hand, is a great opportunity to complement skills and capabilities, but on the other side, is also a huge challenge to define workload efficiently, and balance academic and financial production.

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Complementary or substitution effects between transfer mechanisms used by researchers in occupational health and safety

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INTRODUCTION

Many models of knowledge transfer have been studied and applied in different contexts, fields or disciplines. The focus of this study is examining transfer mechanisms in the specific field of

occupational health and safety (OHS). In previous analysis, we identified three (3) mechanisms of knowledge transfer activities used by researchers. This study focuses on how those mechanisms are complementary or substitute in the activities of knowledge transfer of researchers in occupational health and safety.

Like other authors (Knott and Wildavsky, 1980; Landry et al., 2007; Laroche and Amara, Accepted), we measured knowledge transfer as a series of activities. We conducted a principal components factor analysis (PCFA) that showed that the items of knowledge transfer were organized according to three factors (diffusion, active dissemination and implementation). These factors represent the mechanisms used by researchers to convey research knowledge to managers, professionals and practitioners. The findings point to active dissemination as being the most oft-used mechanism by researchers in the field of OHS in Canada (Laroche, 17-19 June 2009). "Active dissemination" is a mechanism by which researchers transfer their knowledge to users via interactions between the two groups (by sending and presenting results directly to users, by sitting on working groups using their research results). "Diffusion" is a form of passive dissemination in which researchers are transmitting their results by publishing them on an up-to-date website, in newspapers, e-news of bulletins, or by using an e-mail distribution list to share knowledge. Also, in the mechanism of implementation, research results are used in business activities and the consultation services provided by researchers, in the creation of new or improved goods, services or policies, and the commercialization by others.

To our knowledge, no study has investigated the conditions under which researchers in OHS will be active concurrently in multiple knowledge transfer mechanisms. The aim of this paper is two-fold. First, complementarities, substitutions and independence between various forms of mechanisms of knowledge transfer are studied in order to see how researchers in OHS mix these mechanisms to transfer knowledge (Colbeck, 1998; Landry et al., 16 & 18 May 2007). Second, heterogeneities in the determinants of researchers are explored in choosing among three mechanisms of knowledge transfer. Thus, this study investigates whether the three transfer mechanisms of research in OHS are complementary or substitute and explores heterogeneities of the determinants of those mechanisms. Studying these complementarities and substitutions in combination with their determinants can provide insights into the use of mixes of mechanisms of knowledge transfer by researchers in OHS.

METHODS/DATA

This paper uses a multivariate path model to reflect the fact that in practice, researchers simultaneously consider whether or not to undertake concurrently multiple valuable mechanisms of knowledge transfer activities rather than treating them independently. The Multivariate Probit model includes three equations referring to the three transfer mechanisms. The multivariate probit specification allows for systematic correlations between engagements for the three transfer mechanisms. Such correlations may be due to complementarities (positive correlations) or substitution (negative correlations). The explanatory variables included in the Multivariate Probit model are the qualitative or quantitative nature of results, the disciplinary or specialized nature of publications, the adaptation of knowledge, the research fields, the contacts with knowledge broker, the number of research reports, the presence of a dissemination strategy, the resources dedicated to dissemination, the number of peer-reviewed journal articles, the researchers' level of seniority, the private funding, the institution type and the knowledge production mode.

This study is based on a 2007 survey of 568 researchers in occupational health and safety in Canada. The data was collected with a web-based survey and we obtained a net response rate of 48.5%. The list of the participants was constituted from membership lists of different researchers' institutions and groups. At first, an initial list of 405 researchers was constituted. Thereafter, this list was enriched to obtain a final number of participants of 568 researchers.

RESULTS

The results provide evidence to the existence of complementary effects between active dissemination and implementation transfer mechanisms. The correlation coefficient between those variables is positive, thus suggesting complementary effects. Conversely, the correlation coefficient between diffusion transfer mechanism and the two other mechanisms (active dissemination and implementation) is negative, suggesting the existence of a substitution effect between those mechanisms. Finally, the results also show that there are differences in the determinants of the three transfer mechanisms used by researchers in OHS.

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O-097 Software clusters in Brazil: a tale of two cities

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Introduction The literature on the benefits of the location of technology clusters in a given territory usually points to the advantages this location may provide for regional development. In the case of the software and information systems industry, clusters are viewed by local governments as initiatives that increase the skills and abilities of local workforce, promote knowledge spillovers and contribute to establish networks of enterprises. In the software industry networking is often associated to the activity of offshore outsourcing activities.

State of the art about the topic

Benefits of software clusters are related to physical and organizational proximity. Physical or geographical proximity create static advantages as scale economies, possibilities to strengthen productive chains, reduction of transaction costs and access to new markets. It also creates dynamic advantages such as knowledge accumulation and development of innovations. Geographical proximity creates conditions to the sharing of tacit knowledge, which may happen as a result of cooperation between enterprises, rotation of human resources and entrepreneurial activity in the region. Physical proximity is also an advantage for the diffusion of codified knowledge, as its absorption requires an institutional context that allows for joint problem resolution, learning and knowledge creation (Bathelt et al., 2004).

Organizational or relational proximity is related to affiliation and similitude of enterprises, so it is not necessarily contained in a territory. Both kinds of proximity - geographic and organizational - are crucial in the sharing of tacit and codified knowledge (Davenport, 2005). This concept was developed to understand the process of sharing information contained in business trips, common routines, databases, common software and temporary communities of projects and task forces.

Some authors suggest that relational proximity may substitute geographical proximity in certain stages of the innovation development process (Lemarié et al.,2001, Amin and Cohendet, 2005, Davenport,2005). Geographical proximity is important in the early stages of the innovation process (design) and in the final stages (testing); the stages of development and prototype can be based on long-distance communication. In the case of ICT industries, relational proximity has materialized in the activity of outsourcing, where firms transfer part of the software and services development process to other firms.

As the activities of enterprises are embedded in an institutional context built by social relations, the formation of agglomerations of enterprises can be considered as the result of a selection process that determinates favorable conditions to answer demands put by technological change. In spite of the fact that user-supplier relationships may extend outside the territory through organizational proximity, some studies suggest that for knowledge generation it is more important to belong to a community than to an organization (Kaufmann et al, 2003, Walsham, 2003). Bathelt et al. (2004) suggest that successful clusters combine the generation of local knowledge with the acquisition of external (codified) knowledge.

In the case of software development, Nicholson and Sahay (2004) suggest that software development depends on sharing organizing principles, routines and standard operating procedures that may be non-migratory due to embeddedness of knowledge in context. Cassiolato et al. (2007) argue that the tacit and complex nature of knowledge necessary to generate innovations in the software industry enhance the importance of communication channels between users and suppliers. If those channels are built on a local basis, an accumulation of competencies in the region will take place, leading to growth and internationalization of local enterprises, given the strong path dependency of the industry.

Research Focus and Methodology

We will in this paper relate the case of two cities in Brazil where local governments had a strong role in supporting the software industry. The main question of the research was whether institutional support is sufficient to develop a successful software cluster. One city, called Recife, managed to build a successful cluster, whereas the other, called Petrópolis has not been successful so far. The paper will explore the differences between the clusters and discuss their perspectives, based on a research the authors did during 2008 and 2009. The methodology involved revision of the literature, analysis of statistical data on ICT production and employment and semi-structured interviews in Recife and Petrópolis.

Findings, contributions and implications

Our research shows that the characteristics of the regions are important for the development of software industry. As for the institutional environment, governments have an important role in the promotion of software clusters, because of their potential to create a favorable environment for the industry. At the federal level, governments may create specific laws that support innovative activities. At the local level, governments may stimulate software clusters by creating technological parks or other initiatives to support links between governments, industry and universities.

However, even when institutional conditions are favorable, software clusters may not grow as expected. Success of a software cluster depends also on how firms access markets and whether they are capable of continuous innovation, either by establishing partnerships to develop new technologies with local universities or with their clients.

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ST-14

Evaluation and dissemination of research: the University Press as a tool for knowledge and technology transfer

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In the information society, characterized by the explosion of free media, the usual patterns of knowledge diffusion, acknowledged for centuries in various scientific communities, have undergone profound and rapid changes. In particular, the literature in this area (Brunella Longo-2001) speaks of a growing process of "disintermediation". This is due to the spread of digital magazines, of open access and of content via Web: the role of traditional media is threatened by a standard of exclusively online publications. At the same time, the spreading of "on demand" printing mode is reducing considerably bookshops activities. The transition to digital is challenging the current models of management, production and distribution. The prospect of a dematerialized and "differently mediated" content industry is already taking form and its most "pervasive" (for the concept of pervasiveness see Kranzberg Pursell, and Mackay) consequences can be observed in the field of scientific publishing. It's necessary in this area to redefine the standard procedures in order to accomplish its functions, addressing especially the structural weaknesses. Since the eighties, Italian researchers have addressed the issue of research evaluation. It was clear from the very beginning

Since the eighties, Italian researchers have addressed the issue of research evaluation. It was clear from the very beginning that, with the advent of new technologies, the system should change its method. In Italy, but also in the international context, the publishing business still owns almost all of the world's scientific publications (Vitiello, 2003). Since the impressive growth of research in the years following World War II, private publishers could provide a constantly growing dissemination of research results, thanks to distribution networks, and to the monitoring and recognition of scientific validity of what was published through peer review.

To date, it's possible to observe the lack of an essential link between electronic publishing (in particular open access) and the processes of research evaluation. In fact, the electronic publications belonging to the commercial circuit and the articles published in online journals with impact factor and no Open Access have acquired equal "academic" dignity of printed publications at least with regards to evaluation purposes or for participation in competitions. On the other side monograph and periodical publications, when of open access and free of Impact Factor, remain without recognition and certification.

Universities are one of the main actors of this system: university scholars have a role both as authors and users of the contents. The life cycle of the scientific content of publications it's like a ring: the content is created in universities and research laboratories and returns to them, via the University library, which is often the only client interested in buying it!.

Stevan Harnad (1996) has called this circle a "Faustian bargain", ie the phenomenon by which the academic scholars, as authors of scientific research, typically are not paid for the publication of their results, and are denied the possibility of free distribution of digital versions of their work (Harnad and De Robbie). Therefore scholars are forced to pay, as users, to access content produced by their colleagues. As stated by Guédon (2004) scientific knowledge, being funded by public money, should itself be made public.

To face the changes in the field of science communication and the increasing difficulty of publishing in general, numerous attempts have been made at international level (Cotoneschi and Pepeu 2004). In most cases, this attempts try to implement its usual function of instrument of digital scholarly communication and dissemination of internal research, turning it in a vehicle for communication and dissemination outside Universities. This study reports the analysis of several case of international university press as an effective tool to accompany the entrance of the universities in the transition to the new paradigm of digital communication science. Some of the indicators that have been subjected to a comparative assessment are:

- 1) The reduction of the costs of the universities' publications;
- 2) The certification procedures relating to the quality of the publications;
- 3) The criteria of protection of intellectual property;
- 4) The contribution to the spread of the university image through the publications;
- 5) The increase of the impact of scientific output, becoming part of the global circuit of the Digital Library.

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O-043 **The Triple Helix and Evolution of Smart Cities under the Cultural Reconstruction and Governance of the Urban Renaissance**

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This paper sets out to demonstrate how the Triple Helix model enables us to study the knowledge base of an urban economy in terms of civil society's support for the evolution of cities as key components of innovation systems. It argues that cities can be considered as densities in networks among three relevant dynamics: the intellectual capital of universities, industry of wealth creation and their participation in the democratic government of civil society. It goes on to suggest the effects of these interactions generate dynamic spaces within cities where knowledge exploration can also be exploited to bootstrap the technology of regional innovation systems (Cooke and Leydesdorff, 2006; Etzkowitz and Leydesdorff, 2000). Dynamic spaces, the paper suggests that are explored through the all-pervasive technologies of information-based communications (ICTs) and those currently being exploited to generate the notion of "creative cities," as the knowledge base of intelligent cities and their augmentation into smart(er) cities.

The paper suggests that it is the ability of this dynamic to work as such a meta-stabilizing mechanism and reflexive layer in the reinvention of cities which lies behind the surge of academic interest currently being directed at communities as the "practical" instantiations of intellectual capital and knowledge they produce (Amin and Cohendet, 2004; Amin and Brown, 2008). It also suggests the reinvention of cities currently taking place under the so-called "urban renaissance" cannot be defined as a top-level "trans-disciplinary" issue without a considerable amount of bottom-up cultural reconstruction. Taking such a "bottom-line" approach to the reinvention of cities, the paper serves to kick-start this reconstruction by challenging the Mode-2 assumption that cultural development is the spontaneous product of market economies and by using the critical insights the Triple Helix model offers to represent the policies, academic leadership qualities and corporate strategies which provide critical sights into the governance of this cultural reconstruction.

This reveals that cultural development, however liberal and potentially free, is not a spontaneous product of market economies, but a product of the policies, academic leadership, and corporate strategies which need to be carefully constructed. Otherwise, cultural development of this kind remains merely a series of symbolic events, left without the analytical frameworks needed to explain itself in terms of anything but the requirements of the market. This also serves to demonstrate that any such appeal to the efficiency of the market as a means to explain cultural development can only be considered as analytical shortcuts holding back any meaningful specification of the policies, leadership qualities, and corporate strategies which their governance stand on.

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Drawing upon the "renaissance" experiences of "world class" cities like Montreal and Edinburgh, the paper provides evidence to show how entrepreneurship-based and market dependent representation of knowledge production are now being replaced with just such a community of policy makers, academic leaders, corporate strategies and alliances. Strategies and alliances that in turn have the potential to liberate cities from the stagnation which they have previously been locked into and offer communities the freedom to develop polices, with the leadership and strategies, capable of reaching beyond the idea of "creative slack" as a residual category. Beyond the idea of creative slack and towards a process of reinvention whereby cities become "smarter," in using intellectual capital to not only meet the efficiency requirements of wealth creation, but to become centres of creative slack, distinguished by virtue of their communities having political leadership capable of not only being economically innovative, or culturally creative, but enterprising in opening-up, reflexively absorbing, and discursively shaping the governmental dimensions to such developments.

Armed with these critical insights, the neo-evolutionary logic of the Triple Helix model is subsequently used as a means to uncover the intellectual capital sustaining the development of this cultural reconstruction and reveal the corporate management strategies making it possible for this process of reinvention to function as meta-stabilizing mechanisms integrating cities into the emerging innovation systems (Deakin and Allwinkle, 2007; Deakin, 2009 2009). This demonstrates the "creative reflexivity" of this meta-stabilisation to be far from "symbolic". Far from symbolic and in that sense real, insofar as it generates the critical reinforcement which is needed for the democratic values of civil society to govern over any such "programmatic" integration of cities into innovation systems, particularly those centred around the "creative destruction" of the global and "reflexive reconstruction" of the local (Deakin, 2009a and b).

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O-128 Following the Approach of National Innovation System: Evidence from National Innovation Platform in China

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The National Innovation System (NIS) concept first appeared in the mid-1980s in the context debates over industrial policy in Europe. Remarkably, this concept has been rapidly diffused and widely used in both academic circles and policymaking content.

China; SNIS has some prominent weakness in the following aspects. First of all, compared with other countries, the innovative capability of the main actor, i.e. enterprise, is weak. Second, China has not developed a mature channel for interaction and cooperation among actors. Third, regional and national supportive programs to innovation overlap and lead to waste and inefficiency. In the light of this, a new concept of National Innovation Platform (NIP) has been brought forward by Chinese government. In March 2008, in his report on Chinese Government work in the next five years, the Chinese Premier, Jiabao Wen, announced that China will put into effect a program of j°National Innovation Platforms (NIP);± to strengthen China's science and technology infrastructure and support technological innovation of enterprises, especially SMEs (Small and medium enterprises).

Although we can not find the accurate definition from the government policy or academic research, we can give a descriptive interpretation according to the three pilot projects. Generally speaking, the National Innovation Platform has been developed to improve innovation and linked to sectors based on the generic and crucial demands of enterprises in the specific sectors. NIP integrates the innovation resources (e.g., knowledge, facilities, and skilled people), which are present in enterprises, universities, and research institutes, as well as the Platform guides the concentration of factors of innovation in enterprises. It is a supporting program that mainly promotes application oriented innovation of a sector national wide.

NIP is proposed as a public policy strategy which aims at improving innovative capability of specific industries and is expected to solve some problems generated by the reform of China; s R&D-system as well as to overcome some weakness of China; s NIS.

Compared with the concept of NIS, NIP places more emphasis on the infrastructure of innovation and can be seen as an early stage to form a completed innovation system. To have a deep understanding, we will go a step further to find the relationship between NIP and NIS in substance and in detail.

NIP is an experiment under the guidance of the NIS approach. First of all, NIP accomplishes interaction and cooperation among different actors, which is the key factor highly emphasized in NIS approach. NIP-program in China forms organizational and institutional linkage among universities, research institutes, enterprises, government and other actors. Because of NIP, innovation resource is shared among actors or concentrated for crucial innovation which is beneficial to the whole industry but hard to achieve by a single enterprise. Interaction between knowledge producer and user is also supported since one guideline of NIP is to build based on the demand of enterprises. Feedback from enterprises is a driving force for the collaborative innovation process. Besides, NIP reflects government industry policy so that is supported by central and local government. Second, NIP achieves basic functions or activities of NIS. As we conclude, NIP can accelerate the flow of both codified and tacit knowledge like bridging agencies as well as create new knowledge. In addition, it also guides the direction of innovation, influences deployment of resources, supplies fund for innovation, creates positive externalities through R&D activities for generic technology, and provides technological services to enterprises etc.

NIP is a possible way to shape China; s NIS. We admit that the outcome of NIS is the cumulative and integrative effect of system; s components (actors and institutional set-ups) along with exogenous factors (such as change in the international environment). Although NIS can not be planned or designed with a definite objective, we still believe it can be affected or at least shaped to some extent. Consciously designed government policies and actions can change actors; incentive mechanism and/ or their relationships (organizational or institutional), leading to a change in actors; behavior. If changes in individual actor are in the same direction and strong enough, the cumulative effect should be a change in the performance of NIS. As to the case of NIP, it forms new relationships (interaction and cooperation) among different actors and encourages these actors to engage in innovation process based on the crucial and generic demand of industry by policy. In other words, NIP-program affects the components of NIS, i.e. both actors and institutional set-ups. If NIP is implemented felicitously, it is reasonable to make an optimistic forecast that the resulting NIS will form stronger domestic links and interactions among knowledge producers, users and the government. The technological infrastructure and supportive institutions for enterprises will be developed. Besides, NIP is a good complement to China; s National S&T Infrastructure Platform. The former is application oriented. It supports innovation in enterprises and helps them apply new technology to production while the latter provides a national support to basic research. However, the NIP-program is still based mainly on practical considerations in China. Theoretical study about this newly-emerged program falls behind practice.

To fill in the gap mentioned above, this paper introduces a new framework, which derives from the National Innovation System (NIS) approach, to explain the theoretical basis of the NIP program in China and elucidates the relationship between NIS and NIP. It also proposes a framework for analyzing the mechanism of $China_i^-$ s NIP. We argue that the national innovation platform in China is a good practice following NIS approach. NIP effectively accomplishes, what is emphasized in NIS theory, the interaction and cooperation among different actors and it encourages the flow of knowledge in the process of innovation.

P-002 Doing gender in Sweden's innovation policy

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Since the establishment of the new governmental agency Vinnova in 2001 and the initiation of the regional growth agreements in 2000, the Swedish government has promoted innovation by means of regional innovation systems. Just as long, there has been a debate about the gendered aspects of these policy efforts, especially in relation to the transformation of academic theory into regional practice. In this paper, the matter of how gender is produced in Sweden's innovation policy is discussed in the light of a survey brought out on the pattern of prioritization among regional innovation systems in Sweden. The survey exposes how 75% of the regional innovation systems subject to public promotion via the Vinnväxt programme concerns groups of industries that primarily employ men. From a 'doing gender' perspective, this pattern implies that gender is done in a manner that distinguishes men from women in relation to regional innovation systems. A seed of change is to be seen, however, in the bottom up initiative to organize regional innovation systems around women's entrepreneurship and innovation, originating from the project Lyftet. In this paper, this seed of change is interpreted as an alternative to the segregating and hierarchical doing of gender in Sweden's innovation policy, introducing a way where it is unnecessary and undesirable to distinguish women from men when it comes to public promotion of regional innovation systems. Some final thoughts on how different measures of gender mainstreaming influence the doing of gender in the regional practice of innovation policy programs indicate that measures introduced ad hoc in already prioritized formations will not change the encompassing pattern of how different groups of industries are esteemed in the process of prioritization, thus leaving the predominant way of doing gender intact. However, a gleam of hope can be discerned in recent calls made by Vinnova on areas that bridge the gender segregated labour market, e.g. within innovation journalism, e-services and healthcare.

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W-02 **Regional Policy and Homosocial Structures**

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Theoretical background

This paper presents a social constructivist perspective on regional development and innovation systems. Our theoretical points of departure rest on both human geographical and sociological perspectives. This means that we focus on gender relations on regional and organizational levels and scrutinize the interrelations between these levels.

The regional policy in Sweden today is characterised by a strongly emphasized governance model, i.e. an orientation towards networks and cluster initiatives. The running regional development programme of the county of Värmland is a template for the modern governance policy. It rests upon some basic principles such as partnership engagements, networking, EU-specific linguistic usage, and superstar rhetoric. But this seemingly innovative regional policy has roots in traditional industrial society (Sw. bruksmiljö). The network planning model gives the opportunity for informal social structures to re-enter the area for regional planning.

One hypothesis in this paper is that gender equality in regional government policy is challenged by the presence of homosocial shadow structures such as secret networks and clubs on the outside of the official organisations. Strong and efficient networks are of cause essential elements in modern regional development based on governance policy. But networks are also very important in the historical reproduction of traditional power structures, male dominance and hegemony. In Sweden, the gender equality discourse stand strong but in practice there are still many obstacles to confront. One central obstacle lies in the fact that networking can be used mutually as a progressive and as a conservative tool among actors in the innovation policy.

Aim: To dissect how gender order and innovation policy interconnect the micro and macro level. How the inclusive and exclusive mechanisms work in regional policies and to analyse the formal and informal practices of local and regional actors. This is the central "how" question in this paper.

Method: Interactive design in collaboration with women on leading position in the innovation system in the county of Värmland in the middle of Sweden. Data is collected through documents (regional planning), interviews (SME-leaders), workshops (women on leading positions) and archives (historical analyses of homosocial networks).

Empirical findings: Several homosocial networks of a shadowed character are integrated in the regional policy through the partnership where we find important actors from central organisations in the public sector and the private sector of the county. One central shadow network includes the freemason, a homosocial upper class conservative organization with ritual initiation traditions based on Christian values. We traced central power groups backwards in time (1800 - 2009) and found that certain networks of families (freemasons for example) have successfully reproduced their central positions in the growth policy of the county by transforming their positions and interests in traditional industry into the very essence of the innovation system of today.

Theoretical implications: The network model makes the regional policy a homotopic strategy with a one-dimensional regional narrative about innovation and economic clusters. These are characterised by traditional export based masculine enterprises (pulp-and paper industry) and a blindness for more female oriented and service economies, such as wellness and care. This path dependence has negative implication on the creation of dynamic and innovative development.

At the heart of male networks are actors who themselves possess or have strong and close relations to the power-bearing positions. These groups have the power to reproduce and consolidate the power in regional development. Although the idea of partnership is based on non-hierarchical and inclusive network of equal partners they do not work in practice as a policy tool to break the previous power structure, but rather, reinforces existing structures and actors. In turn, this means that new activities and potential economic clusters are difficult to assert themselves. Women's networks on the other hand do not overlap with the influential networks and do not have the relationships to power, which can facilitate cluster development in their branches. In addition, these networks do not aim to promote their own enterprise, something that usually is characteristic of male-dominated networks.

O-054 Triple Helix Relations as Consensus-Building Arenas: Regulating Mechanisms and Political Design

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Due to their high level of complexity, triple-helix relations can be regarded as consensus-building arenas. As self-regulated structures, integrated by autonomous but interdependent actors (individuals and organizations), triple helix organizations must reach consensual agreements and collectively make decisions on important matters, such as the nature of the problems that they will address and the way to solve them but also about the very rules for making decisions.

By their complex nature, triple helix organizations are inclined to consensus, joint decisions and complicated negotiation and deliberation processes (Luna and Velasco, in print). Participants that value their autonomy dearly cannot be compelled to give up their identities and their constitutive characteristics. Thus, consensus helps the organization retain its members, at the same time helping members preserve their autonomy and identity (Brunsson and Olsen 1998: 29, and Ahrne and Brunsson, 2005: 442). But consensus building among heterogeneous and differentiated actors is problematic. Interactions among participants may be inconsistent and potentially conflictive; leaders from different communities may compete for authority; joint decisions may create uncertainty and confusion, thus making it difficult to determine who should be held responsible for the decisions and actions made in the name of the organization. In this context, contrasting with what happens in political institutions, legitimacy is not guaranteed beforehand. Even when their stated purposes are acceptable, triple helix relations frequently face legitimacy problems, partly stemming from the existence of various, imprecise and sometimes ambiguous forms of representation.

The aim of this paper is to provide a conceptual model for analyzing triple helix organizations as consensus building arenas. It focuses on two main components. The first concerns leadership and authority and the second refers to the institutional design and the operative norms about representation, participation, and decision-making rules.

Taking into account the high level of complexity of triple helix relations, and paying special attention to the political design of triple-helix organizations, the paper addresses four interrelated general questions: What are the main challenges that triple-helix organizations face when they engage in consensus building? What are the more suitable institutional conditions (e.g regulating principles and mechanisms, integrating factors and operative norms) for consensus-building among heterogeneous and differentiated actors? What risks and opportunities do these conditions imply for the development dynamics of triple-helix relations? To what extent the collaborative system moves into a converging direction, becoming more complex and stable?

Previous theoretical and empirical research done by the authors provides elements for this proposal. Based on the analysis of the relevant literature and the study of a number of cases in Mexico (ranging from highly specialized knowledge networks to broad political initiatives by civil society actors), we have developed a framework for understanding and evaluating complex associative systems.

For the purposes of this paper we have followed the methodological strategy of "parallel demonstration of theory" (Skocpol and Somers, 1980: 176-178), where the development of theory is parallel to the case study. In this sense, the case study has as main function to clarify, illustrate and support the arguments' coherence. As a case study we have chosen Mexico's Scientific and Technological Consulting Forum (FCCT), a triple helix entity formally charged with advising the Mexican government on the improvement of the science system, R&D and innovation matters. FCCT brings together representatives from the scientific, technological, and business sectors. We consider this forum as a "paradigmatic" case of a certain type of triple helix relations, such as those more engaged on policy issues than on the solution of specific technological or scientific problems, and where the problems addressed in this paper are more evident.

In particular, we ask the following questions regarding the case study: How able is FCCT to represent the diverse communities that it is legally mandated to give voice to? To what extent has it been able to preserve and institutionalize its own autonomy, especially (though not exclusively) vis-à-vis government authorities? How effective has it been in coordinating actions, processing conflicts and reaching agreements? How effective has it been in formulating acceptable and viable policy and legal proposals?

Finally it could be said that approaching triple helix organizations as complex associative systems may provide a better understanding of their nature, potentialities and limitations, and approaching triple helix relations as consensus arenas may contribute to a better understanding of their functioning conditions and therefore to a more efficacious performance in the search for common problems. As Schmitter (2001) has claimed, a deficient political design usually has poor political results.

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P-006 Why are WE not more Attractive for Women? (WE= Work in Engineering)

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Regional sustainable development is depending on successful enterprises and the enterprises depend on committed motivated employees. This logic motivates efforts for increased interaction between university - industry - government. Triple Steelix is one of the winners in the VINNOVA VINNVÄXT program. A cluster, consisting of about 700 SME's, 6 steel producing companies, manufacturers of mechanical equipment and industrial IT, 13 municipalities, three universities, research institute, regional actors and the regional authorities. The initiative for developing this cluster into an innovation system was taken by Jernkontoret, the Swedish Steel Producers' Association.

The aging population in EU- countries pinpoint that the struggle for talent and competence has only just begun. The lack of competent labour is already a problem for many companies in the region of the innovation system.

Social sustainability includes, for example, gender equality, which is also to be seen as a driving force for development and achievement of regional growth. If gender equality, along with other aspects affecting the chances of sustainable development, is to function as a "fuel for growth", then greater in-depth knowledge on gender equality and gender-research proficiency is needed. Experiences within European social fund programs and regional growth programs show that while the various project owners have an interest in gender equality, knowledge is lacking on how this might be achieved (Westberg, 2005, Gunnarsson 2007b).

Sweden is considered to be one of Europe's most gender equal countries, despite the fact that the labour market is one of the most gender segregated. The segregation obstructs the movement of labour and decrease flexibility. Old pattern and preconceptions decrease the potential for optimal use in the view of available talent. Although efforts have been made to increase the interest of industrial work among women the amount of female workers is still low. Many have experienced negative reactions when action for increased equality is brought up on the agenda. Since most organizations consider themselves to be gender sensitive the subject is a "none issue" (Amundsdotter 2009). To start discussions about equality and the invisible influence of masculine dominance in the industrial sector is a difficult and challenging task. Both enterprises and individuals often believe themselves comply with the expected level of gender equality. With increased knowledge and understanding the gender equality issue is not, as often perceived, a burden, but an additional parameter to sharpen business development opportunities. Facing the uprising recruitment problem it is justifiable to ask: Why is Work in Engineering not more attractive for women?

Companies that care about gender equality will undoubtedly have advantages in the competition for labour. Therefore one project, "Gender perspective for Attractive Work" (GATT-project), is formed to mainstream gender in the cluster Triple Steelix. The aim of the GATT-project is to engage and motivate the participants to look above traditional perspective.

This paper is based on empirical research, which was carried by the GATT-project in collaboration with an expanding engineering enterprise situated in a semi rural area in of Sweden. In order to retain, motivate and recruit staff for future expansion the company wants to develop its employer brand (Backhaus, K., Tikoo, S. 2004) by developing a more equal and attractive work irrespective of gender. The foundation of the theoretical platform is action research (Aagaard, Svensson 2006) combined with theories of masculinity (Hearn 2001, Kimmel 2009), gender construction (Gunnarsson 2007a) and attractive work theories (Åteg 2004). The methodological framework has its basis of different interactive tools with the intention of creating discussions and reflections in order to widen the participants view regarding gender constructions.

As a result of the participatory approach the method was developed during 13 workshop with at total of 130 participants. A conclusion from the workshops was that discussing gender issues often starts emotions and sometimes even resistance. But the resistance was not so strong as first expected. An open attitude, sharing personal thoughts, made the gender issue less dramatic and opened up for comments and reflections, reflections for a sustainable learning process.

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Triple Helix VI) Conference Madrid, October 2010

W-06

University-industry-government linkages - the internacionalization case of Pipeway Engenharia

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Introduction

This paper presents the case of internationalization of Pipeway Engenharia born of the relationship between the company Petrobrás (one of the largest Brazilian energy company), the Catholic University of Rio de Janeiro and the government through its Financing Studies and Projects. Noteworthy is the fact that the technology developed from the relationship of the Triple Helix is one of the big differences in company's internationalization process.

In 1990, CENPES (Research & Development Leopoldo Américo Miguez de Mello of Petrobrás) and CETUC (Center for Studies in Telecommunications of the Catholic University of Rio de Janeiro) began to develop a technology capable of performing inspection of pipelines by magnetic tools.

In 1998, work began on the Pipeway Engineering, located in the Genesis Technology Incubator at PUC-Rio and supported by the Funding of Studies and Project of the Federal Government, the company obtained a license to exploit the technology of geometric inspection and on counterpart of license, the company was committed to pay royalties to both the university and to Petrobrás.

What has happened in the beginning of structuring the company is that the private market participants pipeline inspections were already international by nature. In a second time, it was natural to enter the Latin American market that through its network of relationships in Argentina, also helped spread to Uruguay and, therefore, contracts have been won in Chile, Bolivia, Venezuela, among others and its implementation and responsibility divided between the parent and subsidiary in Argentina. However, these contracts have the final word would always be dictated by the array so that would make available the equipment for subsidiary after the closing of each new contract, thus maintaining managerial control in the matrix, and especially the technological dependency of clients.

This evolution of the internationalization process of Pipeway was always based on tools that were developed and the profits from the contracts that were being executed. Thus, the presence of a large capitalist always has been dropped at first, because the development of tools was funded by own resources (reinvestment) and government agencies through lines of credit to encourage research, for example, calls and lines credit of the Funding of Studies and Projects (FINEP).

Currently, the big bet for the future of this Pipeway the U.S. market through its subsidiary International Pipeway because it is estimated that the pipeline network to reach U.S. 2 (two) million km, and only 400 thousand state-owned Texas. The estimates relating to South America are about 200 thousand kilometers.

State of the art about the topic:

The state of the art which is based on this case study is the discussion of the importance of the Triple Helix in the generation of differential for a born global company. So the theories will be discussed in this article assumes the approach to literature as the Triple Helix, the process of internationalization of companies and born global companies. Examples of bibliography: ANDERSSON, S.; WICTOR, I. Innovative international strategies in new firms Born Globals, Nordic Workshop in International

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Research focus:

The focus of research is the influence and importance of the Triple Helix in the process of internationalization of the company. We investigate how the roles of government, university and company were instrumental in generating the technology, knowledge and philosophy of the company especially in the process of internationalization.

Methodology:

The methodology of case study prioritizing qualitative character. For the study to be accomplished are: a literature review, especially Triple Helix and internationalization of enterprises, development and implementation of questionnaires through face interview with the company's board members, and gather the data, the case description and analysis the light of the literature studied.

Findings:

The birth process of the company, the importance of technology developed from the university-government-business in the process of internationalization of the company. Identify the impact of continuous announcements of support for innovation launched by FINEP improvements and adjustments in the retarded for new formats and requirements of national and international markets.

Identify the process of creating the company and how the relationship between universities and business-government can generate differential for high-tech companies that by nature of its market and the global trends are born increasingly global.

Contributions and Implications:

This case study can identify existing paths and trigger mechanisms in the generation of university-industry relationship that helped by public policy (government) will enable more companies to be born prepared for the global market.

For universities, this article may help the understanding of the importance of the university-enterprise and the development of mechanisms to facilitate and assist the transfer of knowledge between these actors.

For the Company, the article may highlight the importance of joint research with research centers and universities to generate innovations that will enable competitive advantages for the company in national and international markets.

For the Government, can serve as an example of public policies and structured to allow the continuation of important programs for the generation of innovations and competitive enterprises in the international market. This role is already carried out in developed countries and is now also recognized by developing countries as in the case of Brazil. However, it is important that these policies in Brazil have yet to be better systematized so that they are temporary and not integrated with any program of national development and global competitiveness.

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ST-07

The Architecture of Innovation System for the Commercialization of Science -The Incentive Structure for the Decisions of Financial Resource Allocation –

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The commercialization of science research often fails due to the lack of an appropriate architecture to bridge the financial gap between science research and commercialization. The lack has created by characteristics of science researchers: high risk of uncertainty, long term of research (10-30 years) and difficulty in creating the market of know-how (difficulty of M&A). One of the primary reasons of these failures is that most of the outputs of science research are in too-early stage for industry to get interests in their value. In this research, with taking the theories based on previous researches, we will show an empirical study by classification of innovation systems to bridge the financial gap for the commercialization of science research, and conduct new innovation process model.

Baldwin explained difference between vertical integration model and horizontal integration model by using the concept of modularity. In Baldwin's concept, horizontal integration is becoming better strategy for corporations to accelerate the innovation. However, in comparison with vertical integration model, it is extremely difficult to create incentive structure for financing the empty space in horizontal integration model. Rosenberg described the termination of central research institute.

Chesbrough illustrated the concept of "Open Innovation", which is one of the horizontal integration models, and the concept became mainstream in innovation system. Some previous studies prove that "Open Innovation" works effectively in some industries with high modularity such as IT industry. However, in "Open Innovation" concept, each entity focuses on its own core competence. This means, the empty space (gap) that no entity will work occurs.

Etzkowitz described the concept of "Triple Helix" which explains the importance of universities as the source of innovation and linkages among universities, industry, and government. Nelson described the concept of "National Innovation System", and Porter illustrated the proof of "Clusters" as a regional innovation system that could accelerate the collaboration among different entities.

Shane, Bygrave & Timmons proved academic startups and venture capitals are the vehicles of executing innovation to fill the gap.

All of these previous research outputs describe characteristics of Silicon Valley's Innovation Model. The model fits to IT sector, and we believe that this model works in many of innovation-related sectors. However, some data of biotechnology industry describes that sales are increasing every year but profits (=Operating income before depreciation) stays almost zero for thirty years. This is a reality of biotechnology industry with Silicon Valley's Innovation Model.

The paradox between belief based on previous studies and the reality of biotechnology sector's performance, new research topic and research questions emerge. Chandler proved modern corporation (separated ownership from management) because of the invention of the railway and the telegraph. Rosenberg, Chesbrough, at el. have proved "Silicon Valley's Innovation Model", based on semiconductors, software, computers and communication sectors. Now as Pisano declares we have to seek appropriate architecture for the science-related industry.

Our research goal is to design the appropriate architecture of innovation system for the commercialization of science. To achieve our goal, we have two research questions; 1)What are the emerging innovation systems and their structures?; 2)What is the effect of information processing model and incentive structure for the decisions of the financial resource allocation? Our research conducted the hypothesis that explains new innovation model. Our hypothesis was conducted by analyzing sixteen innovation systems. Sixteen innovation systems were defined base on literature review of architecture and innovation theories and were selected by interviews of innovation researchers and categorized by previous researches. We analyzed sixteen models using secondary sources including webpage, books, and reports. In addition, we conducted pre-interview for seven organizations to deepen the understandings of innovation systems. Furthermore, we analyzed all sixteen models. In each system, we analyzed the causal relationships between the architecture and solutions for difficulty of science. Explanatory variables are based on previous studies of innovation and architecture theories to explain incentive structure. Dependent variables are based on Pisano's framework (difficulty in the commercialization of science).

Several new findings came out from this analysis. Emerging models have several similar characteristics. Emerging models focus on deepening new science findings, transforming from "illusions" (high uncertainty) of scientists to applied research fields with lower uncertainty, providing longer-term finance, providing networks to related industry to share tacitness, and educating researchers for emerging research field. As a method, they create translational research organizations or systems. Emerging models try to solve the difficulties of the commercialization of science that Pisano declared.

There are three types of methods to create incentives for investors for the translational research. First method is to use the cluster. Translational research is essential phase to create new cluster for regional government and large enterprises in the region. They aim to attract talented human resource and create startups. Second method is to use the financial incentives. Equity based investment with IP protection is high risk and high return business model. Third method is venture philanthropy. Their incentives are the contribution to the society by solving social issues with financial return. First method is quite common in many cases.

According to our analysis, we created new innovation model. By putting "translational research" between basic research and applied research, the problems of commercialization of science Pisano described may solve. There is a chasm at the stage of translational research, because scientists propose "illusion" that is too uncertain for industry to be interested. As a definition, translational research is to find new applied research fields to reduce uncertainty.

In this research, there are several achievements. In academic perspective, the outcome of this research can explain why current Silicon Valley innovation model, which is combination of previous studies, does not work, by defining new innovation process model using theory of "translational research". In addition, the outcome will clarify the incentive structure of "translational research" to fill the financial gap. In practical perspective, there are several contributions. Firstly, researchers can find new way to fundraise and deploy their research outputs. Secondly, investors can find new business chance. Thirdly, large enterprise can find new business chance with lower risk. Fourthly, research outcome supports policy makers to accelerate the innovation.

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O-105

The role of higher education in a new Quadruple Helix culture. The rise of a new quadruple helix partnership - University, civil society, government and industry working together for human and social development

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Abstract

What next for the classic Triple Helix culture? In the last decades we have seen how higher education institutions have been working with industry and government and have made some real positive strides. On the other hand in some countries there are signs of a growing movement of collaboration between universities and the third sector in areas such as community-based research, teaching and extension. There is also growing evidence that civic engagement is becoming an essential learning goal for institutions throughout higher education.

However even though higher education institutions (HEIs) have been acting as a meeting place for bilateral relationships, what is not so frequent is HEIs is fostering a fruitful relationship between all sectors in order to achieve human and social development. This paper proposes a rethink of and suggestions for the exchange between HEIs and wider society. HEIs that act as a new Agora, as a meeting place for a 'Quadruple Helix' collaboration - adding civil society to the existing university, industry and government triple helix.

The paper highlights how members of the Quadruple Helix can have a collective responsibility to contribute to the building of fairer societies and to help find innovative solutions to the problems that face the world today - on a local and global scale. Since Information and knowledge management are crucial for the development of this Quadruple Helix, this paper also explores how Information and Communication Technologies (ICT) could be relevant tools for the actors in the Quadruple Helix.

The authors assert that HEIs should be the catalyst for the formation of the Quadruple Helix. The authors go on to ask the following questions: How can HEIs engage with a wider community beyond the traditional Triple Helix? How can research, curricula and graduation conditions be adapted to these new realities? How can we understand ICT for Development (ITC4D) in the context of the Quadruple Helix?

The paper examines work currently being undertaken by the State University of Maringá (Brazil), in terms of its social practice and models of outreach and offers a description and interpretation of empirical cases that show the Quadruple Helix at work. It also highlights other examples of good practice from around the world that show the emerging Quadruple Helix and suggests a way forward for the Higher Education sector.

Keywords: higher education, innovation, triple helix, quadruple helix, social responsibility, social network, third sector, academe curriculum, UN Millennium Development Goals, human and social development, ICT4D

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ST-12

The role of research institutions in the development of innovation systems in the solar photovoltaic industry in Germany and India.

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Introduction

Global climate change and rapidly increasing energy demand have called for the need to reduce the dependence on conventional energy sources by investing in renewable energy technologies and market deployment mechanisms. Solar photovoltaic (PV) is one such industry that has successfully been developed over the years by countries such as Germany, Japan, and the U.S. More recently, primarily driven by increased energy demand, developing countries such as China and India have started making significant efforts to invest in both technology and industry development, as well as in market expansion for the solar PV industry. According to the National Solar Mission plan, India estimates a solar PV installed capacity of 20,000MW by 2020 from a present installed capacity of 100 MWp.In order to meet this projection India also needs to adopt supportive policy instruments, incentive mechanisms, R&D infrastructure.

Literature review

The growth of knowledge-intensive industries has heightened the importance of networks across R&D institutions. Universities play an important role in providing trained researchers familiar with the latest research techniques and integrated in international research networks is important for firms to perform their innovative activities. [1]

Interorganizational relationships between public research organizations and industry play an important role in driving innovation processes.[2]Both Nelson and Lundvall argue that organizations that promote the creation and dissemination of knowledge are main sources of innovation. [3]

Despite some attention to the importance of university-industry linkages to the local economy and formal mechanisms of technology transfer little attention has been paid to informal institutions supporting university linkages (e.g. networks of collaboration) [4]. Further to this work, we will explore micro-level mechanisms through which public research institutions contribute to innovation and industry development.

Research Focus

Within this context, the goal of our paper is twofold. First, we aim to examine the innovation ecosystem and dynamics between various actors and networks that have supported the development of the solar PV industry in Germany, with a particular emphasis on the role of policy incentives and research institutions. Second, we aim to make a preliminary assessment of potential lessons that developing countries such as India could adopt and adapt from the case of Germany, in their strategic efforts to invest in solar PV technology. The emerging nature of innovation system allows us to improve our understanding of processes involved in the formation and growth of Solar PV technology and to identify the associated key challenges for policy makers managing the transformation process

Methodology

We use National System of Innovation approach in which we trace the evolution of actors, networks and institutions that represent the complex dynamics in the development of the solar PV industry. To this of end we are using qualitative research methods drawing on more than 20 semi-structured interviews with specialists in the solar PV industry, scientists, policy makers and other actors in innovation system in Germany, conducted between February-May 2009. In addition, we use secondary research sources to assess the development of solar industry in Germany and the potential for industry expansion in India. Almost all interviews were recorded and the main issues we addressed in the interviews relate to(1) products and innovation process; (2) relationships with research institutes national labs; (3) History (4) location choices (5) role of policy incentives for their specific operations and (7) directions for industry development. We hope that the approach is in concurrence with the theory on innovations propounded by Triple Helix.

Findings

We find that the main actors involved in the innovation ecosystem in the solar PV sector in Germany are: (1) private sector companies; (2) universities and R&D institutions; (3) various policy instruments and incentives for investors; (4) public approval and participation. The impetus for the development of solar industry in Germany emerged primarily from the oil crisis in 70's and Chernobyl disaster. In due course, several R&D institutes have been established across various locations in Germany drawing on funding from public and private sources. Research institutions have been instrumental in promoting industry collaboration through research projects, problem solving capabilities, promoting technology based startups, increasing talent pool and knowledge transfer which is central to innovation. Collaborative research projects resulted in mutual learning process for the scientists and researchers at the institutes and for industry managers. As a result, industry clustering around research organizations occurred. We expect that in India, the industry development model would differ, given the variation in regional governance models, R&D capacity, national resources, and industrial experience. Nevertheless, strategic lessons from the German experience should offer some insights into the role that different organizations, in particular public research institutions, could play in fostering innovation and industry development.
Contributions and Implication

By applying the innovation systems conceptual framework to the case of India, we aim to identify ways in which this theoretical model applies (or does not apply) to an emerging industry in a developing country. We hypothesize that our assessment and some of the strategies pursued in Germany will offer insights for policy makers to support the innovation and industry development in India.

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P-028

From Policies to Actions. How the CUEES (State, University, Enterprise Committee of Santander) comes true in Colombia.

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Subtheme: Triple Helix in Action: unlocking economic and social crisis. keywords: triple helix, top-down procces, politics making, national framework, regional framework

Colombia is having a shift associated to the competitiveness paradigm. This shift is originated mainly because of the results in the ranking of the indices of the country due to innovation and the shortage vocation or effort towards innovation by comparing the values obtained in the variables that make the innovation index (COLCIENCIAS 2008).

Due to the above, the Colombian government created the National Policy for the Promotion of Research and Innovation named "Colombia Build and Planting the Future", which set two main objectives: the first associated with Social Policy and the second associated with a High Competitiveness Policy which concerns the present work (COLCIENCIAS 2008). The main question to answer due to the performance of the country was What has been the role of public- private cooperation in competitive strategies of the country?

Regarding Competitiveness Policy, it has had great impact within the Santander region and its capital Bucaramanga city. This is because the context has created a number of agencies that spread the policy at lowest level positions in society and at the same time allowed the junction of the three actors in the triple helix in a committee in the region that has established a number of projects that have impacted the region and the country. This committee is formally called CUEES (State University Enterprise Committee of Santander) and is the result of a process of deployment of national policies in a regulatory model with a top-down philosophy as it was described by Etzkowitz (Etzkowitz 2002).

This study provides the framework developed starting at the National Competitiveness Policy, the creation of the National Agency of competitiveness and finally and most important the creation of the CUEES as a pillar and integrator of different triple helix actors in order to carry out key projects for the region of Santander, Bucaramanga its city and the country.

Although CUEES can be thought of as a 4th pillar described by Johnson in his work (Johnson 2007) and although Meyer (2003) showed that financial assistance is one of the most important factors that help to SMEs especially in the triple helix, the CUEES does not help to fund directly the projects, but it sets a framework that allows different actors to speak the same language and set policies regarding the mode of work acting as a counselor which allows neutral approach to the challenges of effective participation in the organization of the triple helix model.

Given the above, the research focuses on identifying the incident factors which affect the establishment of the framework that allowed the creation of the agency CUEES as an integrator of triple helix organization, the experiences lived, and the impact it has had on the city, region and the country. Equally, one final goal is that the CUEES framework could be used as a model in politics making in other countries, especially Latin Americans who have similar environments in order to contribute to the creation of competitive advantage and welfare generation for citizens.

The result of the creation of CUEES is a increased integration of the three actors forming a triple helix in the region of Santander and the effective development of projects of national and regional impact in a top-down process which is described below:

Given that the National Competitiveness Policy, its suggests a vision where by 2032 Colombia is one of the three most competitive countries of Latin America supported by three pillars: world class sectors, leap in productivity and employment, and labor and business formalization. The vision has two cross bases: firstly science, technology and innovation, and secondly environmental conditions and cross goods; with this in mind the Santander region established their own vision for 2032 where the region of Santander is one of the three most competitive regions of Colombia, have high levels of quality of life and the highest income percapita in the country. This regional vision has its own three main pillars: cluster development, formalization and business development, and internationalization, and three cross bases: firstly infrastructure, secondly science, technology and innovation, and finally cross-cutting strategies (Santander 2008).

On the second cross base related to science, technology and innovation, exist another vision: in 2019 the Santander region will count on a consolidated joint dynamics of interaction between the productive sector, universities and state agencies, to create, transfer and adapt knowledge that drives innovation in the region. This vision in turn rests on four pillars: university, state, and industry linkage; accessibility to ICT resources, consolidating scientific capabilities, institutional strengthening, and a transverse base: networks and alliances. The first major pillar is a representation of the triple helix model and contains three well-defined activities: firstly, the most dynamic performance with CUEES entrepreneurs; secondly, to execute an event called PROMOVER as a space of knowledge for the joint university, industry, state and thirdly, to increase the number of research and innovation projects carried out in partnership (Santander 2008).

The CUEES is therefore an example of integration of the triple helix model in the Santander region of Colombia that allows the articulation and development of projects with the ultimate aim of meeting national competitiveness policy and economic growth for the benefit of Colombians.

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INTERORGANIZATIONAL RELATIONS IN SCIENCE PARKS: AN EMPIRICAL ANALYSIS OF THE ROLE OF ORGANIZATIONAL SOCIAL CAPITAL FOR ENHANCING BUSINESS PERFORMANCE

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INTRODUCTION

The importance of inter-organizational relations for business competitiveness is widely known. In recent years numerous researchers have been studying relationships between organizations using the social capital theoretical framework. This conceptual approach is a multidimensional concept to study various facets of relationships. The empirical evidence in the literature shows that social capital is a valuable corporate asset that can determine firm performance. Focusing on the structural landscape of Science Parks as facilitating inter-business interactions, we conducted an empirical analysis on a sample of firms located in Spanish Science Parks.

STATE OF THE ART

The main aim of our work is to converge two lines of study: Science Parks and organizational social capital. On the one hand, we analyse parks as an artificial physical structure that facilitate interaction among the economic agents located inside (Hansson, Usted and Vesteergard, 2005; Hansson, 2007). But we are considering that the main value of Science parks are the interactions among firms, universities and the management staff of the park that help firms to face changes in their environment. Thus, we focus on Science Parks using the view of networks and knowledge-based organizations as the main source of competitive advantage in the market (Westlund, 2006).

On the other hand, we are considering that our unit of analysis are interorganizational relationships between agents. So, we propose an approximation of study from the relational view (Dyer and Singh, 1998) and from the theory of social capital (Westlund, 2006). This relational approach considers all interactions between economic agents generate a type of capital, that in the literature is known as social capital. Thus, we contribute to previous work considering that economic agents interact in environments that influence and affect their business (Burt, 1992). In our study, the positive environment created by Science Parks facilitates access to valuable resources. Those specific valuable resources that firms need to survive, grow and compete (Powell, Kogut and Smith-Doerr, 1996) are located in Science Parks environment, and extends the effect of resources available to the organization (Adler and Kwon, 2002; Westlund, 2006).

RESEARCH FOCUS

Therefore, Science Parks create a physical structure where economic agents can interact within the same geographical area (Hansson, et al., 2005). We believe that the relations between firms and Universities and between firms and the Management Staff of the park can generate valuable organizational social capital. To study the relationships we use a conceptual model of social capital adapting the one proposed by Adler y Kwon (2002) to study the generation, the main dimensions, the positive effect on business performance and the contingent value of the social capital. In the first part of our model we identify that organizational social capital is generated by two kind of relationships: Relationships with Universities, and relations with the Management Staff of the Park. In the second part we identify the three main dimensions of social capital: Structural, Relational and Cognitive. In the third part we study the effect of social capital generated for enhancing business performance, mainly with objective variables of innovation (number of new products developed) and subjective variables (knowledge acquisition, technological distinctiveness and firm reputation). And for the fourth part of our model we study the moderating role of control variables in the social capital-business performance relationship.

METHODOLOGY

For testing our model we sent a survey to a sample of 1280 Spanish firms from 21 Science Parks. Those firms were from sectors such as aerospace and automotive, training and human resources, information technology, medicine, biotechnology, engineering, consultancy and environmental activities. We received 214 valid questionnaires and we processed the data with a Structural Equation Model using the technique of Partial Least Squares.

FINDINGS

The main results obtained are:

1. Organizational social capital is generated both in relations with Universities and with the Management Staff. Also, we found that social capital has positive and significant facets (structural, cognitive and relational).

2. Social capital generated through relationships with Universities had positive and significant effect on knowledge acquisition and reputation. Contrary to what we have hypothesised social capital had no significant positive effect on the development of new products and technological distinctiveness. In relationships with the Management Staff of the park all relations hypothesised were significant.

Furthermore, data show that social capital generated by go-betweens is more intense on enhancing business performance.

CONTRIBUTIONS AND IMPLICATIONS

We believe this research has positive implications:

- For park managers, that should adopt proactive strategies that facilitate the promotion of relations for obtaining better results due to the interaction. These activities complement their formal activities for advising, space management and creating high value services.
- For firms located, the results of our investigation show that firms should be proactive with relationships they establish with Universities and with Park Management staff because contribute greatly to improving their performance.

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P-020

Evaluating gendered evaluation procedures - a contribution to a new research culture? What can be learned for RTDI policy, science and the private sector.

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S5 «Government and public policy in the Triple Helix Era» Key words: Public policy and decision making innovation policy and gender gender bias in proposal selection gender in research new research culture

Introduction

The proposed paper will be based on the findings from the current evaluation of a new Austrian RTDI funding programme "Laura Bassi Centres of Expertise" (LBC). It is named after the Italian physicist Laura Bassi, who in the 18th century became the first woman in history to be appointed as a professor at a European university.

This initiative programme aims at equal opportunities for women in cooperative research, at establishing a new research culture, at offering new career options for all research personnel at LBCs. The call for proposals was open to all topics in the areas of natural science, technology and life sciences at the gateway between science and economy. Currently, eight LBCs in cooperation of science and industry are funded, all of them headed by female researchers.

The initiative programme defines itself as a "learning initiative". It tried to adopt new approaches to contribute to the above mentioned goals. The accompanying evaluation the paper is derived from analyses these new approaches in the light of the programme goals; according to the self-concept of the initiative programme, it has a strong focus on learning elements, that include not only learning within the evaluated funding scheme itself but deliberately aims at the evaluation and identification of programme elements that could be transferred to other RTDI-measures. In this sense, the initiative programme could also be conceived as a "teaching" programme. Hence, depending on the findings, the information gained from the programme and from the evaluation could also provide other research programmes with impetus for a more gender-equal design and increase the gender competence of the Austrian scientific community.

State of the art

Traditional selection processes focus on normative masculine career patterns when it comes to the review of the curricula and the references. This has a strong implications on how scientific performance (i.a. "scientific excellence") are measured and it opens the door to a potential gender bias in the selection procedure (Wenneras/Wold 1997; Bornmann 2007; Budden et al. 2008), e.g. of research funding. Second strong factors that may influence the selection procedure are the presence of less formal specifications in the tendering procedures, a lack of transparency and the prerogative of informal networking.

The funding initiative LBC is – inter alia - based on the assumption, that proposal evaluation procedures ((extended) peer review; judging scientific quality on the basis of impact points), that are state of the art for proposal evaluation in most other funding initiatives that try to capture scientific excellence and other (structural) goals, do not contribute to gender equality and fail to capture certain aspects of future research potential. This could be the organisation and management of the future LBCs, that should provide for more / better team work, a stronger role of science-industry collaboration (also in terms of cooperative definition of research agendas), but also innovative thinking through more openness and trans-disciplinarity, better career opportunities by deliberate integration of human resource development in the centers' management etc. Supposedly, both the research and the private sector partner should profit from a modern form of knowledge management involving reflective and actively structured collaboration.

Therefore, the ex ante evaluation procedures for proposal selection in this initiative programme was designed differently in terms of criteria and processes, not only requiring qualifications which are gained during a traditional scientific career, but also taking into account other skills and competences. The implementation of the new selection criteria and procedures aimed at creating a new kind of research culture. This culture should enable to create working conditions and culture that allow men and women to have equally fulfilling careers as researchers in the areas of natural science, technology and life sciences at the gateway between science and economy.

Focus, methodology

The paper will focus on the findings concerning the effects of the specific ex ante evaluation criteria and procedures for proposal selection adopted in the initiative programme LBC.

The methodology will in general rely on qualitative approaches: interviews, focus groups and workshops targeting

- the direct target group: the LBCs; persons responsible for proposals that were not granted funding; researchers that were addressed as target group by the programme management but decided not to submit a proposal
- other collaborative research centers that are funded by different schemes

experts that were involved in the different steps of the proposal selection process; experts from other programmes funding
excellent collaborative research with no focus on gender sensible evaluation and management (policy and implementation
level) – i.e. the wider target group of the programme

- programme management and programme owner of the initiative programme LBC itself (i.e. policy and implementation level) These qualitative approaches will be complemented with a standardized survey, addressing heads and staff of the LBCs.

Findings, contributions, implications

The paper will present the findings along the following research questions:

What are the effects of the specific ex ante evaluation procedures and criteria of the initiative programme LBC on the evaluation outcome – i.e. the proposal selection?

What are the effects on the proposals themselves (incentive for submitting proposals, considering specific aspects in the proposals that are usually not subject to evaluation in other selection procedures) and what are the effects on the centres? What can be learned on the policy level in terms of the design of RTDI funding measures that support gender equality and scientific excellence? These learning effects will be one of the foci of the whole evaluation, hence deliberately focusing on the intertwine and mutual interdependency of the triple helix elements.

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An Assessment of Sustaining and Non-Sustaining Cooperative Research Centers: What Happens to Triple Helix Partnerships When Government Funding Ends?

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Like other cooperative research centers around the world, Industry/University Cooperative Research Centers (I/UCRCs) are supported by funding from government (in this case the National Science Foundation), but are expected to achieve self-sufficiency after a fixed term (ten years). However, there is little research-based evidence about the extent to which government funded center programs are able to make this transition. This study attempts to identify the factors that predict center survival and success after they have graduated from National Science Foundation (NSF) funding.

Over the last three decades, national policy has facilitated greater collaboration in research between industry and academia (National Science Board, 2006). These legislative changes have contributed to an increase in collaborative research between industry and university by reducing barriers and encouraging cross-sector collaboration (Cohen, Florida, & Goe, 1994). The goal of these policy changes is to foster an environment that is conducive to lasting partnerships between industry and university. This policy landscape is complemented by grant programs and other types of funding for R&D that is conducted jointly between universities and industry.

These partnerships often take the form of cooperative research centers (CRCs) (Boardman and Gray, in press). CRCs are intended to bring the producers and users of technology, knowledge, and research together in order to speed the innovation process. In bridging the gap between industry and academia, CRCs produce research that is scientifically important and industrially relevant (Gray & Walters, 1998). These Centers are intended to foster long-term cooperation between industry and academia; having sustainability as an explicit program goal.

However, relatively little research exists on the extent to which programs are able to survive a funding transition become selfsufficient or at least reduce their dependence on government funding. The majority of research on program sustainability comes from the public health, community development, and innovation literature. Program sustainability refers to the degree to which a program is able to sustain itself once the initial grant funding comes to an end. It is defined as the continuation of program benefits, activities, and infrastructure (Shediac-Rizkallah & Bone, 1998). Program sustainability occurs in context and is predicted by environmental, organizational, and program level factors. This paper applies these theories and concepts to a widely deployed example of the "triple helix" -- cooperative research centers.

In particular, it focuses on the efforts of NSF funded I/UCRCs to become self-sustaining entities, supported by industrial members and other stakeholders. NSF I/UCRCs are semi-autonomous research organizations housed within a university setting that engage in multidisciplinary collaborative research with industry member firms, in which research is directed by industrial interest. One of the main goals of the I/UCRC program is to foster collaborative approaches to R&D that are sustainable in the long term;. In fact, the NSF explicitly states that its "investment in the I/UCRCs is intended to seed partnered approaches to new or emerging research areas, not to sustain the Centers indefinitely. The Foundation intends for I/UCRCs to gradually become fully supported by university, industry, state, and/or other non-NSF sponsors" (National Science Foundation, 2006).

The primary purposes of the current study were: to assess the extent to which the 73 I/UCRCs that have "graduated" from the program over the last twenty plus years are still operating; to determine the extent to which centers demonstrated continuing fidelity to their partnership-based model; and to determine which factors predict sustainability. Both archival and interview-based data were used to address these goals. The current operation of graduated I/UCRCs was assessed via telephone interviews with key center stakeholders (usually the current or most recent director). Results showed that 80% of centers that received the full 10 years of I/UCRC grant support are still operating in some form today. However, there were a variety of transition strategies used, leading to several organizational forms for graduated I/UCRCs. Results also indicate that sustained graduated centers are highly successful, maintaining the size and scope of their programs. Presentation will highlight environmental, organizational, and program level variables also identified as predictors that differentiate successful from unsuccessful graduated I/UCRCs. Implications of these findings for program management and public policy will be discussed.

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O-116 The Triple Helix of a Regional Knowledge Ecosystem: Evidence from the US & European Science Park Models

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Recent decades have witnessed the emergence of an innovation-driven global economy, where new models of regional concentration of knowledge-based entrepreneurial activity have generated intense interest in policy circles. A successful and economically robust region of innovative firms serves as an engine of sustained economic growth The vivid examples of such regional ecosystem models are the renowned Silicon Valley and the Boston Route 128 in the U.S, and Cambridge Science Park region in the UK. As policy makers at various levels of government grapple with new ideas to stimulate such efforts, they are searching for appropriate strategies and successful models to promote these economic development objectives in their regions.

While some of these regional knowledge ecosystems have appeared without specific planning, others are the result of a triple helix model of planned efforts by university-government-industry partnerships with local authorities. The planned development of a region of high-tech enterprises is a task, which is carefully undertaken over the years. One prominent strategy to support the speedy development of knowledge ecosystems involves the establishment of technology business incubation facilities that provide the necessary enterprise creation and technology development support infrastructure.

This presentation draws upon the authors' last several years of research on regional technology clusters including those developed through a pro-active incubation strategy, which often employs mechanisms such as research/science parks and technology business incubators. The work is based on the last couple of decades of empirical evidence in light of the existing theory developed from studying the characteristics and evolution of such clusters. The successful regional cluster models have resulted in the emergence of several dynamic innovation ecosystems in the US, Europe and several other countries.

After underlying a conceptual framework with key factors contributing towards the development of viable knowledge ecosystems, which facilitate the creation, growth and success of innovative technology-based enterprises through active roles of research/ science parks and their incubators, the authors describe some common features of the successful models based on their recent research in the US and Europe . The US is a world leader in terms of experience with science and technology parks, and over the last more than two decades several European nations have acquired considerable experience in the use of these mechanisms, as well. The paper will highlight the important roles played by the incubation mechanisms in the transformation of several US and European regions into emerging innovation ecosystems. The US STP facilities analyzed includes Rensselaer Technology Park in the New York Capital Region; Northwestern University Evanston Research Park in the Chicago Metro Area of Illinois; Virginia Tech Corporate Research Center in the New River Valley region of Virginia; and the University Research Park in the Madison Metro Area of Wisconsin. Similarly, the European STP facilities include Oulu (Finland), Kista Stockholm (Sweden), Louvain/Leuven (Belgium), Bio-park Leyden and Food Valley (both in the Netherlands). The selected sample includes diverse cases representing rural/urban settings, public/private university sponsorship, technology focused/mixed use type, and with/ without formal incubator facilities; and they all have a sustained operational record of more than one decade.

The research concludes that given the local context the successful incubation mechanisms can well-serve the objective of promoting technological entrepreneurship by providing the necessary focal points. The presentation also discusses the emerging Triple Helix based approaches in designing incubation spaces for building enabling knowledge ecosystems in varying regional contexts.

P-001 Growing Pains Development of University Science Parks of China

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Abstract Since the 1980s when China started to found university science parks, they have been developed fast and made unexpected contribution to the regional innovation and development. In 1989£¬the first university science park of Chinaj^aj^aNortheastern University Science Parkj^aj^awas born in Shenyang, Liaoning province. There was then more than 10 university science parks built in Beijing, Shanghai and other cities. These endemic university science parks played a key role in promoting grinds gathers and impelling local economic growth. In 1999, the central government decided to develop university science parks by government support through establishing j°the National University Science Parkj±. Moreover, the Tsinghua University science park and other 15 university science parks were determined to be the experiment units. In 2001, the Technical Department and the Ministry of Education, according to the expertsj⁻ opinions, approved 22 university science parks were the first j°the National University Science Parkj±. Up to April, 2009, there have been 69 the national university science parks and 109 universities in 31 cities involved.

With the support of the government and universities self-help, the Chinese university science parks develop rapidly. It is a typical government-pulled triple helix development model. The central governments decide or approve university science parks₁⁻ establishment; make the evaluation standards of university science parks establishment; carry on the appraisal and implement administration to the university science parks. Introduce the enterprises to locate in the parks. The local governments integrate the university science parks into the regional economy and social development plans; provide lands, funds, preferential policies to support the parks₁⁻ development. The universities not only provide information, technologies, excellent persons, equipments, infrastructure funds to support the university science parks, but also involve the university science parks₁⁻ administration and routine management as a player.

The Chinese university science parks has played the vital role in transforming scientific research results or knowledge and technology transfer, hatching the high-tech enterprises, cultivating innovation personnel, and promoting regional growth. They are becoming the hubs for the government, industry, university interaction. In addition, the key of the Chinese university science parks₁⁻ development is to train innovational personnel and import the latest research results from developed countries.

However, there are some problems restricting the development of Chinese university science parks. First, they are lack of independence. They are limited by the government and university and cannot survive without them. Secondly, the ratio of the university technology transfer is very low. Although the quantity of scientific and technological products is not in the inferiority in the world, but the commercialized degree is greatly lower than developed countries even some developing countries, reflecting the poor in quality. Thirdly, the talent mechanism is unscientific and unreasonable. There is lacking a dynamic mechanism of talent persons₁⁻ flow between the university and the university science parks. Moreover, the talent incentive mechanism is not perfect, and the evaluation standard for research in scientific system is not scientific and effective. Finally, the sole sources of venture capital and lack in withdrawal mechanism result in the weak in innovation and entrepreneurship in the parks. The major part of Chinese venture capital is from overseas and most focus on the j°the follow-up phases₁± in innovation. And the Chinese governments have become the greatest venture investor in domestic through various j°national projects₁±.

Therefore, some countermeasures for the growing pains are the most important to the Chinese university science parks develop healthily and sustainably£¬such as, clearing the project position of the university science parks, enhancing the transfer ratio of research achievements, establishing scientific and reasonable talent mechanism and establishing multipliable venture capital system.

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O-108 **Innovation process in a university milieu: a Latin American case**

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Introduction

The production of scientific articles in Brazil can be considered as a good performance. It was ranked as 13th, before Holland (14th) and Russia (15th) (CAPES, 2008). Even though Brazilian relative success of scientific practice, there is a major challenge to be overcome which can be summarized as the search for transformation the scientific knowledge in economic development. There is a gap between the articulation of knowledge generated by scientific research and the generation of technological innovations; this fact is not exclusively Brazilian. In recent years, the discussion on a third role for universities, to provide economic development, added to the mission of providing education and research development, has received attention for new researches (RENAULT, 2006; ETZKOWITZ e LEYDESDORFF, 2000; ETZKOWITZ et al., 1998). In Brazil, some researchers have studied interaction factors between university and industry (Fracasso & Santos, 1992; Plonski, 1999; Sbragia et al., 2006). At university level, few studies tried to understand the innovation process (AUDI & MOROSINI, 2006, 2007). Considering this, the search problem question can be formulated as: what are the factors that facilitate or hinder the process of linking scientific research to provide their implementation and to promote economic development? The objective was to examine the production of scientific information and its dissemination and to identify factors that interfere in the process to transform this knowledge in economic impacts.

Literature Review

Brazilian industrialization is a recent phenomenon, initiated in 1940, if compared to development countries (STAL, 2008). This industrialization process aimed to form infrastructure to new industries as automotive, equipment, chemical, electrical and electronic industries that started to establish in Brazil by 1950. By the time, there were not technical human resources to satisfy this necessity. In 1968, was created the Strategic Development Program that has its focus on the formation of technical human resources. This Program pointed out the necessity to create financing mechanism and the necessity of a clear Science & Technology policy (STAL, 2008). This policy model followed Sábato & Botana interactive model, considered by Reis (2004) as an embryo of Triple Helix paradigm, formulated by Etzkowitz & Leydesdorff (1995, 1997, 2000).

The scientific knowledge, itself, do not represent warranty of its application. The innovation dynamics started to be an concerning object specially when referred to its effectiveness and efficiency (CASTELLS, 1999). This knowledge is not seen just as a production factor, but an essential factor for the production processes and richness formation.

Methodology

A single in-depth case study was done in a Brazilian State University. This kind of university is subordinated to the State Government policies, even thought the university has administrative autonomy. Twelve professors/researchers with productivity grants from the National Council for Scientific and Technological Development (CNPq) were intentionally selected to be interviewed in their working places. Before interview, all curricula were analyzed in order to identify their research projects, students under supervision and bibliographical scientific production done along years 2000 to 2008.

Findings

The inhibitors and fosters factors of scientific research are similar to those reported in surveys conducted in European and American Universities (Atkinson & Blanpied, 2008; Bozeman & Gaughan, 2007; Ryan & Hurley, 2007; Landry, Amara & Rherrad, 2006; Clark, 2003). An extreme bureaucratic fragility, with non-comprehensive processes by people involved on the interaction among university, government and business still makes the institution an "Ivory Tower".

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O-061 USING A UNIVERSITY'S INTELLECTUAL PROPERTY TO SPUR ON ECONOMIC DEVELOPMENT IN THE COMMUNITY SURROUNDING THE UNIVERSITY - A TRIPLE-HELIX RELATIONSHIP?

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SUB-THEME: S3 Triple Helix in action: unlocking economic and social crises.

KEYWORDS: Economic Development, South Africa, Public private patrnership

Universities are "currently taking up a more fundamental role in society, one that makes it crucial to future innovation, job creation, economic growth, and sustainability" (Etzkowitz, 2008). Universities are also "seen increasingly as playing a pivotal role in strengthening the competitiveness of an area as a global region, based on the knowledge and skills these institutions generate" (Borrell-Damian, 2009). This paper describes a relationship involving the University of the Witwatersrand in Johannesburg (South Africa), the local and national governments and the business sector to utilise ecotourism as a means of economic development. The relationship was set up to exploit the paleoanthropology knowledge base which existed at the university to the benefit of the community surrounding the area where this knowledge was being generated.

The university is a world leader in the study of hominine species because of a number of important fossil excavation sites which are situated approximately an hour's drive from campus. The first steps towards realizing the goal of benefitting the community was the Government and the university's initiative to have the fossil sites declared as a World Heritage Site (WHS) by the United Nations in 2002. The National and Provincial governments and the university then explored various ways in which this WHS status could be exploited to the advantage of the communities.

The relationship started out in the traditional mode as described by Etzkowitz (2008). The university was producing the paleontology knowledge, the land owners wanted to improve the economic environment so that they could benefit from the influx of tourist and the government wanted to regulate these benefits so that they could be spread across a broader base.

The university already allowed the public to visit its main excavation site – the Sterkfontein Caves. As the caves are a very sensitive environment, and a large influx of visitors would disturb the ecological balance inside the caves, an alternative had to be found to cater for the planned influx of tourist. A partnership was entered into between the university, the government and industry to develop a Visitor Orientation Centre in the WHS not far from the caves. At the same time they also planned to upgrade the Exhibition Centre at the caves to enhance the visitors experiences.

The government committed a large sum of money for the capital works that were to take place on the two sites. The university provided all the intellectual capital and a number of industry partners formed a group which was given the concession to run the facilities for a period of 10 years. The main shareholder in the Concessionaire company was the company which was awarded the contract (by the government) to build the Visitor Orientation Centre and the Exhibition Centre. As will be discussed later, this company benefitted from a number of other unrelated civil engineering contracts awarded by both the Provincial and National governments.

The concession was granted on condition that the concessionaire met certain conditions at all times. Amongst these were that a certain percentage of people employed during the building phase had to be from the disadvantaged communities living within the WHS, and that once the facilities were functional, a percentage of all employees at all levels had to be from certain designated groups.

At the same time that the concession contract was granted, a Public Benefit Trust (PBT) was set up to promote, establish, protect, preserve and maintain the WHS. The concession fee that was due to the university and the government for the next ten years would be put into this PBT. The PBT was to provide financial support for scientific research, education and community development activities in or in relation to the WHS.

This paper explores how this relationship between the university, the government and industry fits into the Triple Helix Model and where the model was adjusted to make it work better. The key aspect to be considered is the fact that the relationship was not planned to stimulate innovation in the normal sense, but rather to support further research in the field of paleoanthropology.

Etzkowitz (2008) postulates that these types of relationships in many cases result in what he calls the "circulation of individuals". The paper will also explore how the relationship unfolded in the subsequent years and whether it followed the traditional Triple-Helix model. We will also investigate whether this relationship influenced the Science and Technology policies of the country – which is a developing country with an emerging economy.

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P-018

Strategic complementarity data bank of The Brazilian System of Technical Answer to dialogue's refinement of the Triple Helix.

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Introduction

The "call for papers" of the VIII Triple Helix Conference claims, based on the approach of "triple helix" (TH) developed by Henry Etzkowitz and Loet Leydesdorff, that the University should be leader in the relationship between the Industry and the Government to conceive new knowledge, innovation and economic development. If the University leadership in this process is in fact distinct trace and structural component of the TH model, is necessary the existence of a relationship standard where different "cultures" (university, industry, government) not only can recognize, communicate and respect them mutually but also where the specificities of the university to lead the process are recognized and legitimate.

This present paper examines the elements present in building TH relationship starting from accreditation initiatives of a food college lab and having as reference the operation of the institutional gadget called Brazilian Technical Answers Service (SBRT) and its goal is to make the access of the Brazilian micro and small enterprises (MPES) possible to the information to technological potential solutions at the same time to give diffusion and potentialization of the accumulated knowledge in the institutions of science and technology of the country, establishing fast connection between demands and competences anywhere in Brazil.

State of the art about the topic

Social demands related to environment has lead the industry in general and the food and liquor sector particularly incorporated it in its practice the service of quality and productivity standards that, if by one side they look forward to turn them competitive and sustainable, by other hand they end up by promoting and/or facilitating the dialogue among previously mentioned "cultures". Studies (GONÇALVES, 2005; ANDRADE, 2007 LIGIÉRIO, 2003) show that the document delivery and findings, for instance, the descriptive memorial of production and economic-sanitary memorial to the regulative origins about products to be launched in the market have been a technological barrier to the small and medium enterprises' development.

Experimental analysis college labs by their turn have an important part in the formation and in the students and researchers' development as knowledge creators as they give the chance to suggest, verify and prove theoretical assumptions. Starting from already known experimentation methodology the students are motivated to create new assumptions and/or models, contributing for the creation of the tacit knowledge in the organization.

Research focus

The research focus resides in to bring forth the strategic complementarity among the gadgets like SBRT, from para-governmental nature and the academic gadget like college lab to build that we call inter-cultural dialogue that allows and consolidate the TH co-operation.

Methodology

The research was restrict to food sector due to the representativeness of this segment between the MPES – Rio de Janeiro State and in the other hand by the fact this sector is directly related to a limiting factor of market: non-tariff or technical barriers. To identify the need of the MPES to technological information, it was used the SBRT data bank as research tool and the university side it was analyzed the experimental nutrition lab – Fluminense Federal University – UFF.

Findings

To treat the relation between college labs and the MPES, this research basted relevant factors, verified tendencies, examined menaces and opportunities and put them in perspective a diversified cluster of actions apparently disconnected but that goes in direction of consolidation of a global standard of inter-agents communication. The use of the SBRT data bank to it looks forward the experience of accreditation of a nutrition lab (LABNE) according to the NBR ISSO/IEC17025 gave the conductor wire to the diagnosis and the conclusions that we present here.

Solutions were proposed to the confrontation of questions resulting from differentiated stage of organization ripeness of the agents in relation of the college labs certification of the use of multi-user equipment and college administration.

When we examine in a crossed way the insights of the LABNE, we noticed the conflict between the pluri-disciplinary characters that the demand covers itself in contraposition to organization in general to discipline the college labs linked to the academic departments in the great majority. This is a kind of problem because it demands better communication not only among labs and the MPES world but also and mainly better ways in relations and inter-labs communications.

Contributions and implications

The use of SBRT data showed us that indeed there is a qualified demand in Rio de Janeiro for technological information. The NBR ISSO/IEC17025 implementation process analysis in the LABNE allows us to identify forces, weaknesses and opportunities of a typical college lab in relation to the needs of the MPES and the market demands.

The amplitude and research reach made countless riveting topics were sent to future studies. Among them the question of the cognitive dimension of the elaboration process of technical answers and questions linked to institutional development standards of the universities that point to prioritization of multi-users equipment and to collective lab accreditation.

Key-words:

College labs, demand, knowledge, technological information, triple helix

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O-044 **Creative cities as built places of the knowledge society extended abstract:**

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Recent city planning and urban sociology widely discuss the emergence of what city planners, academics, and journalists call the creative city (cf. Florida 2005; Landry 2000). In the context of this much debated concept, empirical research is needed to analyse its implications for the city, understood as (built) place of the social, and for the overall structure of society. So far, studies have focussed mostly either on the impact of cultural developments on cities (cf. e.g. Jayne 2004; Liep 2001; Montgomery 2004; Scott 2000)or on political recommendations of how to transform cities towards creative cities (cf. e.g. Bianchini und Landry 1994; Carta 2007; Florida 2005; Landry 2006). What's missing are studies analysing the concrete planning approaches that are used in cities which integrate the creative city concept as programmatic element in their city development plans.

Additionally, this new form of planning and transforming cities is hardly put in context with greater structural changes of society. My paper presents findings of my empirical research which I conducted in the course of the last two years in the cities of Dublin (Ireland) and Gothenburg (Sweden). The focus was on the political dimension of creative city planning. In so doing, I studied how planning authorities programmatically integrated the concept of creativity in local city development strategies and how that affected the built environment and the city's relation to and impact on overall societal changes.

With qualitative interviews with city representatives and planning authorities, participant observation, and photographic documentation, planning strategies, their realization, and their effects on the built environment were studied. Photographic archive material and planning documents served as additional material. Evaluating the broad range of material, several interesting findings were made.

One of the findings is that the Triple Helix concept is used as an underlying concept for present city planning and urban transformation. In the city of Gothenburg, the concept is explicitly used in order to transform an old industrial part of the city, the former dockyards, towards a new and sustainable inner-city quarter. That implies focussing on certain parts of the knowledge-intensive economy – which can be subsumed as belonging to the creative class and the creative industries respectively, as Florida or Howkins define them (cf. Florida 2004, p. 328; Howkins 2004, p.88ff). The strategies of the local planning authorities aim at integrating the Lindholmen Science Park in the city of Gothenburg and at enhancing the quarter's infrastructure and reputation. In Dublin, the Triple Helix concept is an implicit part of the planning strategies in selected inner-city quarters. A prominent example is The Digital Hub, a cluster for digital media enterprises which is thought to enhance the city quarter in economic and social terms.

Thus, the paper analyzes the characteristics of these particular planning approaches and contextualises them both with traditionally used concepts such as the integrated urban regeneration approach and with the overall programmatic strategy of the creative city. Additionally, it describes how the concept is used as a means to meet the underlying objective to assure the cities' character as a place of the knowledge society (cf. Bell 1973; Drucker 1993). Both the city of Gothenburg with its Science Park and the city of Dublin with its Digital Hub can thus be described as paradigmaticcities of the knowledge society. In this sense, the paper presents a macro- and a micro-perspective on present social developments in Western Europe. On a macro level, the role of cities in and for the knowledge society is brought into focus. On a micro level, local strategies and concrete planning approaches are presented to give a clear picture of two case studies.

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O-134

The determinants of entrepreneurship among women and immigrants: A cross-national analysis

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1) SUBTHEME: Entrepreneurship: start-ups and spin-offs

2) KEYWORDS: entrepreneurship, self-employment, immigration, women

INTRODUCTION

This paper contributes to the debate on the determinants of entrepreneurship by investigating in detail the role of social and cultural variables in explaining the propensity to self-employment among women and immigrants by using a rich international dataset.

STATE OF THE ART ABOUT THE TOPIC

Over the last decades policymakers have devoted an increasing attention to entrepreneurship as a powerful engine of innovation and growth (Audretsch et al. 2002, Carree and Thurik 2003). In Europe, the debate has also been influenced by a constant comparison with the US and, increasingly, with other innovative economies.

There is a great heterogeneity in entrepreneurship rates across countries, even within an economically homogeneous and integrated area as the European Union. Individual and country characteristics could help explain these differences (Wilderman et al. 1999). A number of stylized facts are well established: the probability of being self-employed increases with age; many people express the desire to become self employed but the number of those that actually become so is much lower; the self-employed work longer hours and under more stressful conditions, but they report greater self-satisfaction than employees nevertheless; and so on (Verheul et al. 2002). There are still a number of aspects for which only mixed evidence exists, though. In particular, important differences seem to exist across countries. So, for instance, while the education level affects the probability of being self-employed positively in the US, it does negatively so in Europe (Blanchflower 2004).

Concerning the gender dimension, being a man increases the probability of being self-employed in all studies surveyed, even if there are some hints that this gender gap has been narrowing recently. Regarding immigrants, the patterns are even more complex. Some groups of foreign nationals have higher self-employment rates than locals, others lower, and the figures tend to change from one country to another (Le 1999). The lack of comparable statistical evidence across EU countries is particularly acute for these two categories, that would deserve a greater attention.

Data in the European Values Study (EVS) and the World Value Survey (WVS) allow us to investigate the situation of women and foreigners with a particular focus on EU countries. The determinants of the supply of female entrepreneurs are likely to differ from that of their male counterparts and those for indigenous entrepreneurs from those of immigrant ones. For the latter, we investigate the impact of the level of acceptance of foreigners in the host country (Strabac and Listhaug, 2008) on the self-employment rate of foreigners and the role of social capital.

RESEARCH FOCUS

The paper focuses on the analysis of the determinants of entrepreneurship, in particular among women and immigrants.

METHODOLOGY

Data used for the analysis includes individual and country variables from 1999 to 2004. Individual variables come from the Value Surveys. The dataset contains a large-scale, cross-national survey of individual characteristics, preferences, values and opinions of citizens from all over Europe and beyond. The dataset is complemented with variables at country level that may influence entrepreneurship. The integrated dataset allows a better understanding of the determinants of entrepreneurship.

The analysis of the determinants of self-employment among women and immigrants is based on microeconometric analysis, combining information at the individual, group and country level. More specifically, we apply linear and multinomial logit models.

FINDINGS

There are mainly two expected results:

- The analysis will determine the most relevant characteristics, at the individual and country level, associated to self-employment among women and immigrants.
- The role of different social and cultural variables affecting the self-employment of women and immigrants will be discussed.

CONTRIBUTIONS AND IMPLICATIONS

The study analyses the determinants of entrepreneurship in EU countries by exploiting the advantages of the database. It also aims at providing a better understanding of self-employment among women and immigrants, for whom personal characteristics are likely to be associated with distinctive patterns of self-employment. This would help design more effective policies to encourage the participation of women and immigrants in entrepreneurial activities, thus addressing simultaneously objectives on innovation and integration.

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O-091 Caring for the business platform

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An important problem for entrepreneurs and support system alike is which firms will survive the valley of death and live and prosper also after the first two years. The survival rate data is harsh: only 7 out of 10 firms survive its infancy (ITPS 2008). On the other hand, the experiences of failed enterprise are a crucial input into the next project of the serial entrepreneurs (Hyytinen & Ilmakunnas 2007). Much resources - and human fatigue - would be spared if we learn to evaluate firms early on in their lifecycle. Such an ex-ante evaluation would also have the advantage of providing the opportunity to alleviate potential weak dimensions of the enterprise before the enterprise succumbs.

The Klofsten business platform provides a tool to ex ante evaluate the life expectancy of an enterprise. The model has been evaluated and it also functions as a tool to test the viability of a future enterprise. Some firms may thus avoid the valley of death through building a bridge (attend to weaknesses) or simply turning around (abandoning a weak idea) to save energy for more viable business ideas.

Predicting which infant firms will survive is an important theoretical and practical problem. In his dissertation, professor Klofsten (1992a) scrutinised important factors to infant firm survival based on a thorough literature review (1992b). He found that infant firm survival to great extent was dependent on the capabilities of the firm. The long run survival of the firm was dependent upon the flow of resources into the firm and also the ability of the firm to use these resources. A firm who has learned to master both these obstacles has learned to overcome some of its initial vulnerability. Even more important, firms which have mastered both these obstacles have in important aspects matured. There are indications that this maturity-process is similar in firms with different characteristics.

Klofsten has formulated the challenges of the infant firm into eight aspects, called corner stones (business idea, product, market, organization, expertise, prime mover, customer relations and other corporate relations). Attaining the eight corner stones of the business platform is a sign that the firm has both a sufficient flow of resources into the firm and ability to use these resources (Klofsten 1994). However, other factors, such as competition, lies outside the realm of the model.

The business platform was developed based on empirical studies of three technology-based firms. Since, it has been applied also to firms in other sectors (cf Yencken & Gillin 2006, Wängsäter 2006, Davidsson & Klofsten 2003). This paper is an attempt to apply, not the business platform per se, but the eight cornerstones of the business platform, on health-care firms which are neither technology-based, nor on an entirely private market. We may note two important differences compared to the firms of Klofsten:

"These are service firms, rather than technology-based sectors. These service firms are developed under different conditions, where profession is crucial, than the firms described in Klofsten.

" They are working on a quasi-public market, where the county council is quasi-monopolistic and play several different roles as contractor, financier, competitor, broker and co-operator.

In a two by two matrix, we may note how these firms differ in both these dimensions.

The corner stones of the business platform taken together provide a suitable framework for understanding and analysing some of the challenges of the care sector firms. Although there is political consent on the importance of developing an industry of private health care firms, these firms typically encounter a harsh reality. The political will is not translated into possibilities offered by the quasi-monopolistic public health care. Therefore, there is a need to analyse the obstacles for infant firm survival in this particular sector and to understand which aspects are important in the early phases of firm development. In this paper, we apply the business platform to care-sector firms in order to answer the question: how can the business platform help us to understand/explain challenges met by firms in the care market?

The paper will be based on interviews with care sector firms. The business platform will be used as an analytical framework to better understand the conditions for new health care firms. In order to systemise the market conditions for the health care firms, the framework of three dimensions of private-public is applied (Lindquist 1992, Lindquist 1998).

Findings

Expected findings include:

" The relations of the health care firm may in some respects resemble that of the triple helix firm. Whereas the triple helix firm is more clearly based on technological and organisational innovation, here too, the relations with the surrounding economy is more based upon collaborative processes with non-market entities than are the common contractual firm. (Etzkowitz 2008:50) " the business platform is perceived as a fruitful framework for improving our understanding of these types of firms

" the market is difficult to these firms. They need to relate to multiple markets, and to that, one market which is quasimonoploistic and with high entry-barriers. " The relationships to the county council are very important. It is important to initiate a co-petition, which is difficult, despite political will on a national level.

" It is difficult for the firms to grasp the difference between who benefits and who pays for the health care service. This is a problem which is graver when the public sector is involved. It also implies that there is a risk of overconsumption of health care. " the product development is comparably uncomplicated to these firms and tends to coincide with the business idea.

Conclusions and implications

Expected conclusions and implications include:

" the eight corner stones are important to understand the challenges faced by the firms. Some cornerstones are easier to attain than expected (product development) whereas others are harder to attain than expected (other relations).

" These firms may need a different kind of support from the support system, where the collaboration with the public sector is crucial.

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Madrid, October 2010

P-054 "I do not know if this is a good idea..." On innovation, gender and profession.

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Assistant nurse is the most common working category in Sweden. Most Swedes work in the public sector and care is a crucial issue and one of the areas where Swedes are most prone to pay taxes for, according to surveys. But care - medical care as well as of the elderly and of the handicapped - is also a sector in distress. Budget cuts leads to stress and distress. It is a hierarchical, bureaucratic production-oriented organisation where many employees have low formal education, high level of sick-leave and where a majority of employees are female. It is not a sector which we commonly associate with innovation.

Nurses and assistant nurses are everyday problem-solvers. "You never know what you will find when you open the door" one home care worker put it. The routinised problem-solving is not expressed and is thus not noticed. This has several consequences, among which can be noted that the bottom-up problem-solving is not shared, not standardised and does not contribute to the work-satisfaction nor self-esteem of the employees (Nählinder 2006). The invisibility of the routinised problem-solving may therefore be considered as a problem in itself.

May the problem-solving capacity of care-sector employees be a part of the solution of the distress of the care sector? And, may nurses and assistant nurses be an important underutilized source of innovation? This paper focuses on the latter through the description and discussion of the project PIMM.

The project PIMM aims at supporting and assisting public care sector employees in the region of Östergötland to present and process their idea into a licensed good or service. Inspired by a forerunner, PIMM has assigned and trained peers (called idea pilots) to inform the employees of the possibility of presenting and processing their idea within the project. Assisted by an innovation advisor, they qualify, develop and protect their idea and finally, given that the idea holds, license their idea to a firm.

PIMM has the potential to attract an unusual target group: nurses and assistant nurses (profession) and these are, traditionally, often women. The design of the project also reflects the sought-after target group: the idea pilots are peers and in meeting their peers they sometimes mention the fact that they are women and point out that women are capable of innovating. Has the project set-up proven to be a success in attracting women? And why so? These are questions we want to address in this paper.

The project PIMM has been operating since September 2006. The multi-partner project constellation brings together partners with different business ideas. Municipalities usually do not take part in this type of innovation support projects. Three organisations are essentially health care providers (the municipality and the county council) focussing on improving the co-workmanship of their organisation.

Two organisations are regional innovation support organisations while the third, the business support organisation ALMI, implements the project platform and helps develop the ideas into innovations. Alongside the project an on-going evaluator from the Helix centre of excellence has also participated in the project.

The constellation of the project is interesting since the diverse goals of the organisation has co-existed and supported one another throughout the process, even though it also has generated conflicts. These three triple helix organisations -the research organisation, the public sector organisations and the private sector firm - has thus worked together and collectively achieved a common goal while been able to use the experiences in their own home arena as well. The three co-authors of this paper represent one of each of these three types of organisations in the project.

Methodology

The three co-authors have participated in the project from the start. In this paper we collect our findings from the project from our perspectives.

Findings

- " The idea pilots are important bridges between the innovation advisor and the working place.
- " The outreaching information has been important to attract new groups of idea carriers.
- " The project is very aware of the reception of the idea carriers. An important question for further research is how the idea carriers whose ideas have not been successful perceive the contact with ALMI. Have they gained in self confidence and in entrepreneurial spirit?
- " The project has been successful in attracting women: 69 per cent of the ideas have come from a female idea carrier.
- "There is no or little differences between male and female idea carriers concerning the preliminary failure rate of their idea.
- " The project has so far been extraordinarily successful in attracting and mobilising a group of passive innovators (nurses/ assistant nurses). A large share (45%) of the idea carriers are either nurses or assistant nurses.
- " Few ideas are refined into commercialised innovations so far. However, this is to be expected from innovation processes and there are indications that the failure rate is in pair with the normal failure rate.

- " Even ideas who did not reach a commercialised product have proven to be valuable. The most common reason why an idea does not reach commercialisation is that the product already exists. In these cases the idea pilots usually reports back to the idea carrier who a stronger position for suggesting the purchase of the product.
- " Idea-carriers from the care sectors demand another reception than other idea carriers. The reception is often softer than for other idea carriers and they are less secure of themselves. A possible explanation is that the idea carriers attracted by this project has been requested to seek contact with ALMI through presentations and are thereby not as convinced by the importance of their own ideas as idea carriers who themselves find and contact ALMI.

Conclusion and implications

Nurses and assistant nurses are in many ways a hidden potential for innovation. The project has been extraordinarily successful in attracting ideas that otherwise would not have been recognised. This has been done through a method, which has been utterly important for the project. The idea pilots have functioned as bridges or translators between the every-day workplaces of the idea carriers and the idea qualification process of ALMI. The fact that the idea pilots are women and peers has probably been important since they are familiar with the work-places and professional codes of the idea carriers, which creates trust.

Nurses and assistant nurses may potentially be important sources of innovation. However, it is difficult to support their innovativeness within the organisation, also because the organisation is in the process of budget-cutting.

Triple Helix VI) Conference Madrid, October 2010

O-111

JUMPSTARTING THE TRIPLE HELIX IN A BACKWARD REGION: THE CASE OF THE NUCLEOUS FOR TECHNOLOGICAL INNOVATION IN THE STATE UNIVERSITY OF CEARÁ

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The Triple Helix approach assigns to Universities the role of main driver in the process of innovation, by assuming that:

a) That's where, as outcome of basic and applied research, relevant new scientific knowledge tend to emerge, which,

b) within favorable conditions and adequate incentives, provided by Government,

c) will eventually embody into new and/or better goods and services produced by firms - pushed by their striving for profit, within the competition driven market - thus leading to continuous rises in society's income and living conditions, i.e., economic development.

In the so-called developing countries - especially those characterized by backward regions, as Brazil - research has shown that the relative weigh of the Model's basic elements may shift, with Government taking responsibility for helping universities (and/ or the productive sector) to overcome structurally imbedded deficiencies or limitations.

The state of Ceará is located in Northeast Brazil, a region which, for both historical and geographical reasons, remained for a long time in underdevelopment conditions, and only very recently began to modernize. Therefore, its production sector is rather sluggish; local government faces both serious social problems and a chronicle dearth of resources to solve them; universities are deficient, in terms of faculty training, laboratories and research financing; and interaction with the production sector is very low.

Obviously, Ceará belongs in a wider national context - and, as generally known, Brazil has been achieving, over recent decades, expressive growth rates, and establishing both a dynamic productive sector and a respectable system of universities and research institutions. Since recently, Brazilian Government began implementing an assertive policy, directed at fostering the country's technological capabilities and, specially, at enhancing the rhythm of innovations' generation by the productive system. Such policies translate a growing acceptance of the basic postulates of the Triple Helix model on the importance of innovation as engine of economic development, and on the role played by interactions between University, Firm and Government, as determinant of a country's innovative capabilities.

But they reflect also the realization that, despite the level of development achieved, Brazil's economic system keeps on displaying some specific features which distinguish it from developed economies, such as the high share, in the Gross Domestic Product, of technologically mature sectors, and the very limited (or almost inexistent) presence of national firms in the most technology intensive (and more prone to innovate) sectors. And thereby, the perception of the need for an assertive and proactive actuation by the "government helix", both at devising and awarding more effective inducements to the "firms' helix" innovative push, and at creating incentive mechanisms directed at academic communities - which integrate the "university helix" - to further economic utilization of new knowledge resulting form research activities.

It is within the context of these latter mechanisms that fits the law-established determination, issued to all the country's higher education institutions, to set up, in their organizational structure, a Nucleus for Technological Innovation (NTI), intended at introducing and disseminating, among the academic community, the culture of intellectual property rights's protection, and their economic utilization, either through entrepreneurship, technology licensing or consultancy to the production sector. As it could be expected, this mechanism was devised with an eye on the advanced scientific-technological system existing in the developed regions of the country - but, since the legislation has a nation wide application, it has begun being implemented also, with variable levels of rhythm and success, in all other regions.

This paper discusses the process of implementation of the NTI of the State University of Ceará - a higher education institution owned and managed by the state government. It aims at drawing the lessons from the introduction of new concepts and degrees of awareness on a university's functions, as perceived by its faculty, research teams and management staff, as well as by the local production system and the very society it is inserted in.

The main goal is to assess that process at the light of the basic concepts of the TR model, validating the assumption that, under conditions of underdevelopment, it may befit the State a more prominent role, as the strongest propulsion power-endowed helix. Its actions might liberate and boost university's intrinsic potential to contribute to elevating the innovative capacity of society, by means of advancing the performance of two complementary functions: creation and incubation of new high technology-based firms, and diffusion of available "conventional" technological knowledge throughout the more traditional sectors of the local productive system.

O-032 Difficulties in Integrating the "Third Mission" – Experiences of University Scientists in Hungary

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Europe, universities have been seen as major contributors to national and regional economic development, and especially through the process of commercializing research results ('third mission'), since buzzwords such as 'competitiveness' and 'knowledge-based society' re-entered political talks. Building on economic theory, European policymakers consider knowledge as a source of economic growth, and accordingly, intend to boost the 'marketization' of academic science by changing the legislation of higher education and that of intellectual property (IP), as well as the structure of research funding (Nowotny, Scott, & Gibbons, 2003). The policy measures focusing on university-industry relations are part of a broader reform-package that aim to increase universities' autonomy, accountability and interactivity with society and the business sphere. These ambitious aspirations feed upon the admiration of the U.S. higher education system (Kirby, 2006) and especially on the very few examples (MIT, Stanford) that can be considered as exceptions even in the U.S., due to their special economic geography and unique resources (Wright, Clarysse, Mustar, & Lockett, 2007).

In Hungary, the Innovation Act (2004) and new funding mechanisms for applied research and development have given way to similar developments to those of the U.S. in the aftermath of the Bayh-Dole Act (1980): universities have gained title to academics' inventions, set up IP management policies and technology transfer offices to guide commercialization, launched research consortia with businesses to be eligible for government grants, and are allowed to establish (spin-off) enterprises to facilitate commercialization. The paradox of the Hungarian situation is that the American technology transfer model has been applied to a higher education system that is yet to undergo transformation in many other areas (e.g. university governance, management and finance) of the intended European reform.

On the basis of the above considerations, the main aim of this paper is to scrutinize university scientists' perceptions about the growing emphasis on the third mission within Hungarian universities. As most papers in the field examine the phenomenon in North American and Western European contexts, it is far from clear whether institutions rooted in an Eastern European post-socialist environment (e.g. Hungary) show the same patterns of entrepreneurial transformation. Although EU and national level decision makers demonstrate a great preference for emulating U.S. research policy, it is unlikely that measures modelled after the Bayh-Dole Act will deliver the same results in a different institutional and cultural framework as in the U.S. (Maassen & Olsen, 2007), where higher education institutions have nurtured a customer service state of mind since as early as the late nineteenth century (Etzkowitz, 2002).

Method

In May/June 2009, I administered a web survey to more than 7,000 university scientists (22.6% responded) of engineering, medical science, natural science and agricultural science. The findings presented are based on the answers of 1,562 academics of fourteen Hungarian state-owned universities. Prior to the web survey, I conducted face-to-face and telephone interviews with technology transfer office staff and management at seven universities. The interviews were exploratory in nature, while the web-based survey addressed to examine causal relationships as well, such as the association between university scientists' entrepreneurial activity and their attitude toward the third mission and the Bayh-Dole-type system (institutionalization of academic entrepreneurship). I used various multivariate statistics to define variables and to measure the level of association between them. I also collected qualitative data from academics through open ended questions, which helped in interpreting quantitative results.

Findings

Albeit, only a small fraction of university scientists participate actively in academic entrepreneurship, their majority accept and even support the third mission as a new academic norm. Those who have more positive (or less negative) attitude toward the third mission are more active in commercialization, however, the relationship between attitude and behavior is quite week. The lack of strong association points to the role of other factors in determining the diffusion of entrepreneurship among academics. Among these factors, the scientist's field of research and research orientation (basic versus applied) as well as his/her department (attitude of colleagues and heads) proved to be more decisive. Qualitative responses also revealed that besides the aforementioned factors, the main constraints of integrating the third mission are academics' limited resources such as time, energy and competences.

Although academics in general would welcome the university's assistance in commercializing research results, they are less positive about offering IP to and sharing income (arising from commercialization) with the institution. Moreover, those scientists who (besides their university duties) work in spin-off enterprises foster significantly more negative attitudes toward sharing IP and profits with the university than their non-entrepreneurial counterparts. Qualitative data pinpoint the role of transaction costs (Coase, 1988; Williamson, 1981) in explaining the differing attitudes of academics, who indicated that establishing spin-off enterprises is (partly) motivated by avoiding intramural transaction costs as for example bureaucracy, administrative work and income redistribution. Entrepreneurial academics thus probably regard market transaction costs to be lower than the costs of cooperating with the university. Hence, universities had better consider the costs of institutionalizing the third mission from the scientists' point of view, as success largely depends on their willingness to disclose inventions and to cooperate with the institution.

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O-133 The new Industrial Property Law in Brazil and its influence on drugs innovation in the national pharmaceutical sector

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In Brazil, regulatory changes and economic changes in the nineties brought about growth business strategies of pharmaceutical companies operating in the country. The main changes can be mentioned: reduction of tariff protection and non-tariff barriers; stabilization of currency; flexible exchange rate policy; inflation control; creation of regulatory agency for the sector (National Health Vigilance Agency - ANVISA); dismantling of price control mechanisms; promulgation of Law on Patents; introduction of generic drugs and imposition of new rules for the industrial sector in order to ensure the quality of medicines commercialized in the country.

The factors governing competition in the pharmaceutical industry are several. From the point of view of markets structure few important barriers for the entry of new competitors should be identified: differentiation of products by therapeutic classes and strategies for the promotion and marketing based on brands; high investments in research and development (R&D) and vertical integration; and, last but not least for patents. From the strategic point of view, it should be mentioned the different pricing policies, especially after the emergence of generic drugs, and strategies for mergers and acquisitions that have characterized the industry in the late 90 (QUEIROZ, 1993; SHERER, 2000; UNICAMP, 2000; HASENCLEVER, 2002). The competition in the pharmaceutical industry is mainly through product differentiation, where big drug multinationals are increasing their spending for R&D and marketing as a way to ensure the maintenance of sales. The development of new molecules is intended to launch new brands on the market under different types of presentations, while differentiation through advertising requires disclosure of the mark among medical doctor and final consumer. Therefore, the supply of drugs is related

advertising requires disclosure of the mark among medical doctor and final consumer. Therefore, the supply of drugs is related to the development of new substances, where the research is high risk for manufacturers. According to Schumpeter (1988, p. 23), the economic system evolution, and in particular the pharmaceutical industry, is in process of continuous search for innovation.

In the United States (US), R&D spending in pharmaceutical companies increased from US\$ 262 millions in 1951 to US\$ 1.7 billion in 1967, US\$ 3.1 billions in 1980 and US\$ 8 billions in 1990, at constant price level in 1990 (SCHERER In: CULYER, NEWHOUSE, 2000, p. 1307). According to DiMasi et al (2003, p. 167) the total spending for R&D in 2000 for a new drug should be about US\$ 802 millions, and its pre-clinical stage representing 41.8% of this amount. In 2003, the worldwide leader Pfizer spent 18% of its sales for R&D totalizing US\$ 39,631 billions, and all the other companies invested in average 17.4% (SCRIP'S YEARBOOK 2005, 2005). The industrial concentration constitutes the dimension of market structure and in this way the literature on competition in the pharmaceutical industry has received more extensive treatment and details. The intensity and effectiveness of competition are significantly affected by the degree of concentration of suppliers in a given market (BAIN, 1968, p. 126).

This paper analyzes the impacts occurred in the national drug industry, caused by the current Law on Industrial Property - LPI 1996, which allowed again processes and products patenting for medicines. Thus, patent applications registered in Brazil in the pharmaceutical sector were raised by residents and non residents companies in the country, identifying the major depositors of patent applications in the period between 1987 and 2005. The choice of databases for the survey took into account the possibility of statistical treatment for its results. The period considered is due to the reliability of the data, since the applications filed in the country are published after 18 months of secrecy and 30 months for applications filed through the Patent Cooperation Treaty (PCT). The results showed that the deposits have increased from 2404 to 21,642 after the entry of the new Patent Law. The ratio between deposits from residents and non-residents, for the period before the Law and after it, was 2% and 4% respectively. The relationship between the number of patent applications from the biggest depositors and the total deposits decreased from 48% to 36% after the enactment of the LPI, and no Brazilian depositor appeared among them. In the period between 1997 and 2005, the concentration ratio for both 4 and 8 biggest companies, after the LPI, was virtually unchanged (22% and 35%, respectively), showing no significant changes in market structure. The growing negative trade balance for medicines, from US\$ 859 millions in 1997 to US\$ 1.5 billion in 2005, indicates a country's dependence on medicines. The article concludes that the modifications added to the LPI did not contribute to make domestic industry more competitive and suggest recommendations for reducing the external dependency.

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P-027

Sectoral Funds: Methodological Framework for Evaluation of Scientific and Technological Development Actions at the National Nuclear Energy Commission - CNEN/Brazil

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Since the first experiences of government programs evaluation in Brazil, the improvement in development and implementation of Science and Technology (S&T) evaluation systems has not been very significant, despite the importance of this theme. This study proposes an evaluation system for the Energy Sectoral Fund concerning the National Nuclear Energy Commission / Brazil (ESF-CNEN). The specific objectives of the system are: (i) Measuring implementation levels of the ESF-CNEN objectives and goals and also the adherence to international trends for scientific and technological research, (ii) Screening and analyzing relevant results regarding scientific and technological development policy, embodied in Sectoral funds objectives and operating sponsored projects institution goals, (iii) Recording all possible differences between expected and actual results, including analysis of its causes and implications, and (iv) Evaluating direct impacts of ESF-CNEN (related to its more immediate goals) and indirect impacts of sponsored projects on policies and institutions involved.

The setting up of Sectoral Funds (Pereira, 2005) by the Brazilian Government in 1999 allowed the expansion of resources allocated for the Science, Technology and Innovation system (ST&I), strengthening the scientific and technological basis for industry in specific sectors and improving integrated management among different sponsor agencies. The main sponsors of the ST&I system are FINEP – the national technological development and innovation Agency - and CNPq – the national council for scientific and technological research, both from MCT - Brazilian Ministry of Science and Technology.

This study focuses on the use of Sectoral Funds applied to Brazilian nuclear area. The motivation to develop a methodological framework for evaluating science and technology actions for the nuclear area is caused, on one side, by the new Government priorities in this field and, on other side, the experience of staff members at CNEN engaged in this research.

There is not yet in Brazil an "Observatory" in charge to systematically design and produce indicators which describe the scientific and technological activities within country, spreading later to the overall participants ("actors") of the Brazilian research and technological development system. Indeed, "there is still not a tradition in Brazil for the production of indicators and data in this area" (FAPESP, 2002, p. 3).

The role of evaluation is gaining importance as a management tool, especially for decision-making, including the establishment of public policies. In this way, the study provides subsidies to CNEN (institutional operator), FINEP and CNPq (national agencies responsible for the Sectoral Funds management) on an evaluation model and especially in its logical evaluation framework. The Evaluation Model proposed for ESF-CNEN provides subsidies for evaluating ESF-CNEN, considering the standards set by the Sectoral Fund, and undertakes analysis of aspects related to efficiency, efficacy and effectiveness of ESF-CNEN and its social and economic impact.

The evaluation of EFS-CNEN is understood as a systematic collection of information about activities, characteristics and outcomes of different actions, aiming to reduce uncertainty and improve effectiveness of these actions and decision-making processes. It is important to consider that the implementation of different projects should maintain consistency with the overall goals of ESF-CNEN, requiring up continuous assessments (Clark, 1999, p. 14 apud Lima, 2004).

The suggested model should a priori facilitate the construction of an evaluation instrument able to consider the most relevant aspects of ESS-CNEN and its social impacts. Projects and programs evaluations traditionally focus on issues such as criteria of efficiency, effectiveness and quality of management (Ohayon & Rosenberg, 2007).

Besides that, this model focus on the impact of technological programs following the more recent trends of adapting the methodologies elaborated in developed countries to the Brazilian environment.

The model also sees ESF-CNEN as being formed by four functional subsystems: (1) Political, Strategic and Normative Subsystem; (2) Organizational Subsystem: (3) Technical and Scientific and Economic Subsystem; and, (4) Resources Allocation and Management Subsystem. These four ESF-CNEN subsystems interact among themselves, in all levels of their programmatic action (annual or multi-annual plans), influence the behavior of all parts involved (institution and teams under the projects) and impact the external environment, in their respective domains.

In the assessment of each subsystem, besides comparing the ESF-CNEN performance indicators with the original planning, the study shows how important is to analyze them in a wider context. In the Technical-Scientific and Economic Subsystem, for example, it is important to know the results obtained with training of human resources and compare it with other initiatives in this area, like those taken with the institution budget. This can measure how important the resources from ESF-CNEN were in fact to the organization.

Performance Indicators are established for each important process in the subsystems, such as: (i) Inputs Indicators; (ii) Outputs Indicators (iii) Impact Indicators (iv) Economic Indicators. To evaluate the results of ESF-CNEN it is necessary to establish a set of analysis approaches. The objective is to define specific aspects to be assessed using the indicators and criteria associated. This is necessary since the word "evaluation" can be interpreted in several different ways and meanings (GEISLER, 2000). The statement of a set of analyses approaches can define clearly the objective of the evaluation. The analysis approaches can be related to one specific subsystem or to several subsystems.

Finally, this article brings about different recommendations to improve evaluation for science and technology programs.

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University's Portfolio of Industrial Connections: Building regional economic development through university centered regional innovation systems; a Case study of Japan

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This paper looks at the traditional relationship of university-industry-government relationships through the lens of regional innovation systems, analyzing the factors that contribute to the formation and sustainability of a university based regional innovation system. I begin with a narrative on the evolution of the university-industry-relationships with a bias on how it has taken shape in Japan vis-à-vis the emphasis that is being placed on regions as areas of economic development. It has become apparent that the mere imitation of existing university-industry-government models to spur economic development does not translate into smooth transition of research into innovative products as depicted by areas such as silicon valley (Saxenian) This paper argues that the social innovative capital focusing on trust-ability and qualitative communication among the key players in a the regional university-industry-government relationship are major contributing factor to the development and effectiveness of the regional innovation system. Trust-ability is the bond that lowers transaction costs among the key players and qualitative communication is the high level of interaction among the same key players. Effectiveness is defined as the ability of the university centered region to continuously churn out innovative commercial products.

Unlike the united states that has a long tradition of university-industry-government relationships that was reinforced by the Bahy-Dole Act with the aim of enhancing industrial and technological strength, Japan after the Meiji restoration, and predominantly after World War 2, Japan embarked on efforts to enable it becomes an economic superpower. Japan's deep-seated preoccupation with its economic security led it to craft strategic policies that stimulated both industry and a local market which led to economic prosperity that took away attention of the Japanese from the ongoing revolution of academia-industry relationship taking shape in the western world. Japan's explicit focus on technology policy, promoted specific sectors and industries aimed at increasing its industry's international competitiveness. The ministry of Technology and Industry designed a wide range of technology policy in which some of the core sectors such as automobiles, electronics and telecommunications have been awarded substantial subsidies for R & D under the infant-industry schema (MITI). It was not until the bubble burst that Japan began to realize the importance of integrating academia in the industrial process and stated formalizing institutions for academia-industry relationships.

However, with the adoption of the Bayh-Dole Act in 1998 and the transformation of Japanese Universities into fully fledged corporations in 2004, Japan has made considerable progress in shifting ownership of patents from industry to university. Previously industry and government benefited from "free ownership" of technology inventions derived from joint research with University research Institutes and government, this is because prior to the new law, universities. had no independent administrative or financial status, they were considered branches of the Ministry of Education, Culture, Sports, Science and Technology (MEXT) and therefore their labs were Japanese government labs.

With the new legislation in place, various state and private universities developed portfolios that could enable them translate their research into innovative products. Ektowitz and Leyderdorff (1996) say that the interaction between government, knowledgebased institutions and industry proves to be useful tool for both the creation and dissemination of tacit and codified knowledge that is a requisite for innovation. Based on this precept, university-industry-government models were set in the belief that they could spur regional economic development, however this has had mixed results and led to the following research question. Why do certain regions that have a university-industry-government relationship not perform as well in terms of producing innovation as their counterparts despite having similar portfolio in terms of physical set up? This paper looks at university centered regional innovation systems in three tiers, based on the size of the university and amount of government funding received directed towards research. Preliminary studies show for example that Kyushu Technical university receives a similar amount of grants as Nagoya Technical university with the latter producing 13 spinoff companies compared to the former which produces 45 spinoff companies a year with a companies in the former regions staying in business for over three years. This paper argues that the innovation is a product of not only key physical factors and institutions but also social aspect that researcher have not paid much attention too. Since social aspect is a broad term, this paper focuses on trust-ability and qualitative communication as a yard stick to measure the relationship inherent within the university based university-industrygovernment relationship. By clarifying the social capital aspect as a major contributor to innovation, universities will be able to come up with a clearer portfolio for developing innovation systems and increase the effectiveness of the university-industrygovernment relationship. This is an ongoing research with the results to be presented at the conference in October.

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O-008 INDUSTRY-KNOWLEDGE INSTITUTIONS COLLABORATIONS IN NIGERIA: CRITICAL ISSUES AND POLICY DIRECTIONS

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The paper focuses on an on-going study on collaborative activities between industry and knowledge institutions in Nigeria. The study is a more comprehensive research on Nigeria's National Innovation System (NIS), following the earlier study reported by Oyewale (2005), which appraised the interactions among the key elements of Nigeria's NIS. This study is focussing on industrial firms in five sectors of the Nigerian economy and knowledge institutions that support them.

As at the time of the study, there about 104 universities, 71 polytechnics and colleges of technology and 70 research institutes, which conduct R&D in specific fields in Nigeria. These educational institutions and research institutes are believed to generate knowledge that could assist the industrial firms in their activities. The industrial sector is categorised by the Manufacturers Association of Nigeria (MAN) into ten (10) sectoral groups using the Standard International Trade Classification (MAN, 1994). Out of these sectors, this study is evaluating activities of the following sectors: Food, Beverages and Tobacco, Chemical and Pharmaceuticals, Domestic and Industrial Plastic, Electrical and Electronics Products, and Non-metallic Minerals.

The study is set to evaluate types of support and collaborations between industrial firms, universities and research institutes. Earlier report of Oyewale (2005) revealed that 40% of the industrial firms supported research activities in universities and research institutes, while about 35% of the researchers based their research activities on ideas from industrial firms. Furthermore, about 40% of the industrial firms also claimed to have had idea inputs into research activities of institutions/institutes and researchers, 20% of the firms gave such ideas to university researchers and 30% to research institutes. About 70% of the firms also claimed they approached Nigerian institutions/institutes and researchers to resolve technical, product, product process and other S&T related problems. The study concluded that there was a severe information gap within Nigeria's NIS and interactions among the elements of Nigeria's NIS were too weak to bring about innovations and knowledge-based industrial development in the country. One of the key recommendations by the study was the establishment of Industrial Liaison/Technology Transfer Offices in Nigerian universities and other knowledge institutions. However, since the time the study that Oyewale (2005) reported was conducted, some of the recommendations had been implemented. For instance, the Federal Government of Nigeria had implemented a programme on the reform of the National Science and Technology System. This study is therefore attempting to make a more comprehensive study of Nigeria's NIS, covering about 500 researchers and 100 industrial firms, with a view to investigating the nature and types of collaborative activities between the selected industrial sectors and the knowledge institutions.

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W-05

Is industry-university interaction real and viable in the Brazilian pharmaceutical system of innovation?

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Introduction

Industrial policy in Brazil has had different waves during the last 20 years. As in many developing countries, during the 1990's the Brazilian government followed the Washington Consensus recommendations of capital and trade liberalisation and decreased the importance of the State in the economy, specially the actions related to the industrial sectors. Only in 2003, the new government established a new industrial policy, which became important again. The Industrial, Technological & Foreign Trade Policy (PITCE, in Portuguese) had the objective to induce new competitive level in industry through innovation generation. It implemented a systematic view of the industrial sector. Some laws and government programmes were created to facilitate this interaction and the generation of innovation. In 2008, another new industrial policy was signed, the Productive Development Policy (PDP), aiming at creating sustainability for economic growth. Innovation and industry-university relationship were maintained as important goals.

The aim of this paper is to show that although some government instruments have been developed to enhance innovation in Brazil mainly through the improvement of the industry-university interaction, they are not enough to make it happen. We believe that many other factors influence the development of companies and their capacity and will to innovate. While companies' investments in research and development (R&D) are very rare and government instruments to stimulate these investments are insufficient, it will be very difficult to increase innovative activities in the industrial sector, specifically the pharmaceutical sector.

Methodology

The study was preceded by a literature review and secondary data analysis that aimed to contextualise it, showing the industryuniversity interaction numbers and characteristics in the pharmaceutical sector in Brazil. The field work consisted of 50 interviews with important actors from the Brazilian pharmaceutical system of innovation, e.g. companies, universities, government institutions and actors related to the sector. The interviews were based on open questionnaires; all of them were conducted in person and recorded. The interviewees are representatives from different and important actors of the system, so it would be possible to create a diverse and large sample of information about the importance of cooperation to innovate. The main topics discussed in the interviews were the motivations and strategies to interact, government role, activities done in collaboration, intellectual property rights, role of liaison agencies and main obstacles to the interaction.

Results

i) Industry-university linkages in the Brazilian pharmaceutical system of innovation Government stimuli and programmes to enhance innovation and the interaction between universities and pharmaceutical companies have represented a significant increase in the amount of investments, collaborative activities and the importance of the search for innovation. The Brazilian Innovation Survey show an increase of 77.4% from 2003 to 2005 in the amount spent on internal R&D and 56% in the acquisition of external R&D and external knowledge. During the same period there were 65% more interactions between pharmaceutical companies and science and technology institutions (IBGE, 2007). Moreover, the Research Groups Directory of the National Council for Scientific and Technological Development (CNPq, 2004) shows that interactions occur for short term scientific research; technology transfer developed by the research group to the partner and technical consultancy activities.

Despite the rise in the numbers, it has to be considered that any growth in a small number will seem to be very significant. Therefore, if you deeply analyse the sector, things are not going as well as the numbers of innovative activities show in Brazil.

ii) What did the interviewees say? Motivations, obstacles and strategies to interaction

Most of the activities done in collaboration are tests that count on university equipments and previous technical knowledge, which means that very little knowledge is being created in these activities. Nevertheless, few companies are now leaning toward systematic innovative activities, developing R&D internal departments and starting to collaborate with universities for long term research that can lead to a more innovative product.

However, bureaucracy, the most common obstacle mentioned by interviewees when commenting on difficulties to interact, drugs registration, imports, exports and the approve of clinical trials protocols still represent very important barriers to the development of the sector and the industry-university interaction specifically. Regulatory aspects and intellectual property rights issues were also constantly identified as factors of uncertainty that block higher investments from industry.

Conclusions

To sum up, it is possible to say that the government will and stimulus to industry-university interaction are not the only factors needed to this interaction and the generation of innovation to happen. The pharmaceutical sector is very complex and depends on well developed and established government institutions to work in a proper way. Regulatory aspects and intellectual property rights are quite significant to production and innovation in this sector. For this reason, to the development of the pharmaceutical sector in Brazil together with government current stimuli, it is mandatory the establishment of a regulatory framework and the bureaucracy reduction in regulatory agencies, government institutions and public universities. These factors will reduce uncertainty and increase companies desire to take risks investing in innovation and production.

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O-021

Motivation, obstacles and strategies to the industry-university interaction in the British pharmaceutical system of innovation. Introduction

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The pharmaceutical sector is one of the most important ones in the UK. It is the largest investor in healthcare-related research and also an important research and development (R&D) performer (HCHC, 2005; UK pharmaceutical directory, 2009). The relevance of R&D activities in this sector leads to strong interactions between industry and university, which is very well developed in his country.

The study about the UK pharmaceutical sector aims to identify the motivations, strategies and obstacles to the industryuniversity interaction. It will help to understand and learn about the positive strategies undertaken by companies, universities and government that led the sector to a virtuous development.

Methodology

The study was preceded by a literature review and secondary data analysis that aimed to contextualise the study showing the UK industry-university interaction numbers and characteristics. The field work consisted of 12 interviews with the UK pharmaceutical system of innovation actors, e.g. companies, universities, charities and government institutions. The interviews were based on open questionnaires; most of them were by phone and recorded. Although the number of interviewees was not very large, all of them are representatives from very important actors of the system. The main topics discussed in the interviews were the motivations and the strategies to interact, the government role and the main obstacles to the interaction.

Results

i) Industry-university linkages in the UK pharmaceutical system of innovation

Kleyn, Kitney and Atun (2007) affirmed that the UK and European government support for collaboration between BioPharma companies and universities has been increasing during the last couple of years. Recent investments from the UK Government in the health sector classified it as a national priority and commissioned a report to identified investments priorities until 2015 with special attention to university knowledge-transfer groups. Nevertheless, the pharmaceutical sector has increased significantly its interaction with research organisations, not only because of Government policies and programmes, but also because of companies' strategies to grow.

Some evidences confirm the increase in interactions. Between 1981 and 2000, the number of co-authorship between companies and universities had a significant growth in Chemistry, Medicine and Biology (Calvert and Patel, 2003). The CIS 4 shows that universities and other higher education institutions are the third most important collaborators for the manufactures of chemical and chemical products sector in the UK (Eurostat, 2008). According to the High Education-Business and Community Interaction Survey 2007-2008 (HEFCE, 2009) the total income from knowledge exchange activities in the UK in 2007/2008 was £2,812 billion; contracted research was the activity with the largest amount of income, £835 million. Moreover, commercial partners (industry) were the most important beneficiaries of the university third-stream priorities.

ii) Motivations, obstacles and strategies to interaction

The interviews were important to show the motivations, obstacles and strategies of companies and research organisations to interact.

The main motivation of pharmaceutical companies to interact with research organisations is the access to researchers' knowledge and expertise. Nevertheless, university researchers are interested in the possibility to turn the research into a product, or to take the technology or molecule from the early stages through the development till it gets to the market.

Negotiation over the IP was identified as a frequent obstacle to the industry-university relationship. As a reason for this difficulty the achievement of an effective contract was also repeatedly mentioned as a difficulty in these interactions. Publication was also mentioned as a common problem on this kind of collaborative activities. The ways companies and research organisations found to overcome these obstacles were being flexible, discussing and negotiating case-by-case; having routines to help the interactions and build networks and having experienced academic staff in the company department that deal with the collaborations.

In terms of strategies to build links with research organisations, the companies' strategy is to go out and look for academic researchers for consultancy, services and collaborative research. Research organisations' strategies to promote interaction with companies occur in two levels. Either it can occur directly through personal contacts. When companies' employees contact researchers and researchers contact companies' employees in conferences, meetings or because of their publications. Alternatively, it takes place through the liaison agencies from the research organisations that were created to build a network to future interactions, to market out the research, to promote events with companies and academic researchers and to deal with contractual agreements and IP rights that will come up from the interactions established.

Conclusions

The most interesting conclusions from the analysis made and that can be used as examples for other countries are that a) a well developed industry in terms of R&D activities is extremely necessary to build an industry-university relationship; b) research organisations in the UK are very open minded and are trying to improve their own structures and rules to become more able to build new links and to develop the ones already established with industry; c) government support is quite important for the development of the academic research, not only funding university research, but also on its own research institutes; d) intellectual property rights should be better discussed and organised in order to the interaction become better.

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P-043 Webometrics analysis of public voices in Nanotechnology Websites: A Triple-Helix Approach Extended Abstract

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There is a burgeoning interest among social scientists in accordance with the diffusion of nanotechnology in a society. Recent notable examples are 1) scientometric analysis of social science research publications related to nanotechnology (Porter, Shapira, & Youtie, 2009), 2) hyperlink and content analysis of nanotechnology industry websites (Ackland, Gibson, Lusoli, & Ward, 2010 forthcoming). Further, in order to increase social science interest in the Europe research community, European Union's Sixth Framework Programme initiated support for research into the societal dimensions of nanotechnology. In 2009, National Science Foundation of USA allocated 2.7% to societal and education concerns of nanotechnology (Porter, Shapira, & Youtie, 2009). However, the current literature still lacks social science examination of nanotechnology.

The problem with existing literature on nanotechnology is that it hasn't been widely discussed, nor adequately examined related to Triple-Helix approach. The development of nanotechnology demands the involvement of industrial organizations and their cooperation with academic and public partners. Therefore, this paper examines the degree to which three significant functional carriers (academic, private, and public sectors) are sufficiently integrated at the network level to produce a new communication system with respect to nanotechnology.

Methods

Data collection

Among the many techniques for gathering websites related to nanotechnology, snowballing is used in this study. Snowball sampling is particularly useful in the case where the entire number of samples in a given research subject and whether they entertain relations are a priori unclear (Garton et al., 1997). For example, Park and Thelwall (2008) took advantage of this snowball sampling technique to visually map the specific political party's relevant blogging sphere and succeeded in detecting a collection of politically bi-linked bloggers that make a network having a particular party.

The data for this research were harvested from the Yahoo.com's database. More specifically, the 871 nanotech-related webpages that hyperlinked to the Wikipedia's entry on nanotechnology (http://en.wikipedia.org/wiki/Nanotechnology) were taken using the Yahoo's advanced search option as of 9 July 2009. The Wikipedia was selected as the focal node for the mapping of online discourse landscape because, as signaled in its title, the Wikipedia is the world's fastest and largest web-based collaborative dictionary in terms of the participatory contributors.

Data analysis

We conducted a refined webometric analysis of 968 websites. Webometrics is broadly defined "as the study of web-based content with primarily quantitative methods for social science research goals and using techniques that are not specific to one field of study." (Thelwall, 2009, p.6). Three types of webometric analyses were performed in this study. First, webpage authors were classified into the following categories: public non-profit organizations/governmental sites, academics/universities, and private companies/industry sites. Second, the most prominent words were extracted from the summary information about the returned webpages and communicational linkage among Triple-Helix actors was identified in terms of the shared keywords. Third, hyperlink network analyses were employed to investigate the structure of web-based nanotechnology discourse.

Findings

While we are in the middle of analyzing our data, we present some preliminary findings. First, more than seven out of ten webpages were industrial sites. Academic and public pages followed. Table 1 summarizes 871 nanotechnology-related web documents in terms of the institutional identities of their authors.

Interestingly, on the close examination of the results shows that nanobot.blogspot.com is by far the most comprehensive information source in terms of the number of returned document. 374 pages came from nanobot.blogspot.com. The next highly retrieved websites are foolscleverbag.info (22 pages), divedi.blogspot.com (13 pages), nano.foe.org.au (8 pages), nanoart.blogspot.com (4 pages), and nanomedicinecenter.com (4 pages).

Word frequency analysis was done using textual information extracted from the webpages. The distribution of frequent key words is summarized in Table 2. The frequency of occurrence of each word is indicative of its relative level of public engagement from three Triple-Helix actors.

Third, 871 webpages belonged to a total of 346 different websites. We selected only 20 websites that include "nano" in their domain. The proportion of websites according to their institutional types is as follows (see Table 3): Academic/University (5 sites), Industry/Business (6 sites), Public/Government (5 sites), Not Available (4 sites). Hyperlink network analysis using the sites was conducted.

Figure 1 shows the inter-link network of the twenty websites with their incoming and outgoing links to each other. This reveals

that the visibility, impact, or reputation of nanobot.blogspot.com (belonging to industry/business category) in the online nanotechnology community is strong when the association between websites is measured using aggregated hyperlink relations. Further, crnano.typepad.com (belonging to public/government cateogry) also plays a role of another information hub among academic and public sites. The map clearly partitions relatively peripheral sites (on the left side) from central ones (on the right side) in online network landscape of nanotechnology.

On the comparison between inter-link and co-inlink networks (visualized in Figure 2), their structures are little bit different. In a co-inlink network, the association between websites is measured from the perspective of external websites. There is a discrepancy between the density of inter-linkage and that of co-inlinkage network for the eleven sites that form a single group. This means that all the eleven sites regardless of institutional types seem to offer basic information for people to catch up with the news and trends in the nanotechnology field.

Figure 1. Inter-link network of the twenty sites

* Legend: Circle: Academic/University, Square: Industry/Business, Up-triangle: Public/Government, Diamond: Not-Available

Figure 2. Co-inlink network of the twenty sites

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O-093 STI-DUI Innovation Profiles and Innovation Outputs: The case of Basque SMEs

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Introduction and State of the Art

During the last years, much of the debate on innovation centred on studying the types of knowledge flows that can help firms to absorb new inputs and transform them into relevant capacities. In this sense, different analyses demonstrated that in different countries and production systems there are diverse organizational profiles with different modes of innovation (Arundel et al., 2007; Jensen et al., 2007; Bitard et al., 2008; Navarro et al., 2009; Lundvall and Lorenz, 2010). While some of them adopt the science/technology based approach (STI, Science, Technology and Innovation), some others develop innovations (incremental) and obtained better performance and economic and social development with lower investments in formal knowledge activities. These findings made it necessary to open the "black box" of innovation and to identify the innovation factors that focus less on the explicit knowledge flow and devote more attention to the tacit knowledge flow. Among these aspects of tacit knowledge, the interactive learning process (DUI, Doing, Using, Interacting) has been identified and analyzed with increasing interest as one of the key factors (Jensen et al., 2007; Parrilli et al., 2010; Lundvall & Lorenz, 2010).

Methodology

In this paper, we study the innovation profile of SMEs in the Basque Autonomous Community (Spain) and their relationship with innovation outputs. For that purpose, we both analyze STI indicators, those that reflect the absorption and transfer of codified knowledge, and DUI indicators, those reflecting "interactive" nature of innovation. innovation based on science and technology (STI). We relate them to innovation outputs, measured in terms of innovation: (1) new to the firm, (2) new to the national market, and (3) new to the international market.

The empirical base on this paper is comprised of small and medium enterprises in the Basque Autonomous Community (Spain) that participated in the public program Innova Empresa. Data were collected from 409 firms that belonged to four sectors: (1) machine-tools; (2) metal products; (3) paper and graphic arts, and (4) consulting, engineering and information technology firms.

Concretely, we first analyze "innovation management" and "innovation culture" indicators, being both groups STI type indicators. While the first one (innovation management) is clearly an STI indicator, the second one (innovation culture), on its side, can also be seen in terms of STI indicators, as they refer to the existence of a systematic organization of the tools, mechanisms and procedures to promote training, participation, communication, etc.

Then, we perform a similar analysis for the second group of variables that we classified as DUI, which considered the informal and formal interactions that happen both within firms and between firms and other agents (other firms, technological centres, universities, etc.) to transfer explicit and tacit knowledge and to improve the performance of firms in terms of innovation this way.

Findings

The results of the analysis show that there exists a significant and positive relationship between "innovation management" and "innovation outputs", thus, firms with greater levels of systematization in innovation management obtain greater innovation outputs. Regarding "innovation culture", we can observe a similar relationship between this variable and innovation outputs. A significant relationship also exists between the two variables. Thus, those firms with greater systematization of "innovation culture" get better innovation outputs.

With regard to interaction, although the degree of interaction is in general low, and there are more firms that do not interact than firms that do interact, it was in the case of the firms with better innovation output where there are higher percentages of firms that interact with others, either occasionally or regularly.

Finally, for those firms with "significant" innovation outputs, thus, firms with innovations new to the national and/or international market, we also analyze the cooperation between firms and other agents of the innovation system. The majority of the firms that report "new to national or international market" innovations collaborated with other agents of the innovation system. Among them, technological centres are the main agent in this collaboration although university as well are cited as a relevant source of innovation inputs (Etkowitz & Leydersdorff, 2000).

Contribution and Policy Implications

This result shows the importance of strengthening ties to exchange knowledge and competencies among agents, which enriches the firm providing it with new abilities to produce substantial innovations. It is an interaction, although not as tacit/ implicit/informal as the one that advocate the Nordic specialists, but an explicit one, maybe the result of a contract or a previous agreement, a "qualified interaction" that promotes the transfer/absorption of codified knowledge on the side of the firms, as it enriches them and puts them in conditions to innovate in a more consistent and radical way.

In sum, the analysis shows that both STI and DUI indicator are significantly related to innovation results. These results are especially relevant both to confirm the theoretical linkage between STI factors and innovation outputs, but also for public policy as it can direct resources towards those programs guaranteeing impact and efficacy.

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Triple Helix VII) Conference Madrid, October 2010

O-118 **Technological Parks in Mexico: the TecnoPoli experience**

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Abstract:

The process of technological change in which our society is currently immersed is characterized by an unprecedented speed and dynamics that together with the globalization process and economic integration have disrupted in all areas of human activity. Due to this dynamics, the wealth generating factor has changed from the natural resources to intangible assets like knowledge and information, this can be clearly seen in the increasing contribution of the services sector to the Gross National Product of all countries, this a clear sign towards the transition to a knowledge-based society.

In this setting, the role of universities has changed, as a result of the need to learn how to manage technologies that support cooperation within their surroundings. The model of predominant university in the 21st century, named by Smilor "enterprising university", is linked to the needs in its surroundings and, therefore, it will set in motion regional and national development. Under this scheme, universities offer education that then will become commercial products or research results that will be used by the scientific and industrial community, academic and industrial consulting, patents and licenses of research from the academy to the industry, or even the creation of Spin-offs based on patented technologies. Examples like Silicon Valley (grounded around Stanford and California Universities) and the Route 187 (located near Massachusetts's Technological Institute, the University of Boston and Harvard University). For this reason, authors like Etzkowitz claim that we are currently witnessing the second academic revolution, whose focal point lies in the marketing of the knowledge generated by universities to be what it has been called A Triple Helix (formed by the companies, the government and the universities and whose propelling engine is innovation).

It is for this reason that many new initiatives have been proposed since the late seventies, like the innovation clusters, science and technological parks, Tecno-poles, intelligent cities and recently learning regions and milieus, however, all of these have a common point that is the participation of the universities; and their scale, characteristics and performance are determined by the strategies and planning of institutions and the society that supports them.

In the case of Mexico the establishment of Technology Parks has occurred just recently, and one remarkable feature of this case is that these parks are associated with "tractor" firms (very dynamic firms that pull with them the emerging technologybased firms) some examples of this are technology parks located in Jalisco, Monterrey, Morelos and the Federal District.

One of the difficulties to ensure the success of these large investments that will sustain the regional innovation systems is the potential lack of focus or specialization of the park. In this framework, the goal of this work was to consider the strategy driven by the TecnoPoli as a dynamic element that promotes entrepreneur culture not only in the IPN (National Polytechnic Institute the second largest public university in Mexico) but also in all its interaction area.

Among the results obtained were the characteristics that IPN has, as the most important technology-oriented higher education institution in Mexico it was also found that it is perceived as a strong presence in the industrial and productive sector at a regional and sectorial level; and in addition to this, it as also confirmed its success in incubation of new companies. From all of these, arise the need to promote and redefine, in a systematic way, the efforts made so far by the Institute so that they become a communicating vessel that propels innovation as the focal point that will allow the entry of Mexico to the knowledge-based society. Due to this, and considering the context in which the IPN interacts, the Polytechnic Techno-pole or TecnoPoli can be an essential element to turn the IPN not only into an internationally-known academic institution based on the quality of its education and research, but also, at the same time, into a key player in the Mexican innovation system; who, with a strategic vision, has joined into the forefront, like other institutions in the world have done before, in being a part of new solutions that our society is currently looking for.

The TecnoPoli can become the answer to certain social needs making use of the capability and capacities that the IPN already has. And since it takes as pivot point the success that it has now in the incubation of companies along with the previous experience in the transfer of the incubation model while counting with a solid financial support. It was with these favorable conditions, in which the techno-poli was established, and it due to this approach this initiative can surely make of the IPN an avant-garde institution. The design of this strategy incorporates accumulated experience that other countries have had when dealing with this topic as well. The axial point of this plan and functioning are competitiveness, innovation and culture.

In the structure of the TecnoPoli, the core perform multiple functions: Technology Observatory, Competitive technology intelligence, Incubation of enterprises, Information and Communication technologies, software and intelligent Services; all of these aspects are brought up along with supporting institutions (for financing, infrastructure, linking units and technological services), and then all of them move together as a system whose main goal is to support the establishment of competitive technology-oriented companies that are capable of getting out to the market with their innovative products and sustain their activities for a long time and also aiming to reinforce training, developing and research activities within the IPN.

Keywords: role of universities, Technological Parks, emergent countries.

O-073

Knowledge Transfer Offices in Portuguese Universities: Institutional Change and Construction of New Actor-Networks

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Extended Abstract

The Triple Helix (Etzkowitz and Leydesdorff, 1997) underlines the new role of the university within the knowledge economy as an entrepreneurial organization (Etzkowitz et al. 2000). A new stream of activities linked with knowledge transfer (KT) point directly to the promotion of territorial development (Rodrigues, 2008; Gunasekara, 2006). A broad notion of KT includes both the science commercialization activities and others related with the civic role of university. As a central topic for S&T policy, KT gained relevance with the introduction of the Bayh-Dole Act in the United States. Berman (2008) stressed the usefulness of this act in the 80's as a process of institutionalization of a number of practices underlining the importance of transfer activities (in particular, the economic benefits resulting from patents of publicly funded research), creating new incentives and changing practices and routines. In Europe, KT became a central issue with the recognition of a European paradox, regarding the Europe's good performance in scientific research and the less good in innovation.

The transfer happens in an interface area where the worlds of science, industry and government overlap. Different types of bodies have emerged, acting as intermediaries. Howells (2006) suggests the systemic value of intermediaries, not only improving the connectedness within a system, but particularly, in the creation of ties and as system animator. The Knowledge transfer offices (KTO) are one of these new intermediaries that can be seen as boundary organizations, mediators internalizing the contingent nature of the scientific reality in their everyday practice, creating border objects for the collaboration between different worlds (Guston, 1999).

The article, framed under the Actor-Network Theory (Latour, 2005), tries to understand KT by tracing the associations that each KTO needs to do succeed. This approach underlines the concept of translation showing how actors constantly engage in a process to translate their languages, their problems, their identities and their interests into the others. These notions have some affinities with institutional analysis by bringing attention to the process of change through temporary stabilizations (Berman, 2008) and facilitating the analysis of the process of institutional change itself (Streeck and Thelen, 2009).

Portugal is commonly seen as a European Union member-state in a less favourable situation regarding innovation. The limitations of innovative performance are confirmed by several studies at national and regional scale. Portuguese universities were confronted with this new (international) paradigm of the enlarged role of the universities. The changes were strongly felt with the emergence of new pressures, incentives and schemes to engage researchers and firms in these activities, the design of new legal frameworks, with the simplification of industrial property codes and creation of reference guides to spinning-out processes, or the emergence of new actors such as the KTOs.

The analysis focuses three Portuguese universities: Coimbra, Algarve and Aveiro. The choice of these universities is justified by its central role in terms of regional development. The three universities are outside of the two most relevant metropolitan areas in Portugal (Lisbon and Porto) and had a significant impact in the qualification of the human resources and local dynamics. However the cases are somewhat different in terms of critical mass, history and linkages with industry which has created different configurations. Personal interviews to KT officers and the collection of secondary information facilitated the systematization and comparison of the mission, the motives and moment for the creation, the organizational structure and crucial results of the three KTOs.

The Instituto Pedro Nunes (IPN), created in 1991, a pioneer initiative in Portugal at the time by initiative of the University of Coimbra, is a non-profit private organization that seeks to promote a culture of innovation, quality, accuracy and entrepreneurship. The Algarve's Regional Innovation Centre (CRIA), a more recent initiative of 2003, was mainly a regional policy-push project benefiting from European funds financing. This interface entity was established within the University of the Algarve to promote relations between universities and enterprises, support the establishment of new firms, the use of industrial property mechanisms and to develop, outside the university, technological agglomeration areas in the region. The UATEC - Unit of Technology Transfer is the mediator of knowledge transfer at the University of Aveiro. The unit, focusing the acquisition, administration, negotiation, assessment and evaluation of technologies, the protection of intellectual property and its commercialization, has a peculiar characteristic of an intensive demand-side effort that stimulates the linkages in university-industry relations.

The results underline the considerable heterogeneity of approaches to answer the new challenges that universities in Portugal face. Despite the specific features of each KTO, these organisms commonly evidenced a crucial impact for the knowledge transfer network creation, assuming themselves to be the translation enablers in a relevant proportion of the processes in their regional intervention area.

Key-words:

University, Knowledge Transfer, KTO, Institutional Change, Actor-Network-Theory

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Triple Helix VI) Conference Madrid, October 2010

O-117 Incubation of Local Solidary Economy Networks: a Brazilian innovative experience

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Petrobras, the Brazilian state-controlled oil company, spent around US\$130 million in recovering degraded areas in 2007 (PETROBRAS, 2007). How can this investment foster social and economic development in the poor communities victimized by environmental disasters? A triple helix arrangement brought together the School of Administration of the Federal University of Bahia – EAUFBA (coordinator), Petrobras, the local government and the victimized community to co-create a local solution: the Eco-Luzia project, a pioneer experience of territory incubation in Simões Filho, Bahia, Brazil.

Etzkowitz (2002) claims that incubators are hybrid organizations that exemplify the triple helix model of university-industrygovernment relations with significant implications for the university's role in society. He argues that incubation strengthens university's third mission: the promotion of economic and social development.

The first incubators in Brazil date from mid-1980s. Since then, the Brazilian incubator movement has developed rapidly: according to the National Association of Entities for Promoting Innovative Enterprises - Anprotec, there were over 370 incubators in Brazil in 2006. The movement has gained support from universities, government and industry associations. Its potential to contribute to social economic development has made it a subject of public policy both at federal and state levels.

Although most Brazilian incubators focus on the private sector, i.e. on firm- formation, the scope of this movement in Brazil has grown broader and several types of incubators have emerged to respond the local conditions, opportunities and problems. In Brazil, incubators mentor not only high tech firms, but also low-technology firms, non-governmental organizations, cooperatives and, most recently, solidary economy networks, as the case presented here.

Incubation in the field of Solidary Economy in Brazil has traditionally focused on the development of popular cooperatives, such as the pioneer Technological Incubator of Popular Cooperatives - ITCP /COPPE/UFRJ in Rio de Janeiro, started in the late 1990s. In 2009, there were 130 ITCP linked to two national networks in Brazil: Unitrabalho and Rede de ITCP. (FRANÇA FILHO E CUNHA, 2009) The ITCP movement has been greatly fostered by the National ITPC Support Program - Proninc of the Brazilian Ministry of Labour, started in 2004.

The School of Administration of the Federal University of Bahia – EAUFBA has had a well-known tradition of research on Social Technologies, having created an Interdisciplinary Center of Social Development and Management - CIAGS (www.gestaosocial.org.br) and a Department of Local Power and Organizational Studies – NEPOL (www.adm.ufba.br). Solidary Economy is one of its areas of expertise. Its research has generated a methodology for the incubation of local solidary economy networks and created the Technological Incubator of Solidary Economy and Territory Development Management – ITES/UFBA in the first decade of the XXI century. ITES/UFBA is firmly embedded in the research and teaching missions of EAUFBA and is part of the school effort to foster regional economic and social development by taking knowledge out of the university into society.

Solidary Economy Networks - SEN can be understood as a complex cooperation strategy for local development based on the promotion of production and commercialization circuits inside the considered region. The Networks create a new model of economic regulation in which the offer is planed according to the demands previously identified by the communities involved in the solidary economy dynamics. Ethic consumption, fair trade, solidary finances, free technologies and self-managed production are some concepts related to this proposal. The incubation of Solidary Economy Networks focuses mainly on low income communities. (FRANÇA FILHO E CUNHA, 2009)

The ITES/UFBA coordinator claims that the incubation of solidary economy networks has a few advantages over the incubation of cooperatives. The incubation of cooperatives focuses on isolated initiatives which frequently face the same difficulties faced by small regular enterprises when entering the market. In addition, a successful cooperative benefit only the group directly involved in the enterprise. The incubation of a solidary economy network, on the other hand, means the structuring and mentoring of a combination of various solidary economy initiatives in a territory, aiming at the initiatives sustainability and the empowerment of the local actors to promote endogenous development. A Solidary Economy Network is usually connected to other SEN. The incubation of Solidary Economy Networks intends to provide a collective solution for the critical lack of job openings frequently faced by poorly educated people. (FRANÇA FILHO E CUNHA, 2009)

The ITES/UFBA methodology has four main interchangeable stages: forming, researching, planning and experimenting. The Eco-Luzia Project can be understood as a real Living Lab for the ITES/UFBA methodology: an experimentation environment in which the technology is given shape in real life contexts and in which users are considered co-producers. (BALLON et al, 2005) The Eco-Luzia Project originated from a Conduct Adjustment Agreement enforced by the local public prosecutors against Petrobras in 2004 after the company itself detected an oil leaking event in the Santa Luzia area, an extremely poor community of around 500 people about 20 km far from Salvador, the state capital city. The first proposal was to invest the US\$ 160 thousand in the construction of 23 houses but the company professionals thought this was a sub-optimal solution. Having experienced other processes of solidary economy implementation, the company staff invited EAUFBA professors to join the effort. After a year of discussions, the Eco-Luzia project started in 2005.

The author of this paper is convinced that the analyses of the Eco-Luzia case will greatly contribute for the understanding of a different kind of U-I-G linkage based on an non-market logic which may be replicated in other low income communities around the world.

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O-137 Conflicts of Interest By Research-Based Spin-off Firms

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SUBTHEME: S6.2 Entrepreneurship: start-ups and spin-offs.

KEYWORDS: knowledge transfer, spin-offs, conflicts of interest.

INTRODUCTION

Because scientific knowledge is a source of high value added, since its accumulation in the R&D process is increasingly expensive, and due to specific nature of knowledge as a non-rival and non-excludable good (Pavitt 1984), knowledge transfer from public sector to commercial market encounters many conflicts of interests. These conflicts become especially sharp when the property rights on R&D results are blurred, when the latter are a product of cooperative efforts of many actors.

Research-based spin-off firms (RSOs) from public scientific organizations perform specialized R&D and provide innovative technologies for specific demands of industrial customers. Because RSOs can generate large revenues and involve intellectual and financial resources from many sources, they become a focal point for a complex set of conflicts of interests.

Though the literature on RSOs actively studies the variety of RSOs' forms and specific conditions for their growth (Granstrand 1998, Mustar et al. 2008), economic relations of RSOs with the other actors of the national innovation system are rarely scrutinized. The concept of conflict of interests is yet mainly used in political economy, sociology and financial and administrative management (e.g., Davis and Stark 2001).

RESEARCH FOCUS

In the paper, the conflicts of economic and non-economic interests around research-based spin-off firms will be analyzed from the viewpoint of innovation process participants, their goals and patterns of behavior. Perspective from a Post-Soviet country provides rich evidence, because RSOs have emerged here simultaneously with transition to private property rights; hence, the contradiction between the "public" nature of knowledge creation and "privatization" of intellectual rent unfolds especially intensively here.

METHODOLOGY

This paper is built on empirical basis of 10 case studies with RSOs in Belarus, Estonia and France, supplemented by over 20 interviews with administration of innovative infrastructure organizations, directors and experts from scientific organizations, who possess the practical experience of work with RSOs; organization by the author of technology transfer events.

3

FINDINGS

RSOs as an institutional form of the innovation process organization have emerged as a way of resolution of conflict of interests between industrial enterprises, and university and academic science, concerning strategic targets of activity, R&D directions and terms of order execution (tight deadlines for technological solutions versus long-term cognitive search).

Because founders of RSOs are at the same time innovators, their economic interests turn out to be much richer than striving to profit maximization. They also include the need to provide conditions for further research; scientific curiosity; and the "instinct of creator": a parental relation to technologies and products they have developed; a wish to participate in the further fate of their developments and to be proud of their usefulness for the world. Often these differing goals contradict each other.

Besides, the owners of an RSO might include other economic actors with very different economic interests, not themselves participating in R&D:

- the state;

- venture capitalists;

- companies bringing FDIs, etc.

For instance, the state might be interested in preservation of strategic control over the breakthrough technologies or guaranteeing the availability in the country of R&D potential for productions that are cornerstone to the national industry. The conflict of interests can emerge in attempts of the state to influence the choice of customers; pricing policy; technological trajectory of firms' development.

Another example are the venture capitalists interested in the rapid manifold growth of RSO's market value by means of resources concentration on fast growing markets and the following exit from the firm. This coincides with the profit maximization interest shared by all RSO's stakeholders. However, the scheme of firm's value increase monetization by means of its sale to competitors can essentially intervene with the goals of RSO's founders concerning activity profile, market niche growth etc. (Smallbone et al., 2008).

The main types of conflicts between RSOs and other participants of the innovation process that will be elaborated in the paper are those:

- with industrial enterprises concerning transferred knowledge;

- with foreign actors concerning distribution of property rights in case of joint activity;
- with parental organization concerning distribution of intellectual property rights on R&D results.

IMPLICATIONS

Since participants of the innovation process are not always acknowledged about the needs, interests and goals of each other, in practice the resolution of conflicts of interests often takes place with low efficiency and sub-optimal distribution of resources. Detection of these conflicts and disclosure of them should be a part of the innovation management strategies in practical activity of each RSO and other relevant actors of the national innovation system. The forms of management, reduction and elimination of these conflicts that have already emerged in practice should be benchmarked and disseminated. Elaboration of solutions for conflicts imposed by system is an important direction of the regional and national innovation policy.

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O-083

The role of EU financial support in governmental policy and the Triple Helix dynamic in the post-accession period in Hungary

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In our presentation we concentrate on special elements of the innovation system. The Triple Helix dynamic is a crucial point for an effective innovation system. Since the accession to the European Union - beyond the traditional governmental routes - new financial opportunities have been opened up in Hungary especially for industries. In Hungary there are two basic supporting systems that have influential potential for industry and university collaboration: The Hungarian Research and Technology Innovation Fund (RTA) and the European Development Fund (EDF). The aim of our paper is to show how these new support opportunities influence the University - Industry - Government collaboration in the field of innovation.

The European Trend Chart on Innovation (2004) stated Hungary "has all the major elements of a potentially successful national innovation system: a fully fledged education system, internationally recognized research units, both at universities and the institutions of the Academy of Sciences, and an increasing number of business R&D units, yet, its performance is far from being satisfactory" (ETCI 2004). The question still is, how can work these players together? We examine in our paper how new European funding opportunities enhance Triple Helix (TH) activities in Hungary. The following supporting actions aim to encourage big companies, SMEs and universities to find ways of effective collaboration.

Innovation fund (RTA)

Act XC of 2003, approved by the Hungarian Parliament on November 10, 2003, established the Research and Technological Innovation Fund, which provides stable and reliable financing for RTDI activities. The Fund is financed by mandatory contributions from all companies registered in Hungary, matched yearly by government contributions.

Regional Knowledge centers

The National Office for Research and Technology announced a call for proposals in October 2004 to support the establishment and operation of Regional University Knowledge Centres. The main goal of the programme was to exploit research and development results in close cooperation with the industrial sector, manage innovative projects and transfer R&D results to marketable new products and technologies through these Knowledge Centres (NKTH 2004). During this programme (2004-2006) 19 new Regional Knowledge Centres were supported.

Ányos Jedlik Programme

The Ányos Jedlik Programme supports research and development projects, which range from basic research to experimental development. Eligible activities are: basic research, applied research and experimental development, under the condition that basic research activities shall only receive funding together with related applied research activities. During evaluation, priority shall be given to proposals submitted by enterprise-led consortia.

National Technology Programme

The programme aims at enhancing the competitiveness of the economy and improving the sustainability of development by promoting application-oriented, strategic research and development in the field of state-of-the-art technologies. The objective of funding is to promote innovation, taking Hungarian R&D strategies into consideration.

European Development Fund

New Hungarian Development Strategy

Since joining the European Union (1 May 2004) Hungary has qualified for regional development funds from the EU. Hungary has reached the gateway of a historical opportunity. Between 2007 and 2013, the country is eligible for a development fund of EUR 22.4 billion to re-align itself with developed countries. In order to qualify for this support Hungary was required to formulate a seven year plan for development. This has been named the New Hungary Development Plan (NHDP (2006), and amounts to a seven year national strategy for advancement. It is a development policy that sets out the strategic areas in which the country would like to concentrate EU development resources. It represents a huge investment in infrastructure in Hungary, and the funds are to be allocated to many different projects. These individual projects will create further investment and jobs, which in turn will assist the development and convergence of the nation. The NHDP is divided into 15 Operational Programmes (OP). The most recent OPs that are related to TH actions are the following:

- GOP-2009-1.1.2. "Developing and strengthening Research-Development Centers"
- GOP-2009-1.2.1. "Support for Accredited innovation clusters"
- GOP-2009-1.2.2. "Support for innovation and technology parks"
- GOP-2009-1.3.2. "Improve capacity of companies' R&D"

The Pole Programme

The Pole Programme is defined in the New Hungary Development Plan. The Programme is a strong coordination mechanism among the operational programmes (OPs) of the NHDP, which are the thematic strategies of the key sectors and the 7 regions in Hungary. The programme increases turnover from R&D, innovation services provision by bridging innovation institutions and

incubation houses operating in development poles as a result of the EDOP. The focal points of innovation are mainly the cities which have universities and research institutions. Strengthening innovation, developing innovative clusters, knowledge-based economies and enterprises are placed in the centre and built on the basis of development pole programmes. The Pole Programme lies on two pillars as accepted in the concept of the Programme by the Government.

1. Cluster development pillar: Support of clusters and cooperation of companies focusing on export-oriented, innovative and high value-added activities mainly centred around SMEs. OPs related to in the cluster development pillar:

- Economic Development OP
- Regional OPs
- Social Renewal OP

2. Horizontal economic development pillar: Creation and improvement of a favourable business environment for better competitiveness mainly through the support of infrastructure development and human resources development. OPs related to in the horizontal economic development pillar:

- Economic Development OP
- Social Infrastructure

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O-084

Roles of the 3rd Strand of the 'Triple Helix' in Promoting Work-Integrated Learning in Thailand

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In shifting from 'cheap-labor' comparative advantage regime to 'technology and innovation-intensive' competitive advantage regime, Thailand encounters problems related to, inter alia, science and technology (S&T) manpower. Shortage of S&T manpower significantly slows down the transformation. The lack of S&T human resources is observed not only in terms of quantity but also in terms of quality. The former, indeed, appears to have effect of great magnitude only on industrial firms catering primarily for graduates at vocational level, whilst the latter is found to have affected all firms demanding for "work-ready" graduates at all levels of education. Work-readiness of graduates is imperative for competitiveness of industrial sectors. Not only does it help save cost and time of training, but also work-readiness of graduates increases productivity and innovative capability of the firms. This would consequently enhance potential for long-term growth and prosperity of the country through economic and social development.

Work-integrated learning (WIL) concept has been implemented in a number of countries and recognized as one of the most effective approach to provide learning in the workplace. In other words, given that it is well-planned, well-organized and well-structured, WIL approach is powerful to equip students with authentic and hand-on experience before entering (knowledgeable) labor market.

Nevertheless, adoption of WIL, especially in an environment lacking tradition of strong linkages between government, educational and industrial sectors, is not easy. Effective WIL requires partnership-type engagement between educational institutes and industrial partners which goes far beyond a mere 'formal and representational' involvement at high level committees to a 'real' commitment that jointly invest in effort or resources at more operational levels. However, like most developing countries, Thailand still has been struggling in building up the second type of educational- and industrial-sector partnership. The grounds of the difficulty relate to a number of factors. These include divert culture, attitude and styles of working between each side as well as the lack of strong motives from both sides. Because of these, it is apparent that promotion of WIL cannot be coming to success without appropriate intervention. In this regard, policy and support from the government, which is identified in this paper as the '3rd strand' of the triple helix, becomes imperative.

This paper proposes to show why and how the '3rd strand' of the 'triple helix' is important to the adoption of WIL as policy instrument for the development of S&T manpower to meet the demand of the industry in Thailand. The paper analyzes conditions and factors critical for successful implementation of WIL by looking into experience of Thailand with particular reference to several case studies, namely: Science-Based Technology School, Cooperative Education, Early Recruitment, Practice Engineering School and Royal Golden Jubilee Ph.D. Program (Industry).

The paper highlights the importance of effective governance, administration and management systems at both policy-coordination and execution levels in the success of adopting WIL approach. It argues that in a developing country like Thailand the role of government policy and support is imperative in establishing and strengthening relationships between educational and industrial sectors. The paper concludes, however, without flexible and accountable governance, administration and management systems, implementation of WIL can be doomed to failure.

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P-045 Roles of the 3rd Strand of the 'Triple Helix' in Promoting Work-Integrated Learning in Thailand

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P-040

Development of Method of Quantitative Estimation of University-industrygovernment Interaction by Students of Institute of Innovation

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Triple Helix model of university-industry-government interaction was received the most serious qualitative study by various international research teams lately. However approaches to the quantitative estimation of Triple Helix model calls the heated debates in scientific and research environment. Students of Institute of Innovation TUSUR attempted to develop the interaction indices of Triple Helix actors, the quantitative estimation of actor interaction in ten Russian Federation regions. Students offered "ideal" mechanisms of interaction models with theoretical additional definition of the initial conditions.

The aim of the research work is development of quantitative estimation of Triple Helix actors interactions among universityindustry-government in Russian Federation. Tasks of work are: analysis of existing mechanisms of Triple Helix actors interactions, determination and development of quantitative estimation of interaction mechanisms, building an ideal Triple Helix model in one region of Russian Federation, development of recommendation on the intensification of interactions efficiency.

Methods of selection and expert evaluations, methods of comparisons and abstract & logical reasoning, method of systematic analysis and gnoseological principle of projections is in the base of study methodology.

Particularity of research work is firstly, students made an attempt to go from existing and acknowledged "Double Helix" interactions to "Triple Helix" in Russian economy, secondly exactly students offer indices, which are characterized success and failure interactions of Triple Helix actors.

Science work was conducted in the following way. Each student chose a point of view by means of which he/she considered the interactions. There are four points of view: university, business, regional authority and person. "Person" means average statistical person, living on the territory of region, having family and job. Then by means of abstract-logical reasoning each student developed the actor mission in region development, each student defined indices on six categories. The indices answer the questions: "What would "my actor" get from other Triple Helix actors and from the person?" and "What would "my actor" do for the other Triple Helix actors and for the person? " Frame of the summary table is presented by the fragment in the table 1.

Then students chose the priority indices and their reasonable amount. In selection of indices the possibility of their quantitative estimation and getting by opened information sources were taken into account.

On following stage the information was collected according to selected indices from ten regions of Russian Federation.

On the base of information analysis "ideal" values of interaction indices are developed, the mechanisms of interaction of the Triple Helix actors are considered from standpoints of "ideal" relations building in conditions of the knowledge-based economy. Under "ideal" are understood such values and relations, which result maximum synergy measured effect. Exactly the actors should aim to the developed "ideal".

Final stage of work will a recommendation development for universities, business and authorities to increase positive effect of the Triple Helix actors interaction in concerned region. Recommendations will be directed to the optimization of actor interaction mechanisms and describe ways of such mechanisms building.

At present the research work is not finished. Final results is planned to get in January 2010 and present them on student sessions of the Triple Helix VIII conferences.

P-007

NON-PROFIT ORGANIZATIONS IN STABILIZING A TRIPLE-HELIX INNOVATION SYSTEM: THE CASE OF PORTO DIGITAL

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Porto Digital is a unique experience in technology-driven economic development, via information technology. It currently hosts 130 technology-based companies - most of them, small firms - as well as research and innovation centres and universities. In 2007 it was awarded by Anprotec - Brazilian Association of Science Parks and Incubators - as the best technology park / habitat for innovation in Brazil. Moreover, it is often cited as example for successful implementation of technology parks and strategies to promote innovative entrepreneurship. It was subject of Learning by Sharing vol.1 (2008), edited by IASP - International Association of Science Parks. More than 4,000 people work at Porto Digital, with average income three times higher than the average in the metropolitan area of Recife, capital of the state. In its tenth anniversary, Porto Digital already stands as an example for other parks and local productive clusters throughout the world, and was referred by specialists, such as Henry Etzkowitz, creator of the concept of Triple Helix, and Ignacy Sachs, polish economist high reputed in the conceptualization of productive clusters, among others.

Porto Digital is distinguished from other experiences in combining features of Technology Park and cluster. It was not born from within the University, in order to develop business up from its research products (PORTO DIGITAL, 2002). Based on Gibbon's innovation 'mode 2' (GIBBONS et al., 1994), Porto Digital was created to be an Information Technology cluster, closely integrated to university and research institutes but focusing on the market and the demands for technology products and services. Gibbons' mode 2 is related to the concept of the "Triple Helix". The Triple Helix model (ETZKOWITZ & LEYDESDORFF, 2000) of innovation ecosystems is in the core approach to the creation of Porto Digital. Since its conception, it was possible to identify each one of the Triple Helix spheres: the local government, the university and private sectors related to the IT industry.

To manage such complex system, an organization was created. It falls at the intersection of the three spheres of the Triple Helix - Government, University and Industry IT - acting as a hybrid mediator, which plays different roles depending on the need. Porto Digital Management Unit - NGPD - arises in a legal framework that allows the implementation of public policies to promote the structure and evolution of Porto Digital in an exclusively private way, combining innovation and the generation of new knowledge, but with the focus on market demand and industry development.

The role of mediation and translation played by NGPD in Porto Digital stabilization can be analyzed under the framework of Actor-Network Theory – ANT (CALON et al., 1986). In that point of view, the cluster constitution can be understood as the result of the association between different actors, inside or outside the system, the conflicts, resolutions and negotiations between them. These actors can be people, material artefacts or institutions that are related for a particular purpose. ANT believes that all entities, families, organizations, objects, people, machines are ordered and stabilized networks of heterogeneous materials, whose resistance to the ordination has been exceeded (LAW, 1992). Which means that the social whole is nothing more than networks ordered and stabilized heterogeneous material.

The network is structured, then, by these actors. It is constantly dynamic and temporarily stabilized due to the convergence of the actors' interests within it. These actors continually build and rebuild the network, which can eventually expand, contract, and even disappear. The continuous effort to reorder the elements of heterogeneous a network is called translation. Translation is the process of interpretation that every actor performs in relation to other actors in the construction of the Actor-Network. When working toward a common objective, the network is also considered an actor. That is why it is called Actor-Network.

Networks with similar tasks over a given period are stabilized networks. The stabilization of the network does not reflect the existence of a priori structures. It reflects the effect of translation processes performed by the actors within it. There are several translation strategies, which occur based on empirical, contingent and local variables. Some special types of translation strategies are mentioned in the literature, such as the "Immutable mobiles" by Latour (2009), which describe materials that play important roles in the construction and reconstruction of networks, or the "point of passage" (CALON, 1986), which indicates the existence of certain actors in the network, vital to its stabilization and ordering.

The experience of Porto Digital has shown that the existence of hybrid institutions (such as NGPD), in which the public purpose of economic and social development is managed in a private way, combining characteristics of the three spheres of the Triple Helix, is essential to the success of the enterprise. This paper will present Porto Digital as a network, which was structured on the Triple Helix model, and how the process of stabilization and growth of this network occurs, by analyzing the strategies and mechanisms used by NGPD in order to play the catalyst and translation role between the actors that constitute the network.

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O-045 **Empowering a State's Development of a Knowledge Society**

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Introduction

This paper presents an ontological framework for empowering a state's development of a knowledge society. It is an adaptation of the framework for the role of Triple Helix (TH) in the global agenda for innovation, competitiveness, and sustainability (Ramaprasad & La Paz, 2009). The adaptation is based on the experience of the Karnataka Knowledge Commission (KKC) in India - Karnataka is a state in India - and related literature. The conclusion shows how the framework can be used to advance the vision and mission of KKC.

State of the Art

India was one of the first countries to institute a National Knowledge Commission. Karnataka was the first state in India to institute its own Knowledge Commission (KC). Today a few other countries and states have adopted the concept. Each effort seeks to develop a target geographical area using knowledge. All of them recognize the importance of the TH relationships. However, lacking a comprehensive framework, their efforts are likely to be fragmented. This paper seeks to fill this lacuna.

Research Focus

The role of KC is a part of the role of the TH in the global agenda for innovation, competitiveness, and sustainability. As such, the general TH ontology shown in Figure 1 (Ramaprasad & La Paz, 2009) can be adapted to the vision and mission of KC. This paper presents an adaptation - a product of the joint effort of one of the authors of the TH ontology and the Member-Secretary and Executive Director of KKC.

Methodology

The methodology for adapting the TH ontology is grounded in (a) an extensive, systematic review of published literature on KC including journal articles, newspaper articles, web sites, and reports (b) public memos, reports, presentations and other documents of the KKC, and (c) personal knowledge of the Member-Secretary and Executive Director of the KKC. (A complete bibliography will be included in the final paper.) The objective of adaptation is to modify the TH ontology to the minimum extent possible and maintain its parsimony while adapting it to the vision and mission of KKC. The validity of the adaptation is judged by whether the proposed ontology: (a) encapsulates the logic of KKC, (b) facilitates realization of the vision of KKC (c) provides better focus for the entire work of KKC, and (d) provides a framework for consultation with KKC stakeholders.

Findings

The adapted ontology for empowering a state's development of a knowledge society is shown in Figure 2 below. The changes are as follows:

1. The first dimension has been renamed 'Leading' instead of 'Managing' - consonant with the proactive role of commissions like KKC.

2. The category of 'Facilitating' has been added to the Leading dimension to make it broad based.

3. The Entity 1 and Entity 2 dimensions have been renamed as Sector 1 and Sector 2 consonant with the scope and focus areas of KKC constitution.

4. The sectors are described by a two-level taxonomy. The University - a key anchor of the TH - has been broadened into the Education sector with University a component of that sector.

5. The Functions are expanded and relabeled to fit the context. Recognizing the importance of historical and traditional knowledge Conservation, Discovery, Rediscovery, and Regeneration have been added. Similarly, recognizing the importance bridging the divide between different segments Dissemination has been added.

6. The Fields (of development) dimension has been renamed Development. The categories of Development have been refined and adapted to the vision and mission of KKC and KC.

This ontology captures the core logic of empowering a state's development of a knowledge society.

Contributions and Implications

The combination of 9 types of Functions and 11 types of Development comprehensively enumerate the 99 possible development Outcomes in a knowledge society. Some examples of these combinations are (a) knowledge conservation for artistic development, (b) knowledge exchange for rural development, and (c) knowledge dissemination for health care/well being development. While the complete list of 99 Outcomes may be desirable, it may not be feasible to devote adequate resources to all of them. The ontology gives a convenient way to map the current emphases as well as the desired ones. Thus, for example, knowledge generation for scientific development may be currently emphasized and desired. However, knowledge regeneration (of traditional knowledge) for environmental development may not be currently emphasized but desirable.

The TH Partnerships defined by the two Sectors and their Relationships are the mechanisms for obtaining the desired outcomes. These partnerships may be at the sector level, sub-sector level, or at the institutional level within each sub-sector. The institutions are not shown in the ontology. The relationships necessary for obtaining the desired Outcomes may range from complete

independence (absence of a partnership) to symbiosis. Thus, the ontology provides a clear way to define the partners in the TH and the nature of the relationship between them required to obtain the desired Outcomes.

After defining the Outcomes and the TH Partnerships necessary to obtain the Outcomes the task of leadership would be to construct those relationships. The construction may entail a combination of the six Leading categories. For example, the call for greater autonomy of universities can be articulated as 'Enhancing Government Sector x Higher Education Independence'. Similarly, the call for developing library consortia using ICT can be articulated as 'Enhancing Libraries x Libraries Collaboration'.

Thus, the ontology can be used to assess the combination of Leading roles, TH Partnerships, and Outcomes (a) currently in place, (b) desirable, and (c) potentially possible. These correspond to the states-of-the-practice, -need, and -art. Systematically mapping these three states and assessing the gaps between them will provide the basis for a systematic strategy to fulfill the development goals.

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O-107 Academic Research Groups and Triple Helix dynamics

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The development of academic entrepreneurial activities has become a key priority in recent years for universities seeking to contribute to local and regional development, strengthen their scientific productivity and create new revenue streams. Building an entrepreneurial university is a long-term process that depends on the one hand on developing the internal context, strategies, organizational structures and management processes that allow an optimal valorisation of academic R&D portfolio (Debackere, 2000), and on the other, on creating close linkages between the university and the innovation ecosystem it belongs to. This paper illustrates this process by providing empirical evidence on the evolution of entrepreneurial activities at the Flemish Catholic University of Leuven (KUL), the largest Belgian university and one of the most successful European universities in developing an entrepreneurial agenda over more than 30 years.

We analyse the structure, dynamics and group distribution of University-Industry (U-I) projects of 22 academic research groups over the period 1985-2000, which reflect the evolution of an open learning process structured at different levels, from university researchers and administration to business partners and policy-making authorities, at regional, national and the EU level. The 'academic research group' level of analysis is introduced in order to reflect a key change in the economics of knowledge production over the last decades, moving away from the Mertonian approach of the individual researcher as the usual level for analysing academic research production, which has a weak ability to explain research productivity given the collective nature of research (e.g. Laredo and Mustar, 2000; Ziman, 1994).

The focus on research groups also highlights new organizational and managerial perspectives, which show that the group is indeed a critical level of organisation where new formats such as cooperative and joint venture laboratories have emerged, demonstrating the complementarity between public and private research (e.g. Crow and Bozeman, 1987; Joly and Mangematin, 1996). The contrast between scientific and industrial laboratories is no longer as clear-cut as emphasised in previous behavioural studies of academic communities, as research labs gradually enlarge their traditional vision of as loci exclusively devoted to basic and applied research (Laredo and Mustar, 2000) and gradually move to a "quasi-firm" status (Etzkowitz, 2003).

We interpret the observed findings in the context of local university policies and measures adopted over the last three decades, as well as economic and policy drivers outside the university. The communication at the interface between the Triple Helix actors, their "taking the role of the other" (Etzkowitz and Leydesdorff 2000; Etzkowitz, 2008), in conjunction with the interplay between differentiation and integration of their fundamental missions ensures a permanent regeneration of the system in which such processes evolve. The KUL example shows how localised cooperation between university, business and regional government authorities can generate a new regional innovation environment that interacts with other elements at national and supranational level. The local effect is thus multiplied at various levels and acts as a selector for the creation and distribution of opportunities that may generate further interactions with new patterns (Leydesdorff, 2000).

We conclude with a discussion of policy implications, such as:

1. The key role of R&D capabilities of both academic research groups and business partners for the propensity to engage in collaborative projects

The fact that in industry, R&D capabilities are most often concentrated in large, R&D-intensive foreign multinational firms raises the question of how much of the economic benefits of joint U-I work are reaped by the regional/national scientific community and society. The presence of R&D-intensive domestic SMEs in such partnerships suggests the existence of 'virtuous circles' of knowledge production and diffusion within the local/regional economy and an enhanced participation of SMEs in the 'knowledge economy', but this trend is still very weak. Therefore, policy measures aimed at strengthening the university research potential as well as the R&D and innovation potential of domestic SMEs can increase the local benefits from U-I research.

EU's position as the second most important funding source of KUL U-I projects after industry, and the higher growth rate of EUfunded projects compared to those funded by government and industry, raise the issue of the impact of supranational research programmes, policies and networks vs. national efforts to consolidate research skills and scientific networks. With their dynamic growth patterns, U-I activities are an important driver of the construction of the European Research Area. Enhanced EU funding to stimulate U-I linkages among European researchers may be beneficial for amplifying knowledge production, but may also amplify 'leakages' outside the ERA, given the increasing internationalisation of both academic and industrial R&D (Tijssen and Van Wijk, 1999).

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ST-06 University Patenting and Licensing Activities in China: The Role of TTOs and Their Affiliated Universities

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In order to maintain a high speed and sustainable economic development, the potential that technology and innovation have from R&D activities to China's future economic prosperity can not be underestimated. One of the major technologies sources is Chinese universities. Meanwhile, theoretical and empirical works in innovation management point out the values of setting up and maintaining good science-industry-government relations [1-2]. As a leader of relationship between industry and government, university can obtain pecuniary gains for itself and external benefits for the regional development by successful creation and commercialization of IP, although the process is complex and dynamic.

To facilitate technology transfer (TT) process, setting up TTOs has become popular in developed countries [3]. In the case of China, Ministry of Education (MOE) has selected six high research quality Chinese universities in every major region of China to invest in the structure of TTO and their staff in 2001. It is the first time to formalize national TT agencies in Chinese universities and official advocate specialization of TT activities. Licensing activities has traditionally been the most popular mode of university technology transfer (UTT) [4], and TTOs in developed countries have been found to promote valorization of research results [3]. But patenting-licensing activities in Chinese universities are little known [5]. Only some descriptive researches on Chinese TTOs have been conducted without empirical study [6-7]. This paper aims at investigating whether the newborn promising TTOs and their affiliated universities play a significant role on the universities patenting-licensing activities in an empirical approach. More specifically, in this study, the number of applied patents, licensed patents and licensing revenues accrued have been analyzed with the factors of TTOs existence, TTOs staff number and universities orientation.

As for the data on TTOs and licensing performances, the statistics evidences are collected in a national survey with the help of MOE. It is the most updated, complete and reliable database on the related issue. Questionnaires have been sent to 60 selected universities, distributed in 23 relatively developed provinces out of 31 in China. 29 Research-Oriented Universities (ROUs) out of 39 and 31 Research & Teaching Universities (R&TUs) out of 73 have been investigated. Concerning the patenting activities data, it can be easily obtained by accessing to the Database of National Bureau of Statistics of China (2009) [8]. With a first view of the data, it can be found that quite a few universities still not have special TTOs. But all universities demonstrate the dynamic domestic patenting activities in 2008. Only a few international patents represent the lack of international strategy. Mostly universities are found to be at the beginning stage because of limited number of licensed patents and accrued royalties. Then, data analysis shows that universities with TTOs perform obviously better than universities without TTOs on each indicator of patenting activities, which includes the number of patent application, patent granted and active patents. It also reveals that universities with more than 3 people participating TT perform better than universities with less than 3 TT people. The phenomenon points to the importance of independent TT agency and TT staff to improve the patenting performances. But the diminishing marginal productivity of TTO staff number could also be observed. Specialization of TT activities also plays a significant role in commercial licenses. The link between TTOs (existence and staff number) and licenses activities (the number of licenses and revenues) is more obvious than patenting activities, which reflects the more significant role of TTO. The universities orientation could serve as another factor. On average, ROUs perform far better than the R&TUs on each indicator of both patenting and licensing activities. But some R&TUs could also compete with ROUs on patenting-licensing activities. This paper makes two contributions to the flourishing literature on UTT. First, it is the first empirical evidence on the Chinese universities licensing activities based on a comprehensive dataset complied. Second, whether or not the TTOs and universities play a role on universities patenting-licensing activities in China are identified.

Since higher quality research does not necessarily result in better TT performance, it is neither possible nor necessary for each university to become ROU because quick responding to the production process problems in many cases may also be very important in attracting external funds. Further, having developed a deep knowledge of both university research and industrial innovation, TTOs play an important role in efficient TT. It is urging for universities to build up a specialized TT agency immediately in order to combine understanding the local technology market with strengthens of the university research. Furthermore, being an intermediate bridge, TTO staffs are supposed to act as the interface between universities and industries in general. Besides, the study also sheds light on the diminishing marginal productivity of TTO staff number. Performance pay could provoke TTO staff to be eager to raise external funds through activities.

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W-28 Total Control? The gendering of the 'Triple Helix'.

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Innovation in the knowledge economy, as described by Henry Etzkowitz and Loet Leydesdorff (1997) is understood as the interaction of policy, funding, research and commercialisation activities by universities, government and business.

This article combines a policy review of the relationship between the strategic economic plans of regional development bodies and their gender priorities. It considers how the way that the knowledge economy is defined impacts on the gender beneficiaries of policy, and research or business funding; provides an overview of gender mainstreaming within European Commission policy economic development policies, and draws upon empirical findings from recent case studies within the EC funded Eurodite program of research on the knowledge dynamics of regional economies.

It examines the sectors where women are contributing to knowledge economies, often unrecognised, and considers their representative and substantive participation in contributing to knowledge economy governance, research, and business.

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Business model analysis of technology based academic start-ups using resources based view: reflections from the case of COPPE/UFRJ in Brazil

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Introduction

The theme of the technology based academic start ups (TBASU) is very little studied in Brazil, the literature on the subject is still incipient. Studies show an exploratory focus, directed to the characterization of the entrepreneurial profile of universities and companies that are created. Even in the international scene there are few studies that include an analysis of the business model adopted by these companies. This gap was highlighted by the work of Mustar et al (2006) in an effort to produce a literature review of the most relevant topics on the subject.

An approach widely used in studies on the creation and development of TBASU is the Resource Based View (Barney et al. 2001; Brush et al. 2001). The works based on this approach focuses its analysis on resources identified in the creation and development of new ventures that gives them a competitive advantage. In these studies, the authors emphasize the differences in available resources in the process of new venture creation and development (Shane & Stuart, 2002).

From these resources researchers create start-ups in order to commercially exploit the results of their research activities. One of the biggest challenges faced in this process is the definition of a viable business model, enabling the company's expansion and enhancement of its profitability.

There is a number of studies published in recent literature on the different business models adopted by TBASU (Mustar et al 2006). In this work business model is defined by the allocation of different resources available - technological, human, organizational, financial and social capital - in order to generate and capture value in specific market segments.

The classification of business model adopted is based on the activities performed by these companies. Stankiewicz (1998) proposed three different profiles of business model: (i) services oriented companies that provide consulting and R & D services; (ii) Intellectual property oriented companies that use indirect channels to reach the market; (iii) Product oriented companies.

Methodology and data collection

The research involves in-depth case studies with ten TBASU created in the Coordination of Graduate Programs in Engineering (COPPE) from the Federal University of Rio de Janeiro (UFRJ). These enterprises were supported by the business incubator between the years 1994 and 2006 and were created by students in master's and doctorate, teachers and researchers from UFRJ.

The identification of TBASU began with an interview with the business incubator manager, when it was possible to obtain an overview of the history of each company supported by the incubator and identify those that were created by students in master's and doctoral and / or professors. From this interview it was possible to select the ten cases studied.

Interviews were conducted in person and by phone through a structured questionnaire. The data collect was focused in the characteristics of these companies in terms of resources present and the business models adopted in it's process of creation and development.

Main findings

The analysis focusing on the business model adopted by these companies is an issue that needs to be deepened, there are just few papers on the subject. The conceptual approach from the resource-based view, added to the analysis of different business models adopted by TBASU offers a framework that introduces new dimensions in the analysis of this process.

In the case of COPPE, it is possible to observe a strong correlation between the routines and resources present in the academic environment and those which are present in the TBASU in their early stages. This correlation of routines and resources, is formed by the trajectory of academic people involved in creating their business, they have affinity for consulting projects and R&D, currently performed in the laboratory of origin. All TBASU created in COPPE analysed in this work adopt a service oriented business model in the early stages. In a second step the different business models are adopted in a hybrid fashion, the same company may adopt all three business models simultaneously, this was the main strategy adopted by the TBASU studied.

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O-015 Stages of Development of Enterprise-University Cooperation in Brazilian Multinational

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1. Expanded Summary

The concept of innovation has widened and the current challenge involves not only the generation of innovative products and processes, but the continuous search for innovative solutions. The analysis of the innovation process, before focusing only on the linear generation of new knowledge, also suffered many changes and today covers the development of dynamic and open to produce, implement, distribute and share knowledge, skills and technologies (BERKHOUT et al., 2006; LEYDESDORFF, MEYER 2006; LEYDESDORFF et al., 2006; ETZKOWITZ, 2004; ETZKOWITZ; LEYDESDORFF, 2000; CHESBROUGH; CROWTER, 2006).

In innovation, it is remarkable the importance of another subject, called internationalization. Initially, the international operations of companies is restricted to productive activities, but in today's innovation activities are also carried out abroad, and these in turn are held in subsidiaries or in partnership with universities and research institutes abroad (ASPELUND; MOEN, 2005; DUNNING, 2002; CHIESA, 2000; PATEL, PAVITT, 1998; GASSMANN; ZEDTWITZ, 2006).

The joint assessment of the issues "innovation and internationalization," specifically considering their empirical and theoretical developments, leading to the observation that innovation must be managed dynamically and their understanding should include not only the analysis of innovative activities that are developed by internal R & D companies (parent and subsidiaries), but should primarily involve the evaluation of open innovation activities, especially the interactions that can be wedged between companies, universities and research institutes, national and international.

Considering this scenario, in which cooperation is seen as an alternative to boost the innovation performance of organizations seeking out new technological advances on a global scale, the paper proposes to determine their stage of development of university-enterprise cooperation in the Brazilian multinationals. Specifically, we sought to (a) review administrative practices adopted by Brazilian multinationals in the management of cooperation, (b) whether they are structured cooperation activities in the headquarters and the subsidiaries of these corporations and (c) indicate in general terms the stages of development of university-enterprise cooperation.

To achieve these objectives was performed a descriptive qualitative study using multiple cases. The companies studied in depth were Embraco, Gerdau, Smar, Tigre and WEG. For the interpretation of primary and secondary data used to document analysis and content. The primary data were collected through semi-structured interviews and questionnaires, and secondary schools were obtained from reports and organizational documents and also secondary sources of evidence, such as newspapers, periodicals, conference proceedings and on the websites of the organizations studied.

The survey results show that Brazilian multinationals studied, despite adopting some practices structured to manage technology partnerships have yet to evolve considerably when it comes to the management of university-enterprise cooperation, with some exceptions, such as Embraco and WEG, which has have structured management models for cooperation. Note also that more efficient practices of evaluation need to be developed by multinationals studied, so that the real return on cooperative projects can be measured. In the specific case of Gerdau, Smar and Tigre, and the most efficient evaluation will also need to implement more elaborate practices of selection, planning and monitoring to ensure that partnerships with external sources of technology can really be leveraged, and better managed. For the structuring of cooperative activities, it was found that the subsidiaries of multinational companies studied have autonomy to manage their partnerships, and monitor the arrays, except for arrays of Gerdau and Smar. Partnerships subsidiaries are commonly associated with specific projects that result in technological adaptation.

Regarding the stages of development of university-enterprise cooperation, we identified the mature stages, intermediate and embryonic. In the mature stage, the cooperative projects have great relevance in science and technology, and a formal governance model is adopted to balance the technology needs of business and scientific interests of the university. In the intermediate stage, the cooperative projects continually enhance the internal R & D and although in some formal management practices, there is a management model formally structured. In the embryonic stage, the cooperative projects on time enhance the internal R & D and are taken predominantly informal administrative practice, which undermines the structure of a formal management model for university-enterprise cooperation.

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W-21

To Join or Not to Join: Individual and Sub-organizational Factors Affecting Industry Membership in University-based Cooperative Research Centers

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While most university-based cooperative research centers (CRCs) receive funding from the government, maintaining a high level of industrial support is critical to the survival for many of these ventures (e.g., the National Science Foundation's I/UCRC program). However, the literature is almost silent on the effectiveness of various recruitment strategies and the decision making processes and evaluation criteria that industrial firms use when deciding whether to join or decline participation in a CRC. This abstract summarizes a multi-stage project that involved a survey with CRC directors about marketing practices, and both interview and survey methods with industry decision makers who had recently participated in a decision to either join or decline CRC participation.

According to Cohen, Florida, and Goe (1994), approximately 1200 industry-university cooperative centers existed in the U.S. in 1993. Although these estimates have not been updated recently, the general consensus is that CRCs have grown in number since this study was completed and that CRCs continue to be the primary mechanism for industry to support university research. There is strong evidence to support the value of these entities to universities, industry and government (e.g., Feller, Ailes, & Roessner, 2002).

While many CRCs also receive funding from the government, maintaining a high level of industrial support helps ensures their long-term survival. For instance, for NSF Industry University Cooperative Research Centers (IUCRCs) receive the majority of their financial support from industry (Gray & Walters, 1998). For NSF Engineering Research Centers (ERCs), the substantial government support ERCs receive is conditioned on attracting and maintaining a high level of industrial support and involvement. Not surprisingly given this situation, center directors for one government-funded program have rated the topic "recruitment and retention of members" the first or second most important topic for discussion at their annual meeting every year for the past two decades. Clearly, CRC directors, university officials, federal sponsors of CRC programs, policy makers, corporate strategists trying to exploit the new "open innovation paradigm" and scholars interested in cooperative research have a vested interest in learning more about the factors that affect firm participation in these cooperative research ventures.

The relevant empirical literature on cooperative research covers a range of collaborative arrangements, from strategic alliances and industry-based consortia to industry-university cooperative research. Studies that directly assessed differences between joint research participants and non-participants are limited, with most studies sampling from current members and focusing on either relationship processes (e.g., Doz, Olk, & Ring, 2000), relationship intensity (e.g., Santoro & Chakrabarti, 2002), or benefits realized by participants (e.g., Lee, 2000). Few studies have explicitly compared participating and non-participating firms. In these cases however, the outcome variable targeted participation in joint research in general (e.g., Hayton, Sehili, & Scarpella, unpublished manuscript; Adams, Chiang, & Starkey, 2001), rather than a specific collaborative engagement and the organizational processes and factors influencing the decision to participate.

The current study applied a mixed methods approach to identify factors within organizations that could explain how industryuniversity partnerships happen. Two preliminary studies were conducted to explore pre-collaborative exchanges between universitybased CRCs and their prospective member organizations. These first two stages of research revealed underlying communities of university researchers, industrial technologists, and government scientists. Within these communities reside networks of actors engaged in dynamic relationship exchanges that propagate formal partnership considerations. Further, semi-structured interviews with organization representatives brought to light a varied and often increasingly elaborate process regarding decisions to partner with university-based CRCs.

The final stage of research administered a structured survey to a sample of industrial and public organizations. Study participants were asked about factors related to their respective organization's recent decision regarding membership in an NSF I/UCRC. The decision process is described as it unfolds within organizations considering CRC membership. Further, a series of regression models identified the unique and relative effects of decision outcome predictors across several domains of analysis. I found support for network-based perspectives on the development of industry-university partnerships. However, the influence of network relationships rested primarily on the initiation of the partnering decision. Technical and non-technical characteristics of the CRC, as well as sub-organizational and individual variables, were found to be most predictive of actual decision outcomes. Implications of this research for CRC directors, prospective member organizations, and policymakers are offered.

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P-055 Academic entrepreneurship in the era of "growth politics"

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Entrepreneurship, commodification and globalized markets are prominent parts of contemporary political culture, often connected to sustainable (economic) growth as an overarching political goal. In this process, the role and positions of the universities are changing, going from more autonomous "ivory towers of knowledge production" to being important parts of the "triple helix nexus" in order to contribute to the goal of sustainable (economic) growth. Of course the academy always has produced knowledge in relation to state and society and we do not regard the past of the universities as a past of "freedom from outside pressure". Instead, this transition must be traced to the more fundamental changes of the forms and goals of politics. Simultaneously with these changes, "gender" has entered the academy in two ways, as the growing discipline of gender studies and as the political demand for "increased gender equality".

In this paper the ambition is to put the quite recent phenomena academic entrepreneurship in a broader context, highlighting the how the shift in politics - roughly put and drawing on the work of Chantal Mouffe (2005) - a shift from conflict to moral where the citizen are transformed into a consumer (see also the work of Nicholas Rose 1999). We argue that the increased emphasis on entrepreneurship and commercialised research results need to be analysed in a similar way. The shift in politics from conflict to moral could in the academic setting be seen as a shift in how "good knowledge" is conceived. In order words, we argue for the need of highlighting what happens with "knowledge" when an entrepreneur discourse enters the academy and when the academy as an organisation is steered by tools departing from the idea of new public management. Departing from how Michel Foucault (1980) ties knowledge to power, the paper applies the recent shifts in politics as a way of understanding how the discourse of academic entrepreneurship and the power at play when "excellence and good research" are defined. We will also scrutinise how gender and gender equality are produced in the discussions of academic entrepreneurship. The paper will draw both on earlier research and on policy analysis of steering documents from two Swedish universities, Luleå University of Technology and Umeå University.

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O-126 Biomedical Sector Research in India: Analyzing University-R&D-Industry Interactions

S4 University in regional innovation and social development

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Keywords: University, R&D, innovation, cities, India

Introduction

Innovation, the way it is carried out and the way it is managed, has undergone a great deal of change over the last decade or more, accelerated without doubt by the opening up of the world economy. In this scenario, university, R&D and industry interactions have emerged at the core of innovation in today's world. Etzkowitz and Leydesdorff (1998) were the first to come out with the concept of 'Triple Helix', a spiral model of innovation that captures the evolution of multiple linkages at different stages of the capitalization of knowledge. This is achieved when academia and R&D institutions, industry and government, interact in a complex way in the form of a triple helix (Etzkowitz and Dzisah, 2006). There is now a talk of the entrepreneurial university in this parlance wherein universities play a pivotal role in bringing together the government and the private sector in a Triple Helix meeting place helping the generation of ideas and strategies and the transformation of the ideas conceived in the consensus space (Etzkowitz, 2005).

The Triple Helix model of innovation has emerged as the key driver for innovative activities in today's world. The interactions among university, research and development (R&D) sector, government, and the industry, have come to occupy a pivotal position in such a framework. However, theoretical considerations apart, there has been a lack of analytical work in this area. Further, the discourse on institutions, and their asset formation and distribution have important implications in the context of Triple Helix.

The present study

The present study underscores the importance of university, R&D and industry interactions within the Triple Helix paradigm. It looks at institutional capabilities and asset formation, and the spatial distribution of such assets in India as reflecting the nuances of the Triple Helix framework in practice. All this is illustrated with a detailed analysis of spatial distribution of medical knowledge assets across different cities in India. Etzkowitz (2003) has referred to the idea of innovation as creating new configurations among institutional spheres. The formation of knowledge spaces is based upon accumulated knowledge from university/hospitals' research activities in the area of biomedical sector that has implications for a Triple Helix model. Referring to the dynamics of interactional configuration, Admade and Romero (2006) have pointed out that such dynamics helps us to understand the networks of knowledge and their processes of interaction with special emphasis on the type of knowledge and the channels through which it is transferred.

Research focus

The paper considers a case of the dynamics of the Triple Helix framework in action in a developing society by probing into the intercity differences in university, R&D and industry interactions in the area of biomedical sector research in India. The work presented here reports a detailed analysis of city-wise spatial distribution of biomedical knowledge assets in India. The concept of biomedical knowledge assets have been trapped through different indicators. Publication profile data of various Indian cities in terms of these indicator variables have been analyzed to capture the spatial distribution of these assets. This spatial distribution of biomedical knowledge assets across different Indian cities, big and small, has been analyzed over a period of 10 years (1991-2001) with this perspective.

Findings

The study provides a detailed analysis of annual break up of publications over 27 cities across India. Featuring big metropolitan cities such as New Delhi, Mumbai (formerly, Bombay), Kolkata (formerly, Calcutta), Chennai (formerly, Madras); big information technology (IT) hubs like Bengaluru (formerly, Bangalore) and Hyderabad; big cities like Pune and Lucknow; the union territories of Puducherry (formerly, Pondicherry) and Chandigarh; other state capitals such Bhubaneshwar, and Thiruvanathapuram (formerly, Trivandrum); large towns like Madurai, Kanpur, Varanasi (formerly, Banares), Amritsar, Allahabad, and Mysore; and small towns such as Kharagpur, Kolhapur, Bardhaman (formerly, Burdwan), Aligarh, Karaikudi, Roorkee, Kalpakkam, and Tirupati.

The dissection of the role of institutions and assets in such a framework that have hitherto remained largely untapped in the Triple Helix literature form the core of this work. 'Spatial dynamics examines the diverse components that have been considered in the construction of networks of actors. In this dynamics, the empirical studies approach put special emphasis on the importance of the territory for the institutional networks and institutional environments within which the innovative processes develop. In addition, spatial dynamics emphasizes the search for indicators used for scientific and technological activities' (Admade and Romero, 2006). Our study finds reflection in Park et al.'s (2005) comparative study of Korea and the Netherlands in terms of the respective country's knowledge infrastructure based on scientometric indicators and also webometric and technometric indicators. The implications of the results have been discussed.

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W-22 **Developing an Applied R&D unit in a small HE Institution**

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Many countries are engaged in creation of a knowledge economy. One requirement is to create an environment for support of R&D activity within enterprises, and also greater interactivity between enterprises and sources of technology. Providing access to such sources for firms in more remote areas can be a challenge. This paper presents Ireland's experience in developing applied R&D centres within Institutes of Technology (IoTs). These institutes provide degree and diploma level training for 90,000 students annually, and many also undertake R&D activity albeit at a relatively small scale. In 2006 they jointly received •25.7 m in R&D funding, which was 5.5 % of total public R&D funding for the Higher Education (HE) sector in that year. These institutions have certain advantages in enterprise development including (a) they tend to have strong links with local industry as a result of a successful history of industrial training at all levels from operatives to degree-holders, and (b) most are located in areas where industrial firms have no other sources of R&D competence (e.g. Universities) nearby. Ireland's policy is to focus on development of R&D competence in the HE sector as a means of enhancing national RTD competence and enterprise support

The Applied Research Enhancement (ARE) Programme was established by Enterprise Ireland to make applied expertise within the IoTs available to local industry. It funds 3 establishment of applied R&D centres (•5m over 5 years) which engage in R&D of industrial relevance, guided by an industry-representative Steering committee created for each centre. In 2008 CIRCA evaluated 10 ARE centres for Enterprise Ireland. This paper presents some of the major findings with an emphasis on those most likely to have lessons for other countries.

The evaluation showed that success of ARE centres is mainly affected by the following inter-related issues:

Financial Sustainability: Because of the perceived opportunity to earn sustainable client income, ARE funding is provided on a 5-year non-renewable basis. While some centres developed a useful client base, most did not have sufficient expertise or technology to attract major client funding. Their main source of R&D funding is therefore from national agencies. The tendency has therefore been for the ARE centre researchers to apply for small-scale R&D projects from a range of basic & applied sources, which has the effect of diluting their technology focus.

Administrative Compatibility. R&D is a small activity within almost all IoTs and their accounting systems are designed for an educational institute. The ability of the central administration to deal with the accounting, human resource and travel needs of an R&D activity proved very challenging in certain centres. Institutional administrators were often unwilling to modify their systems to accommodate a small proportion of staff. Some centre Directors devoted a high proportion of their time to dealing with internal procedures, with consequent loss of time for marketing or client service.

Centre Director Expertise & Experience. Companies surveyed in the evaluation process emphasised that the Centre Directors should have an understanding of industry needs and practices. In almost all centres the Directors were industrially experienced and were actively involved in contact with companies.

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Technology Sustainability: Centre viability is strongly determined by the relevance of its technology offering. Centres cannot continually offer novel technology or expertise without a continuing supply of new technologies. However, fulfilment of their role required loss of technology. Creation of spin-off companies, or licensing, can divest a centre of its technology edge. Centres must have some means of continually regenerating their technology offerings. A critical differentiation between centres was therefore between those associated with a basic research activity within the host IoT, and those which were created as standalone applied centres. In certain institutes, centres of applied research were created ab initio to address perceived local technology needs. In several of these cases, there was little

Forfás (2008), Higher Education R&D Survey 2006 - www.forfas.ie . see Ryan J, et al. (2008) Research Evaluation 17(4). pp 294-302.

or no existing R&D activity within the host IoT before these centres were established. These centres found it difficult to survive.

Technology Focus. A further critical difference between centres is in their definition of scope of expertise. Some chose broad titles (National Design Centre; Marine BioTechnology Centre etc) while others were highly specific (Technologies for the marketing of Live Shellfish, Micro Sensors for Clinical Analysis). The latter centres had the significant advantage, for a small unit, of being able to focus both their R&D, and their marketing on a narrow field. It also allowed the industry steering group to be more effective. Those centres with a widely-defined scope were, in practice, only active in a small part of field. By their own design, they had made themselves small fish in a big pond.

On the other hand, the disadvantage of a narrow focus is that a centre can make itself redundant by its success. The centre for
'Technologies for the marketing of Live Shellfish' achieved their objective, and reduced their own relevance, by developing systems which met the major company needs for maintenance of live lobsters.

Nature of Applied R&D: Another important distinction was between Centres which focused on "market led R&D" and those focused on "S&T driven R&D". The former were quicker to attract early industry interest and interaction, but industry attraction diminished when the market-relevant aspects of the centre's expertise were either commercialized or shown to be non-viable. For those centres which offered services, those which were market-led were dramatically more effective, but the rigors of delivery were often not attractive to academic staff. It remains to be seen if there is a difference between these two categories in terms of longer term sustainability

In summary, there were some interesting variations in the design and method of operation of the 10 Centres. This public funding is being scaled down and will probably be phased out over the next few years. Already there is evidence that some of these Centres cannot and will not survive when they are forced to sustain themselves. Valuable lessons about long term sustainability of these centres has been learned and these are being used by Enterprise Ireland to develop new centres.

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0-099

Investigating the role of universities in the innovation systems of developing countries - the case of Algeria, India and Malaysia

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This paper is aimed at investigating the ability of universities in developing countries to play an important role in the creation and exchange of knowledge as a basis of innovation. It intends to do so by investigating the links of these universities with regional and/or national systems of innovation and their position within the three stage evolutionary process (statist, laissez-faire, hybrid) of the triple helix system (Etzkowitz, 2003). The links that may exist between the three stage evolutionary model and the types of systems innovation will be highlighted and discussed in terms of proximity and impact on knowledge creation and exchange and innovation.

The paper will therefore investigate the main types of proximity, their links with the systems of innovation and their impact on innovation. A greater focus will be placed on institutional, geographical, organisational and industrial proximity. In addition to the introduction and conclusion, this paper comprises five main sections.

The first section will identify and discuss the theories underpinning this research. It will review the theory of the systems of innovation (national and regional) and the role of the university as a key component of these systems. This section will focus on ties between innovation, networks and proximity (van Dijk & Sandee, 2002). The ability to innovate is believed to be more likely dependent on local than on distant linkages (Audretsche, 1998). The various forms of proximity are based on the assumption that a greater level of networking is seen as a means of facilitating learning, transfer of technology and innovation (Oerlemans et al, 2001). It can lead to the development of trust and mutual understanding which can help establish strong relationships (Doloreux & Parto, 2004).

The paper will attempt to investigate and identify the type/s of proximity associated with the greater role of universities in developing countries in promoting the creation and transfer of knowledge as a basis for innovation and economic and social development.

The second section will be devoted to the role of universities which are increasingly pressed to change and to become powerful drivers of innovation. Universities, from both developed and developing countries have started assuming the mission of entrepreneurs by incubating technological projects in their incubators and technology parks. They have been introducing a set of initiatives to prepare themselves for a more active role in the national (Charles, 2003) and/or regional economic and social development (Gunasekara, 2004)

The third section will explain and justify the research methodology which is essentially a triangulation of quantitative and qualitative methods. This approach is deemed appropriate for comparing the study of the dynamics of relationships that exist between universities, government and industries within the three countries (Algeria, India and Malaysia). Data about the relationships between universities, industries and governments and the role of universities will be collected through the use of questionnaires and interviews. Secondary data will also be reviewed to gain a better understanding of governments policies and their impact on these relationships and the role of universities. The research sample will include ten universities and ten businesses from each country.

The fourth section will be devoted to the three case studies which will provide an opportunity to contrast and compare the evolutionary growth of universities in the context of the three selected developing nations. The challenges that constrain effective interaction between the three spheres of university, government, and industry are rooted in the historical trajectories of the countries. The roles of universities are undergoing significant changes. Within the three countries, there is a clear evidence of policy shift from the traditional technology transfer practice to the development of a 'triple helix culture' in which universities are pushed to take the lead role to provide a sustainable basis for innovation and technological progress. The Malaysian government is actively encouraging the universities to be more entrepreneurial through programmes such as "research universities status" and "Accelerated Programme for Excellence. In the case of India, the triple helix approach has been found to be particularly useful in explaining the important role of universities in the emergence of the knowledge base services.

The three cases to be discussed in this paper are interesting for their contrast, with the implementation of the triple helix strategy being relatively more advanced in India and Malaysia than in Algeria. This appears to be related to the on-going issues of a strong culture of centralisation and top-down bureaucratic culture undermining the development of partnership networks.

The fifth section will attempt to identify and explain the positioning of each university within the three stage evolutionary process of the triple helix model. It will also highlight the importance of the linkages between these universities and the national and/or regional innovation systems. In conclusion, the paper will try to demonstrate if universities associated with hybrid stage are more active within the regional systems of innovation. It will also attempt to identify and discuss the types of proximities which are more likely to help universities play a crucial role in the development and diffusion of knowledge as a basis for innovation and economic and social development.

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P-052

Entrepreneurship and Gender in Ghana - An Explorative Study of Institutional and Structural Barriers

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Abstract

In most countries, the challenge of stimulating and promoting entrepreneurship is a top priority on the policy-making agenda. In Ghana, several support programs have been initiated by various governments since the country's independence in 1959, including also initiatives to stimulate and support women entrepreneurship. Despite of the fact that gender issues in Ghana have been given significant attention over the last decade in particular; and that Ghana ranks relatively high in terms of gender equality, there remain a number of legal, administrative, and institutional barriers that impede start-up and growth of women-owned businesses. The aim of this study is to explore institutional and structural barriers to business start-up and growth in Ghana with a specific focus on women entrepreneurs. Additionally, by applying a social constructionist approach to gender and entrepreneurship, the aim is also to investigate gendered conceptions of Ghanaian entrepreneurship to provide a basis for policy measures that acknowledge such conceptions as well as gendered institutional and structural barriers. Employing a qualitative approach, data has been obtained through in-depth interviews with different stakeholders; comprising government and other officials associated with entrepreneurial policy and structural design and implementation, as well as individual entrepreneurs (both women and men) whose enterprises cut across various segments of the economy. Interviews were carried out with 25 women and eight men entrepreneurs, eleven representatives for policy and different support organizations as well as with five 'gender advocates'. Additionally, policy documents on innovation and entrepreneurship were studied. Preliminary data analyses reveal four basic themes emerging from the empirical data, reflecting conceptions of both entrepreneurs and policymakers. .

The first theme, conceptions of Ghanaian survivalist enterprises reflect the view of the interviewees of Ghana as a country with vast possibilities of doing business. At the same time, it is conceptualized and described as a "sales shop" because of the fact that buying and selling rather than producing and adding value are encouraged and supported. As the economy is not large enough, however, all of these businesses can not be supported. There is also the conception among the interviewees that individuals own businesses as a way to survive, rather than because they are "real" or "true" entrepreneurs.

The second theme, conceptions of the Ghanaian entrepreneur, is based on the view among the interviewees of the Ghanaian entrepreneur as short-sighted, as one that "cut corners" and is consumption oriented. The entrepreneur is described as individualistic, but also as lacking needed business skills. They are seen as very difficult to deal with; as unwilling to learn or to move from status quo. Also they are described as uninterested to be subject to governance structures. At the same time, women are seen as better and more successful than their men counterparts, as having more passion, being more nurturing, as not running off and as more conscientious. This means that some of the conceptions of the Ghanaian entrepreneur can be described as gendered.

The third theme, conceptions of the nature of the Ghanaian business environment, is represented by the interviewees' depiction of the Ghanaian business environment as harsh, requiring an individual to have strong passion, and be very "pushy" to succeed. They also believe that the labour market is unstructured and that labour itself is very problematic. Cost of doing business is also very high and there are numerous socio-cultural difficulties in establishing a viable business venture. Again, according to the interviewees, there is no policy on entrepreneurship that ensures steady growth of business and development and in cases where there is some form of policy these do not support small businesses. There are also institutional failures and lack of access to finance.

The fourth theme, conceptions of new policy direction, illustrate interviewees' view that there should be a complete shift towards supporting small businesses; that Ghanaians must develop their own concepts for entrepreneurship interventions and that these support interventions must be programmed. According to the interviewees the President of Ghana "should take up enterprise development as his baby on his lap and make sure that that baby grows". There is for example a need for programs stimulating and supporting women in the informal productive sector. Instead of "throwing monies" at women such programs should aim at promoting entrepreneurship training and education.

In this paper, by drawing on concepts from institutional theory and entrepreneurship research, our data will be analyzed to provide a better understanding of the challenges economies such as Ghana is facing in the quest for a more entrepreneurial and dynamic economy. By comparing with previous research addressing women entrepreneurs in other similar countries this study will offer important insights into the barriers and opportunities to entrepreneurship prevailing in developing economies such as Ghana, and a more knowledge-based input to future policy initiatives in this specific field.

In addition to this approach, we will also, by drawing on social constructionist approaches to gender and entrepreneurship, discuss how to develop policy measures that, rather than restricting Ghanaian women into 'entrepreneurial ghettos', aim at developing sustainable gender mainstreaming interventions in the field of entrepreneurship in Ghana.

P-013

Determinants of university-industry-government collaboration and the relations~Evidence from Japan

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Keywords

University-industry-government linkages, Open innovation, R&D strategy, Innovation man-agement, Public policy

Introduction

It is said that in recent times, the R&D strategy of firms has changed from independent R&D to R&D introducing external resources. Such a R&D strategy is referred to as j°Open Inno-vationj± (Chesbrough, 2003, 2006). This trend also holds true of Japan.

¡¡Under the open innovation strategy, it is universities and public research institutes that attract attention as the sources of external research outcomes. They play an important role as provider of scientific knowledge because they carry out the basic research with high risk that private firms cannot. However, it is not necessarily certain how firms collaborate with universities and public research institutes. We do not know so much which collaboration firms choose among various forms. By extent, we do not know the relations between such collaborations. Therefore, we empirically analyze these subjects based on survey data. We finally aim to provide separate suggestions for firms, universities and public institutes, and policy makers about the way of university-industry-government linkages.

State of the art about the topic

The desire of Japanese firms to collaborate with outside partners as an effective strategy to gain external knowledge has attracted increasing attention. Although Japanese firms have tended to prefer j°Not Invented Herej± (NIH) as their R&D strategy, recent evidence suggests that they have begun to collaborate with external partners, a trend called j°Open Innovationj± (Research Institute of Economy, Trade, and Industry (RIETI), 2003, 2004; Small and Me-dium Enterprise Agency, 2008; Okamuro, 2006). In particular, the trend to j°Open Innovationj± involves universities and public research institutes as external partners. These institutions are original resources of scientific knowledge and undertake strong, basic research with a high risk that private firms cannot take. Firms use research from universities and public re-search institutes as substitutes for their own basic research. Therefore, collaborations be-tween universities and public research institutes have attracted attention as explicit frame-works within which firms can absorb scientific knowledge.

There is much literature concerning universities and public research institute collabora-tions (RIETI, 2003, 2004; Small and Medium Enterprise Agency, 2008; Motohashi, 2005; Okamuro, 2006). These studies document the actual status of external links in R&D for Japanese firms, but are somewhat restricted with regard to surveyed firms, firm size, or in-dustry. Therefore, they do not necessarily provide a comprehensive explanation of why firms might choose a particular type of collaboration.

Research focus

We mainly focus on two topics. One is to examine what factors determine on collaborate with universities and public research institutes. Second is to examine the relations between such collaborations. In this regard, subjective of this analysis is Japanese firms.

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Methodology

We obtained data through an original questionnaire survey we had delegated an investiga-tion company to carry out. Those surveyed comprised 20455 firms registered as Internet monitors throughout the country and covering all industries. In this paper, we used the data of 5123 firms of these firms (response rate was 25%).

Using probit model based on this data, we empirically analyze the factors that determine a firm; s collaboration with universities and public research institutes. In addition, we use probit model or model of covariance structure to examine the relations between such col-laborations.

Findings

One of our findings is that such collaboration does not necessarily depend on firm size. In some type of collaboration, it is not medium firms but big and small firms to collaborate with universities and public research institutes. However, we could not find the effects of number of universities and public institutes around the respondents. In addition to this, we found that significant relationships between type of collaborations and technological fields in which research outcomes by universities and public research institutes firms use. We can not find evidences about the relation between collaborations with universities and public institutes for firms at present.

Contributions and implications

We provide some suggests for firms, universities and public institutes, and policy makers. First, this finding would also be important for firms in the term of innovation management because this suggests that firms need to form collaborations with universities and public research institutes according to the technological areas that make their business effective. These results could also provide materials for univer-sities and public research institutes to consider direction of their research. In addition,

these results could suggest how policymakers should design public policies for academic- industrial collaborations and for intellectual property including technology transfer from universities and public research institutes to firms. Of course, this paper remains some issues yet. We should re-examine these results further.

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O-051

"COMMUNICATION CHANNELS AMONG ACTORS OF THE COLOMBIAN SYSTEM OF SCIENCE, TECHNOLOGY AND INNOVATION: A TEST TO TRIANGLE SABATO MODEL"

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Introduction

Colombia has a well established National System of Science, Technology and Innovation (SNCTI by its acronym in Spanish) from a legal and institutional point of view. Major initiatives were taken in the late 1980s and early 1990s which concluded on the expedition of the Law 29/1990, organized the system around four major decision bodies: the national council of S&T, programmatic councils, regional commissions, and Colciencias.

All these bodies, exception made of Colciencias, are collegiate corps based on the Triangle of Sabato (Sabato & Botana, 1968), which integrates three institutional spheres: government, academia and industry. Although they do not constitute administrative structures they are formal organizations, because they have tasks well defined.

The SNCTI has principles, a legal framework and directive bodies; but more than that it has been legitimized by its participant agents. The whole system was designed to allow different communities to participate in the negotiation of policies and programs, since in all the decision bodies have members from the research community, the government, and the private sector. Therefore the SNCTI is participatory in its conception. This people do not represent any particular organization, they are elected based on their curriculum vitae, on their expertise; except the civil servants.

What is the novelty of the research? There are many studies about S&T policy in Colombia but not about the evolution of the SNCTI as such. So that will be the focus of the research, the System and its decision bodies, and Colciencias as the head of the System.

1. Hypothesis

Colombia has a solid and stable SNCTI even if it has a small research community, few innovators, and a little and instable budget for STI. Why is so solid? Is it because of the organizational arrangements put into place (i.e. Triangle of Sabato model used in all decision bodies)?

Many experts considered that Triangle of Sabato model failed, because no common policy and decision making has been accomplished over the years, especially when one looks at public policy. The question is, if the organizational model has had different effects other than policy-making, such as communication of policies, programs and initiatives.

2. Theoretical framework

The theoretical framework is given by the Triangle of Sabato model, the system of innovation approach and the Triple Helix model, all of which try to explain the relations inside science and innovation systems. I will also use social network analysis, and more specifically social capital literature, to explain communication flows among individuals, and what they gain from being part of social organizations.

The models are used to understand processes related to knowledge generation, policy-making and decision-taking or how crucial information is diffused within the system. All different approaches attempt to understand the relationships between these three types of sectors, but they differ analytically in terms of how they integrate into a system and the differentiation among its components are conceptualized (Leydesdorff & Meyer, 2003: 195).

"The Triple Helix thesis states that the university can play an enhanced role in innovation in increasingly knowledge-based societies. The NIS approach considers the firm as having the leading role in innovation, and from the triangle model of Sabato the state is privileged" (Etzkowitz & Leydesdorff, 2000: 109).

Sabato & Botana in 1968, recognize that the model of tripartite relations government, productive sector and S&T infrastructure is not novel in itself, success in modern times depend in the multiple and coordinated action of these three sectors. Certainly they give a leading role to government, in charge of policy-making and mobilizing resources from and to the other two vertexes.

The Triple Helix model provide us with a different perspective, helping us to understand the dynamics of both communication and organization, looking at how multiple relations affect institutional arrangements (Leydesdorff & Meyer, 2003).

3. Methodology

Two different perspectives will be taken into account. The policy-maker/civil service side, on the one hand, and the beneficiaries or users of the policy instruments, on the other hand. The first will be attended via in-depth interviews to present and former Colciencias directors. The second, will be done through and electronic survey, reaching the "representatives" of the research community and the innovative firms that are members of the councils.

The main objectives of the in-depth interviews were to find out if the communities recognized the existence of the System, and to determine the main policy achievements and failures. Sixteen persons were interviewed and four panels were conducted in the second semester of 2006.

The first test will be complemented with some S&T indicators: Colciencias budget, GERD, scientific publications, and research groups. The first two indicators show the "fragility" of the System based on the amount and instability of the funding. The other two indicators show the strength of the System based on the response of the research community, based on the steady and steep increase of scientific publications and research groups, despite the lack of enough public funding.

In the next step of this research, I propose to test the hypothesis conducting an electronic survey to various members of the councils, looking at how they see or perceive their role in the system and to track what they do with the information they receive in those formal meetings.

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O-041

Towards a Knowledge Society: Expanding the Role of Women in Science, Technology and Engineering in the United Arab Emirates

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Introduction

Economic diversification and the transition towards a knowledge-based economy, where innovation is at the core, has been a recent aspiration of the UAE authorities. Human capital is essential for such transformation to take place, reason for which the UAE government has expressed commitment to improving the skills of the national workforce, increasing employability and to maximizing the participation of nationals, especially women in the labor market [1].

However, such an economic transformation process is a complex undertaking, and there are several challenges ahead. First, there is an increasing knowledge gap in the Gulf region due to: (a) insufficient investment in R&D; (b) low student enrolment in higher education; and (c) low quality of education in science and engineering [2]. Second, it is argued that the Emirati labor force is inadequately educated and has a poor work ethic [3]. Third, UAE nationals make only 20.1% of the UAE population [4].

Consequently, UAE continues to attract skilled and unskilled foreign workforce to meet its evolving development needs. Yet, it is unlikely that the economic transformation will be successful without developing a national workforce and reaching out to Emirati women.

State of art about topic

Integration of women in STE (Science, Technology and Engineering) education and labor market has proved to be highly correlated with the level of innovation and entrepreneurship, as reflected by the experience of advanced knowledge economies such as Scandinavian countries [5,6]. Hence, more research is needed to understand how women can support the economic transformation process in the UAE.

Currently, their role is limited. Although, there are more women than men in secondary and tertiary education in the UAE [7,8,9], Emirati women only make up 13% of the overall UAE workforce [1].

The mismatch between education supply and market demand – women's preference to study social sciences, humanities and law, and demand for STE skills [1,10,11] – is one of several factors contributing to low women's economic activity in the UAE. It is crucial, therefore, to understand what determines women's choices of academic programs, economic sectors and types of jobs.

Earlier studies account for the following factors to explain the low participation of women in the STE field: (a) socio-psychological factors; (b) school influences; (c) other (outside the school) influences: i.e. cultural stereotyping, lack of role models. We hypothesize that there may be some additional factors related to the local socio-economical context.

Research focus

Our paper is the first study in the region to systematically examine factors that affect: (a) Emirati women's decision regarding the degree program that they intend to pursue; (b) Emirati women's attitudes towards science, technology and engineering education; and (c) career decisions of Emirati female undergraduate and graduate students. We aim to put forward culturally sensitive and informed conclusions and recommendations for the UAE education policy-makers regarding ways to integrate women into the knowledge society, in order to support innovation and entrepreneurship.

Methodology

We take an interpretative research paradigm to assess why a large share of Emirati women follow a certain behavior. Our units of analysis are women students enrolled in local universities, local educators, education policy-makers and employers. To explore our research questions we use mixed research methods: (1) survey methods to systematically collect data on specific issues related to women's choice for discipline specialization and career paths; and (2) qualitative research (semi-structured interviews and focus groups) to examine the set of factors driving individual choices.

Findings, implications and contributions

We argue that low supply of national high-caliber graduates in STE will further hinder the economic transition process towards an innovation-based economy. In addition, it will place greater pressures on the government and firms located in the UAE to compete for talent on the global labor market. Therefore, education and employment of Emirati women should be geared towards supporting the economic transition process. However, to prepare women for effective integration into the labor market, a strong link between education policy, economic development strategy as well as local culture and social values is required.

To our knowledge, there are no studies dedicated to the tertiary education choice and career decision made by Emirati girls that

focus on the STE field. Existing studies are limited by the following factors: (a) use primarily secondary data; (b) are conducted at the pan-Arab (MENA) level; (c) do not specifically focus on Emiratization in the context of low participation of women in the labor market.

In this paper we highlight that the integration of women in STE fields in education and in the labor market is critical for UAE to transition to a knowledge-based economy, where innovation is at the core. We find that this outcome depends not only on providing the right type of education and creating the necessary economic opportunities. Taking social welfare and cultural context into considerations are critical for increasing women's participation in the new economy.

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P-036

Research and Innovation private-public partnerships. Evaluation and comparison of some European experiences

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Introduction

The importance of networking for innovation is now widely recognized and governments have developed new instruments to boost dynamic interactions among the different institutional spheres. Based on the Triple Helix framework (Etzkowitz and Leydesdorff 2000) this paper analyses a Regional Policy instrument (long-term funding of Research Networks) developed by the Madrid Regional Government (MRG) in Spain to enhance innovation by fostering cooperation between different research groups and industry. The aim of this assessment is to detect the main strengths and weaknesses of the policy developed by the MRG and to make some suggestions for future improvements. Three additional cooperative experiences are also briefly analysed and compared with the MRG instrument. Two of them involve two Scandinavian countries, the Oslo/Akershus region in Norway and the VINNVÄXT Programme in Sweden, and the third is a recently created Autonomous University of Madrid-Accenture Chair in Economy and Management of Innovation. The comparison aims to identify valuable lessons and cross-country learning in terms of Triple Helix cooperation.

State of the art about the topic

Even though firms are the main agents of innovation, they depend on the knowledge and skills accumulated in their surrounding institutions (Metcalfe 1995: 42) and, because of this, innovation policy needs to encompass a wider context and consider the specificities of the innovation system in which firms are embedded. The relation between policies and their cultural and historical context is reciprocal: political, cultural and economic forces all influence

the region (Cooke et al. 1997: 480), and the region and its situation influence policy frameworks (Metcalfe 1995: 25). Hence, it is essential to consider the multiple and multifaceted relations between these variables.

Research focus

The paper analyses: a) the results obtained by the Research and Development Action Programme (RDAP) set up by the Madrid government, in terms of improving Triple Helix interactions in the region, b) the possibilities for cross-country learning and c) the specific experience of a public-private partnership to enhance teaching and research cooperation, between the University and a multinational company. The analysis has focused on the wider

contextual characteristics that have influenced the effects of the different innovation policies in achieving collaboration. In other words, we have concentrated on the differences found

across countries (in terms of how effective the selected policies are and the relation between them and their wider political, cultural and historical context) with the intention of searching ctober 201

out suggestions to overcome the weaknesses found in the RDAP.

Methodology

A pilot four-case study, based on documentary analysis and interviews to selected stakeholders, and a survey to all funded Research Networks allow us to highlight on-going results as well as the main shortcomings of the RDAP in the Madrid region. In contrast to the analysis of the Madrid case, which has been based on a "first hand" evaluation, the analysis of the Oslo/ Akershus region (Paalshaugen 2009) and the VINNVÄXT programme (Cooke et al. 2008) have been mainly based on documentary analysis from secondary sources and complemented with a semi-structured interview with a researcher closely related to each case. The analysis of the experience with the Chair is based on interviews with the main partners.

Findings

Our analysis has shown both the positive aspects of the RDAP and the areas where there is room for improvement in future public Programmes. Some clearly positive results have been achieved, for example increasing the interaction between Research Groups and their capacity to attract more qualified human capital, attracting additional external funding and accelerating their internationalization process. However, in terms of the Triple Helix framework some of the results are not positive. For example, a) one of the helixes (companies) is almost out of the picture, and b) the Networks seldom use some of the interface institutions created by the Administration. The Chair UAM-Accenture case sheds some light on how interaction with companies could be made more productive.

The launching of the RDAP reflects the importance that the MRG gives to strengthening university-industry relations, given the possible positive impact these may have on the region's competitiveness and economic growth.

Contributions and implications

Our analysis proves that enforcement measures should be implemented together with the Programme, if effective Triple Helix collaboration is to take place. In this respect, the analysis of the Oslo/Akershus region in Norway and the VINNVÄXT Programme in Sweden has provided some valuable insights and cross-country learning.

We have considered the wider contextual characteristics that have had an influence on the effects of innovation policies in achieving collaboration. Examples of these features are the greater culture of dialogue, the strong tradition of cooperation emerging from the corporatist governance system, and the emphasis on bottom-up perspectives in policy-making. Based on equality instead of the hierarchy of one institution above another, dialogue-based working

methods should be designed and systematized in order to increase trust and Triple Helix cooperation in the Madrid region. In addition, cultural analysts could also be involved as intermediaries in the process, in order to identify cultural differences and help in the dialogue (Jönsson 2000).

Finally, emphasis is placed on the importance of: 1) context sensitive measures and avoiding "one size fits all" perspectives, and 2) implementing the learning mechanisms that will help to build the necessary social capital for increasing collaboration and innovation.

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AGROPOLIS DEL NORTE : a local innovation System, in the framework of the Valle del Cauca Bioregion strategy (Colombia). Experiences of a process.

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From a local tradition, 9 municipalities in the Northern part of the Cauca Valley Region in Colombia, have identified themselves as an Agropolis, meaning their decision of conserving an agricultural vocation. They want to access modern urban conditions, as connectivity, agro-industry and bio industry developments, and good public services. The community asks mainly for an improvement of the social conditions, giving the young, opportunities for a good living.

Corporacion Biotec, a technology development and innovation Center, Universidad del Valle-EIDENAR and Universidad San Buenaventura, joined efforts and interests around a common purpose: to accompany the Agrópolis del Norte community in a process oaf knowledge based development, in a local innovation system (LIS)model. Each organization has different and complementary experiences an knowledge related to a LIS. Working together they have contacted different organizations looking for the financiation of a joint process among Academic organizations, local governments and producers in the Agropolis. From this first process the group has learned several lessons, used for the formulation of a project which was accepted by COLCIENCIAS (Colombian public Science, technology and innovation agency). The execution of this project, since 2009, has moved the process, from 3 specific traditional objectives, to a more complex group of lines of research and action, involving more than 200 persons and near to 30 organizations. To share the conceptual development and the experiences developing the local processes, within the 4 research-action lines (development indicators monitoring, local development agency organization, capacity building - education added value chain-, and research-action continuity projects) is the purpose of the paper we are submitting.

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0-030

The Transfer of Knowledge according to the concept of Entrepreneurial University: Some experiences in the Fluminense Federal University (UFF).

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1. Introduction

In the last decades, important organizational changes have occurred in the universities that have opened up to the demands of society, expanding its interactions with business firms, government and other institutions. In this context, emerges the new conception of the Entrepreneurial University. The idea is that higher education institutions (HEI) have to take a proactive attitude to transform knowledge in economic and social value, without giving up their traditional missions of teaching and research. According to Maculan and Mello (2009), the University try to set up this mission of transferring knowledge to business companies, through cooperation in research projects and, more recently, through marketing of research.

2. Theoretical Framework

The theoretical framework of this paper is divided into five topics. First of all, we refer to the Clark (1998) approach which puts the emphasis on the university challenge to answer new demands from the society. Second, we discuss the sustainability of this answer (Clark 1998, 2001, 2003 e 2006). Third, we introduce the concept of the Entrepreneurial University and its role in the economic and social development according to Etzkowitz works (2000, 2004 e 2008). Fourth, we discuss whether the knowledge transfer can be managed together with maintaining the traditional missions of teaching and research. Fifth we show the importance of the development of this third mission in the universities.

3. Research focus

The research focus is to investigate how a Brazilian university tries to organize the knowledge transfer in order to generate economic value according to the concept of entrepreneurial university.

4. Methodology

The research was organized as a case study of the UFF. The search of information was based on intentional samples, being selected professionals of the UFF who are familiar to the concept of entrepreneurial university, and are working actually in various functions related to innovation, entrepreneurship and knowledge commercialization of research.

The results are presented in six sub-items. Firstly, we present the ways of transferring knowledge that have been used by the UFF. Secondly, the impact on traditional missions is analyzed. Thirdly, organizational structures created to use such practices are presented. Fourth, the implementation of the UFF's strategies is discussed considering the public funding need. Sixth, the differences of opinion about the concept of entrepreneurial university will be seen.

5. Findings

Several evidences allow to infer that the UFF tries to implement different ways of transferring knowledge and to make stronger the idea of an entrepreneurial university. Although, it is not clear if the UFF is actually able to fully establish this third institutional mission.

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6. Contributions and implications

There is a lack of studies about how the Brazilian universities are able to support this third mission. Investigate how this occurs may contribute to the creation of a methodology to understand better how they seek an more entrepreneurial attitude.

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W-10 Triple Helix Model (of Knowledge Based Economy) in the Open Architecture Business Games

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1- Research Problem

One emerging question in the university of XXI century is the development of an entrepreneurial attitude in students of social applied sciences, raising their abilities of leadership and creation of new knowledge and ventures. Recently, was published in Brazil a methodology for education and research called Management Laboratory (Sauaia, 2008) that guides students of social applied sciences beyond the curriculum content. It's based on an organizational simulator that supports a business game where each participant develops a research in scientific format, while manages a company. As recommended by the Triple Helix approach (Etzkowitz, 2008), it has been possible to stimulate the emergence of innovative ventures in this controlled environment, similar to incubators. Then, the university determines a new method, tested and replicated, to lead the relationship between industry and government in the process of knowledge creation that unfold in innovation and economic development to the local society.

2- Literature Review

In the Management Science, business games were consolidated as a management training technique all around the world since 1957 (Keys and Wolfe, 1990, p.309). The educational principles of business game are supported by the theory of experiential learning (Kolb et al., 1984) which assumes that in addition to cognitive learning, the student develops skills to decide and take social and politic responsibility, setting a new position for future professional problems. Business games are an exercise to create experimental environments where changes in learning process and behavior can be observed. The simulated environment, even simplified, is able to induce appropriate answers in situations from the real world.

The studies on business games progressed for over 50 years to produce in Brazil an educational methodology that integrates education and research in Management, named Management Laboratory (Sauaia, 2008). Organizational, political and economic problems can be explored by integrating theoretical models with the simulated practice and experiencing scientifically several possibilities. In the games organizational entities are recreated through written materials (balance sheets, statements of cash, income statements, professional correspondence, annual reports and management plans). Often these games are supported by software. In the model of business game, and also in activities performed by participants, are present most part of organizational functions, such as marketing, production, finance, human resources, R&D, operations and accounting, among others. This process begins with a presentation of a business case proposed to the participants grouped in teams in the decision making experience and describes the economic environment where decisions will be taken.

3- Objective

The aim of this study is to initiate the discussion about the use of Triple Helix approach in the Management Laboratory. The discussion started on the Business Administration undergraduate course at the University of São Paulo and proceeded on the University Federal Fluminense, Campus of Volta Redonda (USP and UFF-VR). The first part of the paper is used to do a theoretical review. In the second part is presented the undergraduate Management courses at USP and UFF-VR and how Triple Helix perspective was observed in the business game environment. In the third part it was described a model of coupling both approaches and, in the last part, considerations and future applications of this approach in education, research, and extension courses.

4-Methodology

Two case studies were conducted to examine the consequences of the replication of the USP Management Laboratory approach at UFF-VR. The report describes the implementation conducted from 2007 to 2009 and examines the difficulties confronted. The innovations resulting from the peculiarities of UFF-VR and the progress indicators reveal opportunities of deepening and perpetuation.

5-Results

Since 2002 in the Department of Management at USP, there is an initiative led by the research group SIMULAB, who created and adopted the Management Laboratory approach for education and research (Sauaia, 2008). The methodology operation is based on an organizational simulator where simulated organizations compete for results. It describes the problem situation of a company that produces and sells a commodity in a domestic market. Groups of students manage simulated companies that are similar at the very beginning. The teams compete to each other for results. The first challenge is the regency of economic rules of the simulator. The second challenge is to formulate, implement and control a competitive strategy over time. The third challenge is to identify opportunities for innovation, differentiating itself from competitors and reporting the experiential process in a scientific study.

This methodology was first replicated in 2007 in the undergraduate Management course at UFF-VR (Oliveira, 2009). The methodology complements the learning process of a variety of issues including the fundaments of business management and the modern techniques of project and innovation management, with the objective to instill in the students an entrepreneurial

attitude and a scientific approach. The activity based on games evolves from an economic rationality, passing through the exercise of a strategic thinking and culminates in encouraging the practice of an entrepreneurial and innovative management (Sauaia, 2006). The research produced in this environment describes the innovation projects, the business opportunities generated from a better understanding of the economic actor's interaction process.

The innovation discussion requires the economic environment as an area of continuous interaction between the actors (universities, industries and government), as recommended by the Triple Helix approach. In knowledge based on economies the Triple Helix can be understood as an interpretation or a model of how economic actors organizes themselves to create, adapt and disseminate new knowledge.

6-Conclusion

The Management Laboratory provides an answer already tested. Supported by the business games, it can create ways to "incubate" simulated ventures and monitor their performance. In a later stage such simulated industries may be "transferred" to the real world in physical incubators or scientific and technological parks.

Since 2002 the Business School at USP has been adopted this methodology for education and research that is being replicated in the last three years at the UFF-VR. To achieve progress in this area it's appropriate to spread these ideas, focusing on direct relationship with the Triple Helix approach and multiplying research groups that could adopt this approach, which under the university leadership, it's feasible to reunite industry and governments to accelerate the economic development.

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W-31 Gender mainstreaming the food processing industry in Skane

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Regional development, innovation and growth policy are gender coded as male objects of interest (Friberg1993, Gunnarsson et.al. 2007, Pettersson 2007, Rönnblom 2002, Scholten 2003). In Sweden, regional development policy and growth, has traditionally focused male dominated line of businesses within male primary business sectors. In a sustainable regional development and growth perspective, gender equality and a broader perspective on innovation and development is crucial. The aim of this abstract is to describe the setting for our action research project Gender equality in the Skane Food Innovation Network (SFIN) and our main research objectives. Theoretically we use Joan Ackers' (1990) analysis of gender in organizations.

The setting

The setting for our project is the food process industry in Skane. In the beginning of the 1990s, several agents in Skane with interest in the food industry business gathered as Sweden entered the European Union. It became evident that something had to be done in order to face global competition. The Skane Food Innovation Network (SFIN) was established and in 2003 the network took part in a call by Vinnova, a national body on research and development and received 100 000 billion Swedish Kronor during a ten year period for a project aiming at developing the Swedish food process industry. In that call, the SFIN also agreed to work with gender equality. However, working with gender equality demands knowledge on gendered power relations, construction of cultural understandings of femininity and masculinity as well as of how these power relations are constructed, maintained and reproduced. In 2007 a second call on applied gender equality in innovation networks were launched. SFIN was successful in that call and the project, Gender Equality in the SFIN was able to begin its work in 2008.

SFIN is a triple helix organization; the board as well as the steering committee is represented by the academy, industry and society. It is organized as a network /community where action is prior to refection or bureaucracy. The steering committee is both acting and reacting on innovation projects. SFIN has a board called the entrepreneurial committee which values and discuss innovations and projects with innovators. The committee may also co-finance project.

SFIS also has its own project managers who work together with organizations and businesses to develop or improve routines and create knowledge. SFIN work with knowledge creating and knowledge developing processes, called "gillen" after a specific Skanian way of gathering and feasting together. One of these processes is called future vision. The process leader of this process argues that gender is a critical indicator for development, improving and innovation. The question is how to use a gender perspective to develop the SFIN further, create sustainable gender equality and improve speed of and quality of innovation?

Gender mainstreaming a network? Some method implications

In SFIN one main objection is to create arenas for learning, development and innovation based on strategic importance. One strategic issue is gender. Gender is thought of as fundamental in making qualitative differences in asking questions according to problem definition. Gender is also valued as crucial according to development and innovation.

There are built in difficulties in trying to gender mainstream a network. In our project we decided early to focus on the steering committee (SC). Our idea was/is to create a learning environment according to gender and gender equality issues and analysis, where every day work by the SC can be influenced by gender equality awareness. The first important step is to create an awareness of what is being done, in what way, why and by whom, out of a gender perspective to help the SC to put demands on working partners within the network. This attempt calls for models and methods based on learning and reflection together with representatives for the innovation habitat and partners within the triple helix in making them sustainable (Berge & Ve 2000, Gunnarsson, Johannisson & Stjernberg 2008, Hansson 2003).

Results so far

Working with the SC has resulted in two workshops on what a gender and a gender equality perspective might bring when it comes to describing the SFINs activities. Input to the first workshop was results from interviews with the board of SFIN, discussing acknowledgement and personal engagement for qualitative issues in relation to research and development processes within the food process industry. Another input was an account of how men and women are represented in the newsletter from SFIN. This input gave the SC first hand feedback of the difficulty on working with gender equality issues. It became clear that the board wasn't that interested or had made any investments in the new project within the SFIN. The representation of men and women in the newsletter described men as professors or project leaders and women as project team members and students. The aim with the second workshop was to introduce a toolbox for gender equality analysis in R&D environments and the question was: what can be learned from others?

Our next step was an eye-to-eye discussion with the members of the SC to discuss how R&D-initiatives are put forward. Every member described the main object of hers/his process and by discussing and analyzing the discussions we have been able to detect described processes as gender blind and helped the process leaders to have an extended repertoire of contacts and

models for conduct his/hers process. Another step that has been developed in our work has been to design direct intervention in the contacts between SFIN and possible new project leaders that are systematically disadvantaged in the traditional food networks, with focus on women starting-up or running small businesses. In this step we act as an interface between the supporting innovation system (SFIN) and the small businesses, guiding the interaction and reflecting on its obstacles and possibilities. By our project analyze the processes we might influence how a network hub like the SFIN, can develop processes and services which support better gender equality in a science and technology environment, traditionally described as male.

Triple Helix VII) Conference Madrid, October 2010

O-022 Variations on the Triple Helix Model

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Variations on the Triple Helix Model – the Case of Dip-Pen Nanolithography. Thematic domains : S2:Triple Helix study; "The future of Triple Helix study". Key Words: Expectations, Circulation, Enterprise, Temporality, Societal strand

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This paper explores four features of Triple Helix dynamics: 1. in the case study of the Dip-Pen Nanolithography research instrument and subsequently industrial tool, the changing content of the expectations specific to the university, industrial and governmental Triple Helix strand; 2. the changing functions of each strand in the segmented temporal dimension; 3. the direction, content and purposes of the circulation of knowledge, skills and markets of each strand; 4.the introduction of a fourth strand in the Triple Helix configuration in this particular instance of university/industry/government interactions, in the form of society as embodied in the "nanofication" of culture. This would suggest the evolution of a Triple Helix into a "four strand helix" model in the face of certain contingencies and under certain constraints. The episode in the recent historyof nanoscale research reported here extends from 1999 to 2010. The Dip-Pen nanolithography instrument technique originated within the university, rapidly moved to enterprise, and then penetrated society where it finds expression as an economic market, pedagogy, a testing ground for performance and applications, and as a spirit. The government strand remains in the background.

The Dip-Pen device deposits molecules onto a substrate where multiple compounds measure just a few nanometers. The final product is thus informationally rich. It was announced in an article in Science, today cited over 1,700 times. The Dip-Pen was first introduced as a clever technical solution to inherent difficulties encountered by the Atomic Force Microscope (AFM) under certain operating conditions. It involved academic research on an existing instrument – a form of "research-technology". Most fascinating, from the birth of the Dip-Pen, its major architect, professor Chad Mirkin, perceived the experimental device as a promising future tool capable of writing and decoding highly complex nanoscale messages. In his princeps 1999 article, Mirkin signals expectations for his research instrument which is explicitly linked to the history and culture of writing, and to the relevance of his device to expanding technical horizons of contemporary culture. As will be demonstrated below, this footnote reference anticipated rapid and intense entrepreneurial efforts and a prompt penetration into the societal sphere – the "4th" strand in the triple helix?

In 2001 venture capitalists became aware of the Dip-Pen device, judging it worthy of investment. Working closely with Mirkin and his university laboratory, they founded NanoInc Inc. While the academic laboratory had demonstrated the feasibility of the Dip-Pen, it remained a laboratory device, incapable of robust operation, standardized production and usage by non-experts. The question remained what were its valid domains of application during this second temporal segment? Progress in these multiple and complex areas entailed close linkage in the form of shared knowledge between the university and enterprise, and the introduction of economic logics. During this period, exchange between academic laboratories and the new enterprise was fluid and omni-directional. Scientists and engineers moved readily across boundaries and one can speak here of interlacing between the university and the industrial strands.

The focus of the circulation of experimental and engineering results, materials, innovations, and ideas for applications thus privileged modes of interpenetration between the university and NanoInc Ink strands during the period 2001 and 2005. Here, the Dip-Pen was transformed from a research instrument into a tool, possessing broader horizons and characterized by robustness and standardization of use. During this temporal segment, university laboratories and scientific research constituted the principal market outlet for the rapidly improved Dip-Pen lithographic tool. At this time it became capable of quickly producing chemically and geometrically complex nano patterns for exploring physical properties, and a platform for biological research.

In the third post 2005 trajectory of the Dip-Pen, circulation of information between enterprise and university persist but during this period, industry assumes leadership. NanoInk representatives visit customer university laboratories to identify promising procedures, questions and techniques pursued locally that had not occurred inside NanoInk. These projects are then selectively financed at the laboratory level, and if worth wild they are then transferred to NanoInk for further developments. Expectations were here split between exigencies of market considerations and the need to react through efforts of internal transformations. NanoInk established five divisions designed to anticipate and satisfy societal demand. This took a variety of forms extending from the earlier mentioned detection systems to counterfeit-proof inscription techniques and a new range of tools intended for a wide diffusion of nano related competence and more broadly the appreciation and comfort with things nanoscopic at the public level. This latter assumes the form of a "nanofication" of society through inclusion of high school and professional programs. In this fashion the societal element constitutes an imposing determinant for the technological and policy horizons of this university, industry, government experience.

In the case of the university/ industry/government connexions surrounding Dip-Pen nanolithography, it is clear that at several junctions, societal considerations prove central. In view of this, we have argued that it is enriching to understand this episode in

terms of the addition of a fourth strand, a societal strand, to the erstwhile three commonly considered strands. The question remains, is the fourth strand relevant everywhere or is it particularly salient to the sphere of nanoscale research? We will propose two concepts, "combinatorial science" and "condensation/extension dynamics" to explain why the emergent field of nanoscale research is exceptionally connect to societal elements, which may thus entail inclusion in the Triple Helix model.

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O-058 **Triple Helix Evaluation: How To Test A New Concept With Old Indicators?**

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Introduction

Triple Helix concept encourages actors (university-government-industry) to work in an open space of circulation of aspirations, knowledge and innovation. This open space of circulation is a novelty (1), which requires deep understanding and internalization it as a personal and collective value where collaboration is a source of a sustainable success. To evaluate how much Triple Helix as a social organisation novelty is contributing to an overall prosperity, new indicators consistent with this new conceptual framework are needed.

State of the art of the topic:

In last 20 years Triple Helix developed into a widely accepted conceptual framework which brings together knowledge, consensus and innovations of three (or four) major social actors: university - government - industry (and civil society) and provide better cradle for social and economic development (2). But the departure from Triple Helix as an intuitive guide for policy makers and researchers to a model of social organisation requires further work on identifying relations between major actors. By using some recent work on identifying indicators for measuring entrepreneurial activity (3), each actor can be described in terms of attitudes, actions and aspirations. It leads to a new question - how to describe those attributes, by which variables and indicators? There are some new concepts of measuring performance of social, economic and political systems (e.g. competitiveness, corruption, economic freedom, innovativeness, entrepreneurial capacity, governance...), but availability of variables and indicators are what circulate across the board. It means that new concepts are supported by old variables and indicators. And that is also a case with the Triple Helix concept which brings novelty of open space, but its evaluation is limited by the present availability of descriptors (variables and indicators). For example, for measuring performance of business sector, there are several sources, like Global Competitiveness Index (World Economic Forum) (4), Global Entrepreneurship Monitor on entrepreneurial activity (5). European Innovation Scoreboard is available for identifying innovative capacity of participating countries (6). University rankings can be used for measuring performance of universities, as well as indicators on university performance included in measuring competitiveness, entrepreneurial activity and innovation capacity. For measuring performance of public sector (government), there are also several sources, like the World Bank Governance indicator data set (7).

Research focus

Rising curiosity for comparing internationally is a good sign of opening and it should be supported, despite of scepticism due to difficulties to recognize contextualisation in which each country functions. Because of that, this paper will carefully examine what existing rankings offer to the Triple Helix conceptual framework in order to test relations among major actors and to identify the best possible set of variables and indicators for describing three major attributes of each actor (attitudes, activities and aspirations). It is not only important to find the best fit of descriptors of crucial attributes of major actors in Triple Helix concept, but to challenge how to measure expected result – what we consider as a sustainable success? Should we make a major effort to replace GDP with wellbeing indicator, happiness index, or what?

Browsing through Triple Helix conferences it is visible that Triple Helix community (policy, research, business) has a rich knowledge base for next steps toward developing Triple Helix model of social organisation. The paper will follow Einstein's statement that "not everything that can be counted counts, and not everything that counts can be counted" in order to challenge our collective imagination to find a new descriptors for Triple Helix as a new social organisation. Megatrend analysis project of the Institute for Triple Helix Innovation (8) is a very important part of this search for variables and indicators, and this paper plans to contribute to the on-going research on this topic.

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P-033 R&D PRODUCTIVITY AND COLLABORATIONS IN SELECTED NIGERIAN UNIVERSITIES

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Research and development (R&D) is a significant component of quality higher education. This is quite understandable and appreciable because R&D, most especially in Science and Technology (S&T), has become the most enduring and effective means of improving sustainable economic growth, development and re-enforcing competitiveness in industries in a rapidly changing world. Universities are widely regarded not only as teaching establishments but also as organisations that create new knowledge and innovation through research. Many academics are of the opinion that doing research improves their teaching (Colbeck, 1998, 2002; Gamson, 1995; Stevans and Reingold, 2000; Robertson and Bond, 2001; Wenzel, 2001; Winkler, 1992a, b; Woolcock, 1997; Zamorski, 2002; in Begum, 2006). In recent times, universities often use evidence of research excellence to employ or promote staff. The main claim of the teachers and administrators are that research activity can and does serve as an important mode of teaching and a valuable means of learning and thus research is a strong condition for teaching.

R&D is one of the main thrusts of activities of western universities. The developed nations have clearly demonstrated that one of the most potent means of achieving developmental goals is effective building of capability in Research and Development. They have also demonstrated the relevance of effective collaboration to sustainable scientific and technological advancement (Boozeman and Lee, 2003). To corroborate this, Ehikhamenor (2003) opined that scientific productivity, in the form of intellectual contributions to the advancement of S&T, is a fundamental consideration in the scientific enterprise. A crucial requirement for productivity and development in S&T is a system of communication among scientists and the dissemination of scientific information.

Productive R&D is expected to lead to new product(s) development or improvement of existing product(s), new process development or improvement of existing process, patents, copyrights and publications.

Scientific publication is a sign of good quality of invention and research outputs. Patents, copyrights, and funds from companies are signs that those inventions have market potentials (Carneiro, 2000; Werner and Souder, 1997; in Numprasertchai and Igel, 2005). Tangible R&D outcomes should promote the link between academia and the industry. However, many private and public organizations in Nigeria are skeptical about R&D outcomes from the universities and in many cases the needs of these organisations are not met. These invariably have further widened the gap between universities and industries (Oyebisi et al., 1996).

Many studies on research productivity and collaborations include an underlining assumption that collaborative activities increase research productivity (Duque et al., 2005). However, there is a dearth of information on the validity of this proposition in Nigeria. Are Nigerian researchers collaborating for R&D among themselves and with others outside their institutions? What factors inhibit collaboration activities of researchers? What influence do researchers' collaborations have on their R&D productivity? These are some of the pertinent questions addressed in this study.

For the survey, 457 copies of questionnaire were randomly distributed among lecturers. 274 of these were returned and found useful (60% response rate). The field respondents were from Faculties of Agriculture (30.8%), Science (38.8%) and Engineering/ Technology (30.4%). In assessing R&D productivity of researchers we adopt the partial productivity approach. Researchers' publications were used as output and the number of years spent to produce the publications as input (in this study 5 years, (2004 – 2008)). The normal count (of output), which is the most frequently used approach, is adopted. The outcome of the study indicated a positive relationship between R&D productivity and collaboration. This is in agreement with some previous studies on the subject of research productivity and collaboration (Lee and Bozeman, 2005; Landry et al., 1996; Harman, 1999; in Rijnsoever et al., 2008, Walsh and Maloney, 2003; in Duque et. al., (2005)

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O-136 The Location of University Spin-Offs

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One particular way universities may contribute to local economic development is by spawning new science and technology based firms. The underlying assumption is that the entrepreneurial activities of university faculty and graduates constitute a fairly effective way for commercializing academic knowledge that might have significant economic value but is tacit and chiefly embodied in its discoverers. The location of science and technology based firms started by university faculty and graduates is of crucial importance since these firms are assumed to create new jobs and knowledge spillovers which have pronounced geographical dimension. Moreover, there is some evidence from some extraordinarily successful regions which points out the role of universities as nuclei of high technology districts. For instance, the emergence and development of Silicon Valley is typically related to the entrepreneurial activities of faculty and graduates from the Stanford University. Similarly, the MIT and the Harvard University are assumed to have significantly influenced the development of Route 128 and the biotech cluster in Greater Kendall Square (Boston, MA) in the United States, and the Cambridge University in the UK the development of the Cambridge Technology Region.

Based on such success stories, a number of policies have been discussed and implemented in the last decades which aim at stimulating local economic development by encouraging the entrepreneurial activities of faculty and graduates. An implicit assumption in these policies is that the newly founded firms locate in the region. It is typically argued that firms started by university faculty and graduates depend strongly upon academic knowledge and other inputs and services university provide so that they have pronounced incentives to locate in vicinity of the parent institution. However, this assumption is based on anecdotic evidence - mainly case studies that unfortunately fail to provide systematic analysis of the relative importance of different factors that might influence the location decision of the firms. In particular, many universities are located in regions with well developed infrastructure, strong private sector and large labor pool. For instance, Roberts and Eesley (2009) show that although MIT is known for its remarkable scientific competences and knowledge base (it is ranked among the top universities worldwide), a significant number of firms started by MIT faculty and graduates do not stay in Massachusetts. In particular, firms in electronics and semiconductors are more likely to leave Massachusetts and to locate in California, presumably in Silicon Valley the world largest agglomeration of these industries. Furthermore, social networks and individual preferences might also influence the choice of location. Hence, trying to simply reproduce the success of some outstanding regions is a risky strategy and more systematic studies on the real importance of universities are dearly needed.

Against this background, this study aims at assessing the importance of universities in anchoring spinoffs in the region. We apply (cross-sectional) data on firms started by faculty and graduates from seven German universities during the period 2002 to 2005. One problem related to this analysis may arise from the mutual interdependence between universities and local economy. In particular, it might be difficult to assess the impact of universities since these are likely to influence local economic and industry structures which in turn impact on the decision of firms started by university faculty and graduates to locate in the region. Another problem might arise if there are unobservable factors that are common for universities and industry in a particular region. To reduce these problems, we pursue a threefold strategy. First, we restrict our analyses to East German universities because the German Reunification and the ongoing structural change from a planned to a market economy eventually led to a (temporary) mismatch between the universities and the local industry structure. Second, in order to assess the impact of the universities and not of other unobservable factors that are common for universities and industry at a regional level, we test the importance of the parent university against other universities in the region while the region is held constant. Third, we split our sample and look - in addition to the whole population - to firms in industries that are underrepresented in the region. By doing so, we additionally seek to emulate the effect of universities in "structurally weak regions", since in the last century universities have been often created in order to stimulate poorly performing regions. Finally, we analyze the importance of neighboring regions' endowment on the probability of firms to locate in parent university's region. This allows us (i) to analyze the impact of universities in regions that are near other well performing regions (e.g. large agglomerations), and (ii) to make some conclusions about the importance of proximity to particular inputs.

Our results indicate that the likelihood that firms started by university faculty and graduates locate in the region of the parent university increases with the fraction of the national professors at the parent university in the specific academic discipline, but not with the fraction of professors at other universities in the region in the specific academic discipline. The results indirectly suggest strong effects of ties between parent university faculty and founders.

Several local conditions are found to affect the probability of firms started by university faculty and graduates to locate close to their parent university: the fraction of national R&D employees in similar and related industries in the region, the availability of labor with appropriate skills, and GDP/capita. When analyzing the role of the neighborhood we find that the concentration of R&D activities in adjacent region might act as a pull factor causing the newly started firms to leave the parent university's region, presumably to locate in places with large amount of knowledge spillovers. This means that policy that encourages academic entrepreneurship in order to stimulate regional development is likely to fail in regions with poor industrial base which located near agglomerations and large cities. However, there is no evidence that the availability of both, labor with appropriate skills and universities in the neighbourhood might act as pull factors.

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O-031

Why do university researchers collaborate with industry? Evidence from German universities

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Public academic institutions, in particular universities, are considered as important element of the system of innovation. By conducting R&D activities universities they generate new economically valuable knowledge and technologies, enhance technological opportunities and the productivity of private R&D, and induce firms to spend more on R&D (Jaffe 1989; Nelson 1986; Mansfield 1991, 1998).

Accordingly, a number of studies emerged that address the question about the channels for transfer of knowledge and technologies from universities into industry. Among the various ways in which university knowledge may become available to private firms, the direct/face-to-face interactions between universities and private firms are found crucial for the transmission of academic knowledge and technologies. Cohen et al. (2002) ask the managers of US manufacturing firms to assess the importance of different possibilities to source academic knowledge and find that the direct (face-to-face) university-industry interactions such as meetings and conferences were considered as "moderately" or "very" important by 35.1 percent of the respondents, informal contacts by 35.6 percent, consulting by 31.8 percent, contract research by 20.9 percent, and cooperative joint ventures by 17.9 percent. The share of firms' managers that find patents, licenses, personnel exchange, and hiring of scientists "moderately" or "very" important for sourcing academic knowledge is 17.5 percent, 9.5 percent, 5.8 percent, and 19.6 percent, respectively. Moreover, Thursby and Thursby (2003) survey industry licensing professionals in the US and report that of the 300 respondents, 188 had not licensed-in from U.S. universities during the period 1993-1997, though many had sponsored research at U.S. universities. The main reasons for not licensing-in university technologies are associated with the embryonic nature of the academic knowledge and the fact that its is chiefly embodied in its discoverers. Hence, firms are interested in establishing direct (face-to-face) relations to universities in order to further develop university research towards commercial ends. Moreover, according to Thursby and Thursby (2003: 209) one of the licensing executives suggests that "the sole purpose of licensing university technologies was to establish a relationship with the faculty inventor." Agrawal and Henderson (2002) assess the importance of different channels for transfer of academic knowledge from the faculty perspective by asking researchers at MIT (MA) to estimate the importance of different channels. Research collaborations, consulting, conferences and conversations account for 12.1 percent, 25.1 percent, 5.2 percent, and 6.3 percent of the influence research conducted at MIT has on industry activities. Patents and licenses account for only 6.6 percent.

Consequently, scholars increasingly focus on university-industry collaborations as a mean of knowledge transfer. Till date a number of studies emerge which analyze university-industry interactions. Most studies focus, however, on the private sector side. Accordingly, the rationales for private actors to collaborate with public research institutions are well illuminated (cf. Belderbos et al. 2004; Veugelers and Cassiman 2005; Cassiman, Veugelers and Zuniga 2007, 2008). However, it takes always two to tango: private companies and universities. Hence, if researchers are to arrive at a better understanding of the establishment of university-industry linkages, it becomes inevitable to understand the factors and motives that determine the collaboration behavior of university researchers. This is particularly important for policy aiming to stimulate university-industry linkages, since there is some evidence that the performance of the innovation system considerably depends on the intensity university-industry interactions (Feldman and Desrochers 2003; Fritsch and Slavtchev 2007, 2008). In spite of the importance of these questions, comparable little is known about the university perspective. Schartinger et al. (2001) and D'Este and Patel (2007) are among the few exceptions looking at university-industry linkages from the university perspective. However, since the unit of analysis in Schartinger et al. (2001) is the department level there are only indirect conclusions possible about the probability to collaborate at the level of the individual researcher. D'Este and Patel (2007) choose the individual researchers as a unit of analysis, the main focus of their study is, however, the simultaneous engagement of scholars in various modes of interaction and not on the factors that explain the intensity of particular collaboration mode.

Against this background, this study analyzes the importance of individual characteristics (research excellence, private sector work experience, collaboration experience, age), motives (public support, fund raising, learning and idea generation, reputation), and institutional factors (TTO involvement, peer effects) for the intensity of various collaboration modes (informal contacts, meetings and workshops, technical services for private firms, consulting, commissioned R&D (ordered by private firms), joint R&D, and advanced training for private firms) university professors have with private firms. The analysis in this study is based on standardized postal survey of professors at seven German universities (four universities and three technical colleges) and considers the period between 2002 and 2005.

The results suggest that the informal contacts, followed by the two forms of virtual R&D, commissioned R&D (ordered by firms) and joint R&D, are the most frequently used interaction mode between university professors and private companies. Interaction modes such as consulting, technical services, meetings and workshops, and advanced training appear less frequently used. As to the determinants of researcher collaboration intensity, the results of this study show that frequency of use of the particular interaction mode is driven by different factors and motives. The possibility to discover new research opportunities seems to be important incentive for having informal contacts to private firms, for participating in meetings, workshops and conferences, and for conducting joint R&D. Technical services for firms and commissioned R&D seem to be motivated by the possibility to raise funds that can be used for further independent research.

The results suggest also that university researchers consider particular collaboration modes such as informal contacts, consulting, commissioned R&D and advanced training as a mean to build up reputation and image. Moreover, this study provides

some evidence that there might be peer effects, meaning that there might be positive feedbacks between individuals and their environment which might force endogenous group dynamics. Hence, a fruitful avenue for further research might be the investigation of the (formal and/or informal) institutions (e.g., reward systems, competition etc.) which are required for positive feedbacks to occur.

Further result of this study is that the research excellence matters for the intensity of collaboration. Excellent researchers are found to have more informal linkages and to collaborate more intensive on R&D (commissioned as well as jointly with private firms). On the other hand, excellent researchers are less engaged in activities such as the performance of technical services and advanced training for firms as well as consulting. The results provide evidence that star researchers allocate more efforts towards collaboration activities mainly associated with the generation or discovering of new research fields.

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O-127 THE ROLE OF BRAZILIAN UNIVERSITIES IN THE KNOWLEDGE GOVERNANCE: AN EXPLORATORY STUDY

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The role of universities has changed considerably over the centuries. Presently they are recognized as loci of professional qualification, scientific discovery and dissemination of knowledge in society, having thus a triple role. According to Cooke (2006), universities have become key factors in the process of mobilization and transfer of knowledge, moving from a narrow role of supplier of skilled workers to become more engaged in supporting innovation.

In Brazil, there is an increase of the universities participation in scientific and technological development. While throughout the 1990s they were responsible for 355 requests of patents at the National Institute of Industrial Property (INPI), between 2000 and 2004, there were 784 requests, which are, however, 2,22% of deposits of residents and only 0.78% of total general requests in the period. Reports from INPI suggest that the creation of Foundations for Research Support, the installation and improvement of centers of technological innovation in universities, in addition to the promulgation of the laws 10.973/04 (Law of Innovation) and 11.196/05 (Law of Goodness), may have encouraged the development of a culture of innovation and intellectual property in the country.

If, on the one hand, the role of universities in the development of innovations has increased in recent years, on the other, no one knows exactly what has been done from the innovations developed. Questions about the commercial exploitation of technological innovations patented by the Brazilian universities; the benefits that are reverted to them; the partnerships with private companies and research institutes, among others, have not been analyzed yet. The purpose of this article is to enlighten these issues.

STATE OF THE ART

According to Etzkowitz and Leydesdorff (2000), the increased importance of knowledge and research for the economy has uncharged the university with the challenge of promoting the economic and social development. Thus, an academic revolution has began (Etzkowitz, 2008), making the mission of the university, previously restricted to conservation and creation of knowledge (education and research), become the application of this knowledge (entrepreneurship).

But the innovation process is not complete without the participation of the firms which, according to Cruz and Pacheco (2009) have an essential role in the generation of innovation. In this context, there are several possibilities to transfer the knowledge generated by the University to society: one is, according to Etzkowitz (2008), the university substitutes the enterprises to support the formation of firms and technology transfer, without being an enterprise, as it occurs in incubators and science parks. Another possibility is to set up offices of technology transfer to facilitate the commercialization of research: in the U.S., patents and licenses based on academic findings represent more than \$40 billion and more than 300 companies were created based directly on academic research in 1999. Thus, it is relevant to understand the strategies that Brazilian universities have adopted to transform knowledge and research results into innovation and how this knowledge has been appropriated.

FOCUS OF THE RESEARCH

This research aims to investigate the commercial exploitation of patents owned by most innovative universities in Brazil and the benefits that accrue from those patents to those universities. From data analysis and interviews we seek to point out what are the main partners of the universities, both in the process of creation as in the moment of commercialization of knowledge and innovation generated. In addition, we analyze the changes that may be occurring in the role of Brazilian universities because of those activities.

METHODOLOGY

For this research, we selected the five most innovative Brazilian universities in the last 10 years: State University of Campinas, Federal University of Minas Gerais, Federal University of Rio de Janeiro, Federal University of São Paulo and Federal University of Rio Grande do Sul. Then we investigated their innovation agencies and the research groups that produced more innovations in recent years.

We have made interviews with their coordinators in order to understand the process of forming knowledge, pointing out the characteristics of the research groups, its funders and partners, but focusing the investigation mainly on the cases of commercial exploitation of their innovations. So, we aimed to know those who have benefited from the innovations generated, people responsible for the commercialization, and the financial or non-financial rewards which are with the University.

CONTRIBUTIONS AND IMPLICATIONS

This research aims to contribute to the formulation of public policies for the development and diffusion of technological innovations by Brazilian universities, especially regarded to the commercial exploitation of their patents. We intend to analyze precisely the process of introducing innovations on society. The research also provides subsidies for the development of public-private partnerships for the development of innovation and knowledge management. Finally, it enlightens the changes in the role of universities in the "knowledge society", considering the current development stage of the country, its limitations regarded to restricted access to the University and the dependence on foreign technological models.

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0-062

The university-industry relationship in Brazil: the impact of institutions and social capital in Brazilian's sectoral system of innovation

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Introduction

The development and economic growth depend largely of productivity gains and technological progress of the economy. The impact of these can be found in the ability to generate innovations in the country. We can see that innovative companies, according to the study of Negri et alli (2006), are more productive, export more and create jobs with higher pay, due to the increased intensity of human capital.

Public policies to encourage innovation in Brazil receive microeconomic incentives in last years. However, the Schumpeterian literature, as Nelson and Nelson (2002) and Nelson and Sampat (2001), highlights the central role of institutions and social capital in the innovation process, leading to innovation to be systemic and not only an individual decision.

Basic theory

The focus of systemic innovation is perceived in two lines of research. The first focus is the analysis of the sectoral impact of industry in innovation, as defined in the Sectoral System of Innovation (SSI) of Malerba (2002). The second focus is the importance of the relationship between universities and companies, as Nelson and Rosenberg (1993) and Etzkowitz (1998). While the first line of research shows the differences in the innovation process in relation to the impact of industrial structure, the second line of research shows that the construction of institutions and social capital between firms and other actors of the innovation process, especially universities, is essential to the success of innovation policies. In two focus considered, the enterprise is an element of the systemic innovation process.

Research focus

We considered the official micro-data of Brazilian industrial companies in 2005. The companies were analyzed on total factor productivity (TFP) of them explained by a multilevel regression model, which included variables of firm's capabilities and relationship with university by industrial sector.

Methodology

The multilevel regression model developed has two levels. The first level shows the estimated TFP of firms by industrial sector accounted for its capabilities, such as human capital, research and development, investment, scale and international trade. The second level has captured the influence of universities, research centers, and test in Brazilian industrial sectors explaining the dynamics of the firm's first level and TFP.

The use of the TFP was broken down by industrial sectors, which reduced the problem of lack of homogeneity of the factors considered in the model. The first level has introduced elements of scale to counter the problem of constant returns of scale assumed in the estimate TFP.

The presence of the control variable of the role of universities (and other research centers dedicated to innovation) in the second level of the model shows that differences in social capital formation among companies and institutions vary from sector to sector of industry.

Results

The estimated model identified that the enterprise's capabilities explain the formation of the PTF, however, differences between sectors were received, showing that the impact of innovation on productivity of firms differs according to industry analysis. The model also identified the role of the university in explaining the TFP of firms and theirs capabilities innovation. The result showed sectoral differences in the impact of the university in explaining TFP firms and their competencies, these differences are perceived by the aleatorial residual of the multilevel model, which would not be captured using a dummy variable in a regression with panel data.

Contributions and applications

Brazil has made progress in the indicators of basic research in recent years, as shown in the OECD study (2009). This evolution can be explained by public policy to encourage innovation by the Brazilian government from 2004 - known as the Industrial, Technological and Foreign Trade Policy (PITCE in portuguese).

The PITCE presented microeconomic instruments to encourage innovation, without disregarding the role of systemic innovation, as the institutions and social capital that came under discussion in the second phase of the policy to encourage innovation (released in 2008). Even with the advancement of innovation indicators, the relationship between universities and enterprises is still in an embryonic stage. The progress of the innovation indicators of the Brazilian universities shows that they have advanced in the publication of scientific papers internationally in a model of open science, but still disappointing in the development of indicators of "academic administration of creativity" as the model Antonelli (2008).

This research shows that the advancement of innovation needs specifications for industry and construction of social capital with the institutions. Only with the inclusion of incentives for institutions and businesses to build relationships of social capital specific to innovation, such as the Office of Innovation and design intellectual property rights, as suggested by Bercovitz and

Feldman (2006), and are not considered in the Brazilian industrial policy yet, it is possible to make the process of innovation systemic in the economy, involving universities in the process and generating a virtuous cycle of sustained growth by knowledge economy rather than only fiscal and monetary policies as the last decades in Brazil.

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W-32 **Innovation, Entrepreneurship and Gender**

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Innovation and entrepreneurship are often discussed together. In some definitions of innovation entrepreneurship is a prerequisite for its realization - without entrepreneurship no innovations. In the public debate, and also sometimes in politics and research, a small firm owner is a synonym for an entrepreneur. As a consequence politics aiming at increasing the number and share of women starting firms of their own is expected to increase the number and share of women entrepreneurs and the number of innovations developed by women on the market.

The health and care sector is heavily dominated by women as employees. The present government has the ambition to decrease the public sector through increase the number and share of private providers. This is supposed to, to a high extent, to be realized through women establishing themselves as owner managers in the health and care sector. When on their own they can feel free to innovate and implement ideas up till then prevented by the big public employer. To speed up the development expected to come the Swedish government decided to support a number of projects (around 15) aiming at increasing the entrepreneurship in the health and care sector.

The paper presents two of these projects and compare their strategies. Both of them are examples of triple helix-methods organizing partners from different sectors of society. Among the differences are the level from which they take their starting point and where the relevant Triple helix constructions is made. One of them was managed by the regional county council in Västernorrland, a region in the Northern part of Sweden. Partners were some municipalities (responsible for elderly care), the Landstinget (responsible for the health care), organizations for sme:s, and public sector organizations like social insurance office and the union of nurses. The project manager had gender competence and used a gender mainstreaming strategy.

The other project was managed from the national level through agreements between metaorganizations for county councils and municipalities, Jobs and Society (an organization financed by private capital to support Sme:s), a national bank and the union of nurses. The last organization was managing the project through hired consultants with gender competence. The gender perspective was discussed as an integrated part of the strategy of the nurses to be acknowledged as a profession

The two projects are presented and compared in some perspectives that turned out to be of relevance for the outcome. A common outline is that the partners are joining of differing reasons and with different ambitions supporting the theoretical standpoint that action can be taken without a common view in important aspects. The importance of gender equality and gender mainstreaming is one of these diverging aspects and so are the entrepreneurship ambitions in the regional Triple Helix-constellation but not in the national one. Despite that the regional based triple helix- project seem to be a working arena for interorganizational discussions and thereby a potential for intraorganizational changes both concerning entrepreneurship and gender. In the paper these changes are discussed and mainly explained by the regional project being an arena also for important actors outside the triple helix-constellations while the metaorganizations constructing the national project not reach the organizational levels where the decisive decisions are put into organizational practice.

Fostering Team Science: Innovative Leadership Practices in NSF Industry / University Research Cooperative Centers

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Scientists increasingly address complex, technological problems through interdependent, collaborative research teams, in what has become known as team science (Boardman & Gray, 2010; Stokols et al., 2008). Scientific collaboration has grown, especially in the last 30 years; multi-author publications now out-number single-author publications in some fields (Jones, Wuchty & Uzzi, 2008). Triple Helix organizations - for government-led, industry-university cooperative, scientific research (Etzkowitz, 2008) - incorporate and capitalize on team science (Gray, 2008; Gray & Sundstrom, 2009; Sundstrom 2009), toward creating trans-disciplinary knowledge.

This paper describes innovative leadership practices designed to fostering team science in one Triple Helix organization - the U.S. National Science Foundation (NSF) Industry / University Cooperative Research Centers (IUCRC) Program. Of many facets of an IUCRC Director's complex leadership role (Gray & Walters, 1998), we focus on fourkey areas for team science: 1) delineating the Center's mission; 2) structural support for team science; and 3) creating opportunities for informal networking. After outlining forms of team science in NSF IUCRCs, we describe current Directors' practices in each area to facilitate team science at their Centers.

Team Science in NSF IUCRCs

Starting in the 1970s NSF has offered small grants to IUCRCs for pre-competitive, scientific research into selected technologies, with guidance, oversight, and on-site evaluation (Gray, 2008). University scientists conduct collaborative research, funded and directed by a board of member organization representatives. In 2009 the program partly funded 44 IUCRCs operating from ?? university sites, with 685 industry memberships (Gray & McGowan, 2009). A typical IUCRC had 2 or 3 University sites, 19 industry members, and 16 scientists from multiple disciplines.

A multi-University IUCRC involves team science via collaboration at 4 levels: 1) project teams; 2) multi-project research groups; 3) University site management teams; and 4) the Center's multi-University executive team and Industrial Advisory Board comprised of member representatives.

Delineating the Center's Mission

Cross-discipline, inter-institution collaboration. Extending the usual, cooperative mission, one Center adopted "multi-disciplinary diffusion of knowledge" as a purpose, for knowledge-sharing between health science practitioners and scientists. Another sought to build an international, "leading-edge" testing laboratory to attract scientists from industry member organizations for residential research projects at one location.

Developing "human capital." Some Centers expanded their development missions to the "human capital" (Boardman, et al. 1999) represented by scientists' careers and capabilities, both as technical contributors and leaders, and to improve their collaboration readiness.

Structural Support for Team Science

Financial incentives for inter-institution collaboration. One IUCRC Director dedicates a budget from the NSF award (not industry members' funds) for inter-institution projects, and encourages multi-year proposals. (Many other Directors encourage scientists to apply for NSF matching funding for inter-IUCRC projects.)

Multi-disciplinary degree & certificate programs. One Center supports multi-discipline research groups through formal, interdepartment degree programs for graduate students and - for scientists - formal, interdisciplinary certificates.

Computer-based tools for teamwork. One IUCRC has developed and made available a suite of electronic tools for teamwork, including: a) meeting tool that creates a link to a meeting website, enables presentations during meetings, stores meeting documents like agendas and minutes; and records members' feedback; b) action item tools that created an electronic "to do" list, and generates project e-mail, including "auto-nags"; and c) paper review tool that uploads scientists' proposals and manuscripts; generates e-mails to reviewers; stores reviews and comments; and enables revisions. Together these tools make team science much more efficient.

Creating Opportunities for Informal Networking

Field trips at annual Center meetings. To maximize informal, personal contact in relaxed informal contexts (toward enabling BDIs - "beer-derived ideas"), one Center organizes field trips bus-rides to locations for "hands-on" cooperation and overnight stays.

Center poster sessions. Adopting a practice from professional conferences, several IUCRCs conduct members-only poster sessions where scientists and their graduate students present research projects to member representatives. These sessions involve appetizers, drinks, and sometimes "best poster" contests with creative prizes.

At NSF IUCRCs and other Triple Helix organizations, leaders can adopt these and other practices to foster team science.

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O-025

The dynamic evolution of knowledge-intensive concentrations in nonmetropolitan regions Triple Helix practice and experiences

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Keywords: Triple Helix, regional innovation systems, regional collaboration

Introduction

The purpose of this paper is to contribute to a very rich literature stream with a relatively unexplored approach by providing a longitudinal comparison of three non-metropolitan European concentrations of high-tech activities: Oulu in Finland, Pisa in Italy and Luleå in Sweden.

State of the art about the topic

Previous research in the field of regional innovation systems and dynamic regional development has contributed with valuable insights into the characteristics and dynamics of knowledge-based institutions and actors in forming a favorable regional development trajectory. The bulk of this research however has mainly been occupied with studying large high-tech concentrations such as Silicon Valley and the Bay Area or Route 128 in Boston; often employing a quite limited time perspective on the phenomenon. We argue that there is need for further research that over time analyses the dynamic forces affecting different trajectories in regional knowledge-based development, especially with regard to high-tech concentrations in medium-sized high-tech concentrations with relevant presence of high level public research. We argue that these kinds of concentrations, which often coincide with medium-sized cities, are extremely important for European growth in the next decade. They also provide an empirical reality that is less affected by other factors such as the attractive forces a large city region with capital functions may offer. The research gap is in fact evident if we focus attention on the development of non-metropolitan knowledge-intensive areas and their industrial clusters.

The purpose of this paper is therefore to contribute to this specific knowledge gap by providing a longitudinal comparison (about 30 years) of three non-metropolitan European knowledge-intensive concentrations in different parts of Europe: Oulu in Finland, Pisa in Italy and Luleå in Sweden.

Research focus

The paper focuses on a description and analysis of the life cycle of the three high-tech concentrations. The specific research interest lies in establishing temptative connections between the history of these areas ("where they come from") and their possible future evolution paths after reaching a maturity/decline phase ("where they will go"). From a theoretical point of view, the study will build on established innovation system research, including the Triple Helix concept (see e.g. Etzkowitz 2008, Etzkowitz & Leydesdorff 2000) together with some recent findings by Teräs (2008) on the dynamic evolution over time of non-metropolitan concentrations of high-tech activities. We argue that collaborative dynamics such as the ones employed by Innovation System research and by the Triple Helix concept have played and will play a relevant role and may contribute to develop our understanding of the dynamic forces in play in such development processes.

Methodology

The research methodology we use builds on combining (triangulating) different methodological approaches, and includes both quantitative and qualitative analyses. The quantitative analysis builds on data gathered with the same approach in the three regions and the analysis of some key performance indicators (such as e.g. high-tech jobs), used to assess the status of the areas during different historical periods. The qualitative analysis builds upon a vast amount of reports, interviews and cases collected by the authors in the three areas in the last twenty years. The literature on high-tech clusters, districts, networks etc. will be acknowledged and used in this study.

Findings, contributions and implications

The paper focuses on the findings related to maturity/decline phases and the abilities of high-tech concentrations to re-invent themselves, implementing strategies and actions which allow "revamping" processes while on the edge of a static or decline phase. The paper has the Teräs-Ylinenpää (2009) TH Glasgow conference paper "The dynamics of Triple Helix Networks and Collaboration in two Nordic Regions" as one point of departure (also see e.g. City of Oulu 2007). The Madrid Triple Helix 2010 conference paper will however provide both quantitative and qualitative analysis of three knowledge-intensive concentrations in Europe by introducing and analyzing also a knowledge-intensive concentration, Pisa district, in Southern Europe (Teräs 2008, Delfino et al. 2005, Di Minin et al. 2006), and moreover extend the time span of the longitudinal analysis. The ambitious aim of the paper is to provide findings and contributions that have implications in a wider European context, partly filling the research gap on non-metropolitan knowledge-intensive concentrations.

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Triple Helix VI) Conference Madrid, October 2010

O-055

The evolvement of triple helix interactions: process perspectives on university – industry- government relationships

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Purpose and perspectives of paper

Research on university-industry (UI) relations has made enormous progress the last decades through the creation of impressive data sets related to funding, publications, patenting and activities at the level of individual scientists, departments, disciplines and universities. Much empirical research has been cross-sectional and quantitative, and has described how interaction is carried out by identifying categories of links and volume of interactions (D'Este & Patel 2007, Schartinger et al 2002). Type and degree of interaction is often explained by partner traits and context characteristics (field of science, technological fields, size and individual characteristics). Still, micro level data is scarce and research focused on processes of forming, developing and coordinating UI collaboration has been fairly absent, and there has been little systematic effort to explore interaction processes in the UI context. To address this gap, there is a need to look into the "inner life" of such relationships, to get a sense of the actors and activities in collaborative relationships, the organizational and institutional frameworks that interaction takes place within, and how relationships evolve over time. These are the core issues of this paper which is based on a longitudinal multiple case study of UI interaction in Norway.

In research on interorganizational relationships, process perspectives have been quite fully developed. According to Inkpen & Currall (2004), the key insight in this perspective is that alliances are dynamic systems of adaptation and evolution. How interorganizational relationships develop over time is related to initial conditions, but alliance dynamics also have an impact on the outcomes of the alliances. The "dynamics of cooperation" perspective has largely focused on phenomena such as alliance formation processes (Ring & Van de Ven 1994, Ring, Doz & Olk 2005), governance and institutionalization processes in collaborative relationships (Vlaar, Van den Bosch & Volberda 2007, Inkpen & Currall 2004), and learning in interorganizational relationships (Vlaar, Van den Bosch & Volberda 2006). Research utilizing this perspective tends to be multilevel and emphasize the non-linear and interdependent nature of development processes. Phenomena such as understanding, sense-making, commitment, familiarity, and trust are used to explain variations in development processes and results achieved in interorganizational relationships. Utilizing this perspective, the paper presents empirical data on formation and development of collaborative research projects between universities, firms and governments, and through this provides insight into dynamics in triple helix interactions at a micro level.

A multiple, multiyear case study of university – industry collaboration

University-industry relationships are highly socially embedded relationships and any type of link (for instance a collaborative research project) between a firm and a university department is often based on long-term relationship where partners interact in many different ways (Thune 2007). Furthermore partnerships between firms and universities tend to develop incrementally from low-risk, low engagement relationships to in some cases lead to institutionalized relationships where considerable resources are invested (Thune 2006; 2007).

To explore how collaboration is initiated and developed in institutionalized forms of university-industry relations, we have used a multiple, multiyear case study approach (Stake 2006). Through a selection of cases from different disciplines, universities, industries, phases (some recently started and others nearly finished) and with different public support, we have tried to achieve an analytical generalization and uncover processes of collaboration at the micro level that may be relevant for all types of university-industry relations. We have analyzed seven cases – four collaborative research centers and three collaborative research projects, within topics such as petroleum research, service innovation, aluminum extraction, cancer research, solar cells, medical imaging and marine bioactives and drug discovery.

In each of these cases, we have looked at applications, project descriptions, annual reports, evaluation reports and web pages. We have interviewed the project leader and other participants from different partners (universities, research institutes, industry, others). In total we have carried out around 70 interviews in this first round of data collection (finished March 2010). Two more rounds of interviews will take place at the end of 2010 and in 2011 to follow up on several topics from the first round and to monitor the development of the cases. In this paper we will present the first results of the case analysis. We emphasize in particular the start-up phase, i.e. we focus on the rationales for establishing the partnerships, the selection of partners, the negotiation of agreements, and the initial forms of interaction.

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Resource Mobilization and Business Development in Regional Universities: the University of the West Indies

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Abstract

Business Development and Resource Mobilization are terms not widely employed in universities. This is related to the limited, or at least, relatively unknown ways in which universities contribute to economic development. A case study of the Business Development Office of the St. Augustine campus of the University of the West Indies aims to define these concepts, understand how they are practiced and analyse what is their importance. We note 10 distinct types of products and services the office is involved with which constitute the university's practice of business development and resource mobilization. These practices need to be developed more fully and responsibility for them devolved throughout the university. However, these functions need much stronger, focussed and inclusive management at the highest level of the university.

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1. Introduction

Most of the literature on universities refers to teaching, curriculum development and the broader philosophical/ethical aspects of education. There is a recent and growing literature on linkage of universities to innovation systems (Youtie and Shapira, 2008). However, the literature on strategic management of universities is very small. While strategic management is a large and mature field of research and practice within business administration, this knowledge has rarely been applied to universities. In terms of professional practice, all universities are highly skilled in management of traditional areas of their work, such as operating libraries and teaching students. Some newer parts of professional practice have become mature fields, like grant management, but are not yet accompanied by a literature that is analytical, remaining mostly professional. The management of developing products and services for educational clients and obtaining financing from private sources to do this, activities which we might call "business development" and "resource mobilization", are perhaps the least mature of professional practices and the least studied by academics.

2. Objectives

This paper explores dimensions of business development and resource mobilization in a professional context, which have arisen during a consulting study of a major university in a development situation – the University of the West Indies (UWO) campus of Trinidad and Tobago. The objectives are:

1. to bring this incipient professional practice to the attention of the academic community so that more research is done on this very important and neglected area, and the wealth of concepts and findings in the management literature can be applied to university management

2. to lay out an initial framework for the complex and wide-ranging activities that constitute business development and resource mobilization within the context of universities.

3. Business Development

The UWO has an office which is officially called the Business Development Office (BDO). The BDO requested Canada's International Development Research Centre (IDRC) to conduct a management evaluation of its role within the university. IDRC engaged one of the authors (Tiffin), to carry out a consulting study in May 2009. This paper extracts a few of the points around the concepts and practice of Business Development (BD), and Resource Mobilization (RM).

The term Business Development is very unusual in a university context. It is a term which has arisen within industry, principally in parts of the software, computer and related fields, and is still rather new, not yet well defined either in industry, nor in business schools. Yet universities are organizations like any other that must create products and services that customers want to purchase, work in alliances with other providers, react to competitive environments and generate financing from whatever source is appropriate. To stay in business, they must continually develop new business.

According to Davis and Sun (2006):

"Business development [BD] practices are a subset of new business formation practices, a variety of corporate entrepreneurial behavior. Business development aims to create growth through expansion or extension of existing product-markets or through development of product-markets that are new to the firm. BD practices are part of the innovation process but are not subsumed by technology development, product development, or marketing and sales functions. As part of the family of corporate entrepreneurial practices, they may lead to the establishment of new business organizations or units within or outside the firm..."

The term business development, is creeping into professional practice in university management, but with almost no formal intellectual backup from business management literature. Since there is no standard practice for it in universities, working it out

in this different organizational context is required. Given the complexity of university missions, however, and the strong social function of this type of organization, coupled with its conservatism and academic orientation, it is obvious that introducing such a term into traditional management practice will not be easy. In fact, it has occasionally been stated that universities are not managed at all – they are administered; in other words, the focus is on keeping the existing structure working efficiently (Tiffin and Kunc, 2008). We feel the choice of the words business development by the University of West Indies, although perhaps without a full appreciation of its meaning, indicates senior management's underlying awareness that the university needs to become more entrepreneurial and engaged with stakeholders. We will therefore use the Davis and Sun (2006) definition as the basis against which analysis is undertaken.

Resource Mobilization

In addition to BD, the UWI also uses the words Resource Mobilization in describing the work of the BDO. Resource mobilization (RM) is related, but not identical to BD. RM has meaning specific to universities and NGOs, needing explanation. The original and widely used term, "fundraising", seems to have been replaced by more indirect words such as "development", "advancement" or "resource mobilization". It is important to note this change in terminology because it signals a much deeper issue that most universities have had to grapple with over the past few decades. Strong pressures have been exerted on the university from the state to become more closely involved with stakeholders, pressures that confront the millennial culture of university isolation. Despite the indirect terminology, the basic intent is still getting money and preparing the ground for getting money. This activity is the cornerstone of the BDO's activities

The shift in terminology does however, indicate something other than just the historical academic isolation from commerce and engagement; universities need and can obtain other things of great importance from stakeholders than just cash. It has been realized for several decades that universities are part of complex knowledge systems involving many different types of actors. In developed countries, it has been argued (Gibbons et al, 1993) that the importance of the university as the knowledge provider has significantly declined as a diversity of new knowledge producing, storage and diffusing organizations have arisen (eg Google for libraries, think tanks, ranking companies like the World Competitiveness Index, corporate training schools etc.). While some researchers dispute the idea of a decline in influence it is accepted by all that the traditional roles of universities and their monopoly on them has changed drastically and these changes are ongoing. A basic concept to understand this new dynamic is that of "innovation systems". Most of the focus has been on national innovation systems (eg as stated in Trinidad and Tobago's Vision 2020, no date), but both the concept and the reality extend to local, regional and international scales as well. The lessons for the UWI are first, that the systems reality means the university needs to be embedded in a complex set of relationships and exchanges with many actors, or stakeholders. Second, these different stakeholders have different needs and interests in involving themselves with universities. Mapping these stakeholders, understanding their needs and supplying products and services to meet their needs will link the university more closely to them and allow the university to benefit from the reciprocal exchanges. Managing this at a corporate, overall university level is a requirement for and the function of RM.

It is critical to note that mobilizing resources is dependent entirely upon the university having something to exchange. No resources will flow to the university unless it has products or services of specific and significant value to the stakeholder. We noticed that the UWI generally assumes the research knowledge produced by individual researchers pursuing publications in academic journals is of great (if perhaps only potential) utility to the world. The reality is very different; in the short run, most of this knowledge has very limited applicability, or immediate utility to stakeholders. Analytical studies show quite clearly that in most cases, universities will receive very little cash from efforts in transferring technology to industry. Obviously, labs designed expressly to serve industry development through research stand a higher chance of producing knowledge that is immediately relevant, but even here, it is our experience that most companies in developing countries are rarely knowledge-based; they have very limited capacity to guide or absorb new knowledge unless it is in the form of very specific consultancies. We have seen several industry sector R&D labs in universities forced to downgrade even their very applied research to concentrate mostly on delivering consultancies and lab analyses to industry. Therefore, it is essential that the RM issue be approached from a longer term, broader perspective of not only attempting to sell what is on the shelf now, but working in collaboration with customers to develop products for the future that they will buy.

Understanding the dynamics of each activity, BD and RM, is essential to act effectively. For example, philanthropy by corporations to universities in developing countries is often weak even if there are strong financial incentives, because the society is not knowledge-based. Giving to a popular sports club or a group of disadvantaged children will generate far more sales of a company's products than to a university that only a small percentage of the population attends, for carrying out some research activity that hardly anyone else understands, knows about or values. Or another example: alumni donations rarely come from graduate students; primarily from those who were at the university as undergraduates. A full discussion of these topics is far beyond the scope of this paper of course, and would include other things as technological support (eg internet for electronic giving, which opens up possibilities for managing very small donations), management and relational strategies, and segmentation of products. It should be recognized that while these activities are fairly new to the UWI and not yet developed, the practices have been part of the fundamental management of universities (predominantly in the USA and predominantly under private ownership) for many decades.

4. Findings

The UWI is a regional institution funded by 15 governments. It has 3 physical campuses (Trinidad and Tobago, Barbados, Jamaica) and an open (virtual/distance learning) campus. Each campus has its own management, finance structures and somewhat unique courses. There are 3 BDOs at the UWI, 1 per campus. It was stated that the one at the St. Augustine campus of Trinidad and Tobago is the largest and most active. On this campus, there are supposed to be additional BD Units in the

faculties of Engineering, Science and Agriculture, and Social Sciences. The relationship between the faculty BDOs and the campus wide BDO has never been formally spelled out, but there is an understanding with the Ag/Science BD Unit that they would focus on the technology and the stakeholders, with the campus BDO working on common issues of intellectual property (IP) policy, contracting and staffing.

According to Finance and General Purposes Committee paper (2002), the BDO's first activities involved marketing university expertise in a consulting mode. The BDO has now spun off the bulk of its consulting activities to the university consulting company and done something similar for international operations, by helping set up an international office and supporting it as it grows. We were not able to meet with the consulting company, but found the international office in an embryonic state, with a recently hired director and no staff.

The BDO is now involved principally with obtaining major international research grants, marketing the expertise of the campus to the private and public sectors, overseeing (IP) on the campus and UWI and seeking philanthropic gifts. It seems the IP activities do not focus solely on research-related issues but respond to all requests about IP issues from the Campus Principal, such as developing a policy for copyright and royalties the university would have to pay to outside agents for things like photocopying. Earlier attempts at focussing on fundraising have been reduced to accommodate other requests. The BDO has also been tasked with commercializing property owned by the university and acquiring new property for expansion. In addition the office serves to assist the development of certain community colleges and junior universities in the region. The Director is also called upon to write speeches for the Campus Principal, edit research reports, attend to visits by international dignitaries, represent the university in external stakeholder meetings and explore potential international relations. BDO staff have been asked as well to write a business plan for a university lab which is producing industrial products for sale, relating to graphite, and are responsible now for dealing with food concessions where the university has external contracts and acquisition of land. One BDO officer has spearheaded a Master's degree in sports management with FIFA.

The BDO is housed in its own building (undergoing reconstruction) and generally enjoys infrastructure at a developed country level. It has a Director, 4 permanent professional staff, 1 professional staff on contract, 2 research assistants and 2 support staff. All staff seem very well educated and highly committed to carry out their core activities. Nevertheless, they are not formally educated in the specialized aspects of their fields and not as well trained in these aspects as would be their colleagues in most developed country universities. For example, no one has a Master's degree in Research Management, which would be quite common in developed country universities in an office like this. In fact, the better universities would often have people on staff qualified at a PhD level in appropriate fields.

4.1 RM and BD Activities at the UWI St. Augustine Campus

In the course of the consulting project, we found both a lack of academic literature on defining and organizing these concepts, and professional management overview of what was occurring at the UWI. Therefore, we focussed on organizing the activities of BD and RM into a single framework. Table 1 summarizes this thinking. It lists the various types of products or services the university has to sell to customers or exchange with stakeholders. Within each category, we list the different types of products noticed and then the different type of customer or stakeholder for each product. The remaining 2 columns on the right portray the involvement we noted by the BDO and the UWI.

This table should not be viewed as a complete representation of the situation of BD and RM at the UWI, given the short time period for gathering data and the fact that this seems to have been the first attempt to do so for the full range of activities and institutions involved. For example, in the first row, only 1 instance is noted where a facility was named for a donor – and in this case the organization became an independent body outside the UWI control. From this knowledge, we would conclude the university has hardly begun to address this issue, but it probabl a more thorough search would note a few more instances. However, much more work would still be required to create a strong evaluation, for example by comparison against a peer institution. In leading business schools, practically every lecture room can have a corporate plaque on it, and the sale of the name of the school usually nets many millions of dollars. Against this kind of benchmark, it would seem likely that the UWI, even if more instances are to be found, will still be barely scratching the surface on this particular practice.

While the picture overall of the UWI is rather limited engagement, it does not mean there is no or only limited potential for more; in fact, there is enormous potential that could be quickly harnessed in many areas that would generate huge sustained benefits for the university and Trinidad and Tobago. One example worth mentioning relates to the "Caribbean Anthurium Knowledge Industry". An informal brochure with this title indicates a clear desire to use advanced scientific knowledge directly for industrial development, as well as an awareness of the major components that would take action on this desire. There is a focus on the industry, its needs, the role of knowledge, the ways of producing innovation, the function of stakeholder involvement, discussion of mechanisms to innovate and create new firms, market the knowledge and handle profits. While this is a nascent initiative, it demonstrates the opportunities exist and that there are faculty who want very much to develop them. Making this happen is not a trivial task, but not impossible.

5. Conclusions

Both BM and RM are critically important activities for the UWI and for any other university. They need to be examined in much greater detail and practiced much more professionaly.

While there are significant overlaps, BM and RM are not identical. When they are displayed together in the form of Table 1, it does show that universities have many "non-traditional" products and services of great value they can use to sell to customers and engage stakeholders. Creating and managing these individual products needs to be done in a devolved manner using specialized organizations within the university. Most universities do have these specialized organizations, but what many do not have, like the UWI, is a coherent and complete management oversight. While executing RM and BD should be done by specialist organizations, some repeated in multiple structures in each faculty, the RM/BD function is something that should be done by a single office at the overall university level. Its purview should cover all the activities listed in Table 1 from the point of

view of streamlining and maximizing the benefits the university can obtain from its unique products and services.

The table developed during this study is extremely useful for management practice relating to BD and RM in universities. It lays out a complete set of important activities that are not usually though of as related – let alone thought of as part of necessary management practice in universities. Once the columns on Involvement have been filled out completely, critically and honestly, the data can be compared against better and best practice situations - benchmarked, with numerical indicators. Then it can be used in a strategic analysis. There are no simple recipes involved in this kind of analysis – where a university can and should go depend entirely on its unique situation. One immediate strategic application would be to use this table and the data to rank activities in terms of cost and benefit ratios, which would immediately help focus efforts on the highest payoff areas.

We also feel this table is important for management researchers. We suggest it be examined critically and extended in light of theoretical literature from other management domains. We encourage management scholars to turn their attention to management issues at universities, where both professional practice and research knowledge is very weak, considering the immense importance, scale and complexity of these institutions.

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O-002 Patterns of the Innovation Ecosystems in Finland

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This article introduces the statistical characteristics of the regional innovation ecosystems in Finland. The innovation ecosystems are strongly formed by the history of local milieu as well as regeneration ability and structure of regional economy. Herein we build a ty-pology which characterizes the different phases of Finnish sub-regions as innovation eco-systems. The concept of Triple Helix forms the core of the analysis. Thus, we focus on characteristics of enterprise sector, higher education institutes and public sector actors and their co-operation. The analysis combines both input and output factors of innovation systems. The analysis builds a model of the regions' ability to be renewed and developed in terms of education, research and development, entrepreneurship and local governance along with variable challenges. This ability to regeneration is even more than before the key element of sustainable innovation systems in future.

Triple Helix VIII Conference Madrid, October 2010

ST-15

The Critical Constructivism of the Actor-Network Theory and the Knowledgebased economy of the Triple Helix: theoretical possibilities and practical implications

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Introduction (objective)

This work aims to investigate the adherence between the critical constructivism represented by Actor-Network Theory (ANT) and the Knowledge-based economy represented by Triple Helix Theory (TH).

State of the art and research focus

Historically, the social constructivism revealed itself an important source of contraposition, especially in 1970 decade, against the predominant bureaucracy and Marxism. However, many uses of the concept markedly simplify the process of reality social construction (Hacking, 1999). A serious limit is that social constructivism (as well as other approaches predominantly subjective) considers that the constructed reality only exists separated from the material questions (Peci and Alcadipani, 2006). In this way, Science and Technology Studies (STS) researchers strengthened the critical constructivism. They discuss that modernity have separated scientific activity from any other one, introducing dichotomies between, for example, scientific and not-scientific thought and between society and nature (Latour, 2001, Latour, 2005). Through a series of empirical studies, Latour (2001) have evidenced that nothing in the common definition of society could explain the connection between, for example, a politician that defends public investments in a new war weapon and the limits of chemistry and physics that need to be surpassed in order to make the new weapon become possible. Through the translation, the possibility of two different interests combined in just one objective is considered. According with Latour (2001), to consider the first ambition as "purely politics" and the second only as "purely scientific" is nonsense, because it is exactly the "impurity" that will allow the success of the two objectives. This implies in changing the reference from "social" to "collective". "Collective" refers to the associations between human and non-human actors. The ANT converts the dissociation between "objective" and "subjective" into one single circulating entity. Therefore the process of collective construction is not only social. Everything is constructed in this way, including the facts. For this, the mobilization of a diversity of heterogeneous elements and the association of them around common objectives are necessary.

An essential characteristic of the Knowledge-based view is the idea that, currently, the technological and socio-economic developments are related with the capacity of countries in appropriating and using the knowledge in a productive and efficient way. On this context, the TH is presented as important practical actions referential because it approaches and relates the roles of the main spheres that generate, consume and regulate the knowledge: university, industries and governments (Etzkowitz and Leydesdorff, 1996). These roles are not circumscribed anymore, but begin to assume a hybrid and dynamic characteristic, contingent to the social and economic collective necessities. An Example are the university research groups that assume a "quasi-firms" characteristic, when they absorb enterprise qualities that allow them to explore entrepreneur activities, integrating research and businesses under an ampler University institutional mission that is contributing for the economic development, beyond solely research and education (Etzkowitz, 2003). The TH approach recognize the elements and situations heterogeneity, which are difficult to be completely foreseen, but need to interact in order to promote collective action as, for example, the "Enterprising University". The success or the failure depends on the adaptation and improbable configurations creation capacities.

Findings, contributions and implications

It is possible to perceive that both approaches (ANT and TH) possess some interesting contact areas. The first one, and perhaps the most outstanding, is related with the fact of both of them suggest a focus on the process. In other words, they discuss about action: the movement in which the performativities acquire certain stability and perennial by the mobilization of a series of hybrid intermediations. The other points of contact are not very clear yet. It can be questioned, for example, which is the role of the non-humans in the context of the TH theory: can the idea that a non-human is able of acting offers some advance in relation to the TH current theoretical landmark? Or it can also be questioned if the information technologies and communication advances limits the TH as a regionalized police, because the territorial borders tend to exert each time less importance in the future collective configuration. In a general way, we assume that the ANT referential can suggest important reflections that certainly could contribute for a differentiated conception of the TH that equalize the centralized trends, or for answering questions involving structural/material and voluntarie/subjective actions. Possibly, this contribution can lead to a higher effectiveness of the TH as a strategical practice of technological and socio-economic developments, in a context where the borders permeability, ambient pressure and technological advances are central in the scientific debate.

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0-020

What are the factors driving the Academy-Industry linkages: an analysis from the researcher's perspective in México

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Introduction

Interest in academy-industry links has been object of a vast amount of research (Cohen, Nelson and Walsh, 2002; Laursen and Salter, 2004; D'Este and Patel 2007; Segarra-Blasco and Arauzo-Carod, 2008; Tether and Tajar, 2008). Worldwide, and also in developing countries, innovation policy has recently focused on fostering academy-industry interactions, however, it has hardly recognised that academy and firms interact for different reasons (Hanel and St-Pierre, 2006). Differences between both perspectives are important to understand the evolution of academy-industry interactions and promote specific policies to strengthen such interactions.

This paper aims to contribute to a better understanding of the drivers of collaboration between firms and Higher Educational Institutes (HEI) and Public Research Centers (PRC) from the perspective of the researchers in the context of a developing country (México). Determinants will be sought in terms of the individual characteristics of researchers and those of the institutions and groups to which researchers are affiliated. The set of individual factors includes previous experience, academic status and research fields (Bercovitz and Feldman, 2003), Institutional and research groups (community) characteristics include institutional affiliation (Boardman and Ponomariov, 2009), department characteristics (Schartinger et al, 2001), access to different sources of funding for research and type and quality of research (Mansfield and Lee, 1996). We also look for the impacts that benefits obtained by researchers through interactions with firms might have on the likelihood of engagement in AIL (Meyer-Krahmer and Schmoch, 1998).

Methodology

This paper is based on a survey applied in 2009 to 461 researchers working at about 115 different Mexican HEI and PRC. The questionnaire collected data on the individual and research group's characteristics. Data of the benefits researchers have got from collaborative projects with firms were also obtained.

We will use logistic regression models to identify the main factors influencing the propensity of researchers to establish linkages with enterprises. The empirical analysis will test the following hypothesis

Hypothesis

Individual Characteristics

H1 Researcher s propensity to link with firms will be different according to the type of research they perform. H2 The propensity of researchers to establish linkages with HEI/PRC increases when they belong to a group. H3 The higher the ISI publications the lowest the linkages

Research Group Characteristics

H4 The larger the size of the research group the higher the probability to establish linkages with firms

H5 The older the research group the higher the probability to link with HEI/PRC

- H6 The higher the academic level of the group, the higher the likely of linkages with firms.
- Benefits

H7 The higher the intellectual benefits researchers perceive coming from the linkages with firms, the higher will be their propensity to establish linkages with HEI/PRC.

Findings

Preliminary results show that propensity to establish linkages with firms seems to be different according to the type of research performed by scholars: while 23.6 % of the academics oriented to basic research have interacted with firms, 68.3% of those focused on applied research and 85.7% of the researchers committed to technology development have established linkages with firms. The affiliation to a group seems to be also an important driver of AIL: about 44% of the researchers belonging to a group have established linkages with firms while only 16% of those not affiliated to a group have had had some kind of AIL.

Larger groups tend to interact more with firms that smaller ones: while 89.3% of the researchers within groups with more than 30 participants said they have interacted with firms; only 49% of researchers from small groups (0-10 researchers) have had AIL. Older groups tend to interact more than younger ones: 89% of the researchers belonging to groups between 21 and 30 years old have had interactions with firms over the last three years; only 67% of the researchers within groups not more that 20 years old have interacted.

Incentives for establishing linkages with firms seem to have a significant impact in the researcher's behavior. We found that the average importance for economic benefits was 0.56 vs 0.69 of intellectual benefits (lickert standardized scale).

Findings will help us to expand our knowledge about the likely impact of policy programs directed to encourage researchers to engage in linkages with firms.

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Conference

Madrid, October 2010

ST-08

"High-Tech industries and knowledge-intensive services: why these activities are the core business for São Paulo competitiveness?"

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Industrial restructuring during the last 30 years demands a new way of looking at how goods and services are produced. The aim of this paper is to analyze the industrial structure of Sao Paulo's economy focusing on knowledge and technology and argue that specific sectors are especially important for the future of this city in a knowledge age.

Knowledge creation and diffusion, technology change and innovation processes are essential factors for the competitiveness of firms, regions, and countries also in order to achieve a long-term growth. Knowledge-based or high-tech sectors are the core businesses for industrial restructuring in developed countries; they provide the inputs for modernizing production chains, are carriers and diffusers of knowledge, as well as central nodes in innovation systems.

Debates on the industrial structure change after the 80's and 90's in Brazil show the need to consider knowledge, technology and innovation in the analysis of local development processes as well as to highlight which sectors can lead to a more competitive city in the knowledge era.

In order to understand the changes in Sao Paulo's production system, it is necessary to consider them as part of a broader process in the global economy that involves: (i) the new international division of labor; and (ii) the prominence of knowledge, learning and innovation in successful long-term economic growth processes. In the first case, manufacturing firms outsource less intensive activities and concentrate their efforts on their core business, especially in the richest cities of the developed world, opening up opportunities for other regions and countries. Regarding the second one, knowledge flows and the co-production of new ideas through networks (among firms, universities and public agencies) and learning processes feed innovation and are central for competitiveness (Boden e Miles, 2000; Lundvall, 1996; Torres-Freire, 2006).

In this new context new activities are created and others become more important. Independent of being manufacturing or service activities, the literature suggests that they are focused in producing value-added goods, employ more skilled workforce and pay better salaries. Examples are the so called knowledge-intensive business services (KIBS) - such as software, computing systems, telecommunications, engineering, marketing, research, financial activities, media, education and health - or microelectronics, industrial automation, optic and medical equipments and biotechnology.

The industrial structure in Sao Paulo city is highly diversified and, according to the new needs for a more knowledge and technology intensive production, new sectors have been developed in recent years - the Information Technology sector, for example. In this paper we analyze the characteristics of these knowledge and technology intensive activities in order to show their importance to Sao Paulo's economic future.

Rather than simply arguing that Sao Paulo has experienced a deindustrialization - or the opposite, meaning that manufacturing is still the engine of the city's economy -, we argue that it is more important to analyze the manufacturing that remain in the city after the industrial restructuring. In the same way, instead of feeding a weak analytical argument which claims Sao Paulo as a "services metropolis", it is more important to understand which service activities have been created or strengthened in past decades. In this context, it is also necessary to consider how the universities, research centers and R&D labs in Sao Paulo - some of them, the most important in Brazil - relate to the new industrial structure.

There are no clear analyses about the share of knowledge and technology activities in Sao Paulo or about the concentration of these activities in the city. This paper tackles these problems highlighting both the characteristics (firms, employment, income, workforce skills and salaries) of these activities and their spatial distribution in the city. In order to do this, we use a classification of economic activities that considers different levels of technology and knowledge, based on categories previously used by the Organization for Economic Co-operation and Development (level of technology in manufacturing sectors) and Eurostat (knowledge intensity in services).

Analyzing the industrial structure with a classification based on the level of technology and knowledge is useful when dealing with the question of competitiveness because it highlights the opposition between more knowledge and technology intensive activities versus less intensive ones. Hence, we go beyond the simplistic opposition between manufacturing and services and put on the agenda the relevance of knowledge and technology for social and economic development, especially in developing countries' cities in a knowledge era.

Questions guiding this paper:

(i) What is the importance of knowledge and technology intensive activities in Sao Paulo?

- (ii) What is the share of these activities in terms of employment generation, income, and salaries?
- (iii) How skilled is the workforce in these sectors?

(iv) How does the spatial distribution of these activities look like in São Paulo and how concentrated are they?

The paper is structured as follows:

Introduction: briefly presents the debate on knowledge and technology intensive activities and the main research questions.
 Methodology: explains the classification based on the level of technology and knowledge.

3) Analysis: applies the classification to a data base of firms and employment, through tables and thematic maps shows research findings about the importance of these sectors for the city and their geographical concentration.

4) Conclusions.

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P-049 **Co-evolution in rural Uganda** -trying transformation based on gender research in technoscience

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This paper concerns processes of co-evolution in the development of an e-learning project in Arua district in the North Western part of Uganda in the West Nile region. It is a particular challenge to practice a multi stakeholder process in Arua as Arua is a remote, insecure and one of the poorest rural districts of Uganda. The main target group for the e-learning project were two advanced level secondary schools, more precisely Ordinary-level girls secondary schools.

The gender aspects in this paper refer to an epistemological foundation in technoscientific gender research as well as in an explicit ambition to develop necessary learning tools at secondary girls schools in order for young women in rural areas to become qualified applicants to university studies.

The main part of the R&D work in this project was based on the methodologies characterising distributed knowledge processes (Gibbons et al. 1994, Nowotny et al. 2001). The research was anchored in technoscientific gender research (Trojer 2006) with connections to the tradition of action research methodologies.

Situated knowledge production was a key concept as well as a practice. It refers to the acknowledgement of an empirical inside perspective. You have to be inside what is being developed concretely on the ground in order to be able to understand some of the complex web of processes going on. Research must focus on the context of production as well as context of implication (Nowotny et al., 2001, 2003). Or as Donna Haraway (1997) notices "Technology is not neutral. We're inside what we make, and it's inside us. We're living in a world of connections - and it matters which one get made and unmade." Gulbrandsen (2004) emphasizes the character of research as reality producing / world producing.

The project was strongly dependent on an implemented practice of a triple helix cooperation. A number of important questions about new challenges arose, when participating in such an open system for knowledge production and development of activities (Nowotny et al. 2001, 2003). Perhaps the main challenge was realising that we were taking part in non-linear processes. Development occured through co-evolution yielding specific results within the different actors' respective areas of activity. Coevolution entails stronger requirements for change in the respective organisations / sectors. We also noticed that what we were doing comprised an integration of knowledge production and policy production. Or to put it another way - research and policy are connected.

10 Innovation entails production of uncertainty and complexity, renewal and change, and is often presented as worth striving for in Government policy. Reijo Miettinen's (2002) discussion of the new models of cooperation between academia, industry and government can be seen as opportunities for collaboration, where the parties' legitimacy, trust and "social capital" must continuously be recreated. This partnership can thus come to play a central role in the development of socially robust knowledge and technology.

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The e-learning project was positioned in an open system for knowledge and technology production. The triple helix model was practiced in Arua, where one of the three cooperating partners was the university. In developing, as well as in developed countries, initiatives for introducing e-learning education most likely come from universities. There you have the skills from higher education including pedagogic skills and the technical knowledge and know how.

Even in a low income country like Uganda the university has resources, which not the other triple helix stakeholders might have to the same extent, namely to: take initiatives; network on vital levels; negotiate with authorities, donors, etc; offer facilities; develop knowledge and technologies needed; develop and offer training; long term engagement; and keep the functional practices and cultures, which have been developed.

What were the success factors? One of them was the frame of understanding in the triple helix model, which was translated into practical work in Arua district. The internal university process, more precisely among the participating researchers and teachers from Faculty of Technology, was characterized by moving from strict disciplinary research to interdisciplinary research and further on to transdisciplinary research and development. With transdisciplinarity is meant knowledge production in the context of application and implication.

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0-063

The Evolving Triple Helix Environment: a Case Study from the UAE Subtheme: Triple Helix in developing countries

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Keywords: Community engagement, Developing Countries, Triple Helix, United Arab Emirates

Introduction

In the history of academic revolutions the roles and missions of universities have expanded from an emphasis on teaching, to a shared emphasis of teaching with research and finally to the current mission of many universities around the world which includes an additional interest in social and economic development (Etzkowitz, 2003). Although the history of universities, research and extension activities in the developing world is a much more recent phenomenon, there have been developments that warrant the attention of researchers.

Although little has been written on higher education and the development of formal relationships among universities, government and industry in the Gulf region, this evolution has not escaped these countries. These countries are expanding their emphasis on the postsecondary education of its young people to better compete in the global knowledge economy.

In addition to this, the United Arab Emirates has increased its focus on the "third mission" of universities through the development of focused centres of community engagement and outreach. This article will present an exploratory investigation into the current development of the Triple Helix (TH) environment in this country, with the presentation of a case study of I.C.E., the centre for community engagement at Zayed University. As much as Zayed University in the United Arab Emirates (UAE) has had contracts with both government and business over the last few years, these were largely a result of individual Faculty initiatives. Now, with the move towards a centralised entity and a formalised structure for TH exchanges there are many lessons to be learned from a path newly started. What is the process and how is it changing, what are the challenges, what is the value that participating actors are looking for and what does the future of the TH in the UAE look like?

State of the art

The TH concept has often been used to describe the evolving environment and roles of universities and researchers. Etzkowitz (2003) suggests that there is a triple-helix of university, industry and government interactions that is increasingly responsible for innovation. A triple helix will form when there are formal reciprocal relationships that develop between the three spheres. These relationships are formed to capture synergies that will enhance the performances of all three.

Aside from the United States, (Phan and Seigel, 2006) these new formal relationships have been encouraged and established around the world. Attention has also been accorded to these activities and the changing roles of universities in developing economies (Hershberg et al., 2007) such as Thailand (Brimble and Doner, 2007) and China (Eun at al., 2007), although Triple Helix is still viewed as a new concept (Irawati, 2006). Furthermore, in the developing world universities are seen less as a source for technology and new knowledge to be transferred to industry, but as a source of regional economic development (Saad et al., 2008) but there is the challenge of developing appropriate mechanisms and interfaces for this development to be fostered. Research focus

The focus of this research is on the evolving role of the Institute for Community Engagement at Zayed University in the UAE. The university has marketed community outreach for about 7 of its 11 year life, mostly utilizing business faculty, but this was the extent of community services and community engagement.

Methodology

A case study method will be used in this research project. Case studies are appropriate when current perspectives in a domain appear to be inadequate in accurately describing and explaining phenomena (Eisenhardt, 1989). They are used for how and why research questions and are used in and for contextual conditions (Yin, 2003). In fact Yin (2003) explains that there are five different applications of case study research: explain, describe, illustrate, explore and meta-evaluation. The current case study will explain, describe and explore the evolving environment of the TH in the UAE.

Contributions

The contributions of this paper will be both theoretical and practical in nature. The results of this case study will aid in theory development in the TH literature and it will provide policy makers in the UAE and universities a better understanding of the processes involved in community engagement.

Implications

As one of the first articles to be presented concerning the TH environment in the UAE there are many implications to this project. First, the concept of TH will be introduced into the dialogue of university-industry-government dialogue in this young and oil rich country. Second, a window will be opened into the Gulf region as a whole with an exploration of how these relationships evolve.

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Triple Helix VII) Conference Madrid, October 2010

O-046 Public policies for regional innovation: the case of Lombardy

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The role of government institutions in developing and improving the innovation capabilities and the international competitiveness of a national economic system is largely acknowledged in the scientific literature (see e.g. Acs et al., 2002; Etzkowitz, 2000, 2003). Moreover, literature highlights the critical role of the local dimension and factors for the success of firms (Porter, 1998; Cooke et al., 1997).

Beyond the national dimension, the regional level is receiving a rising attention, due to the fact that, on one side, innovations tend to be concentrated in localized production systems (clusters) and, on the other side, they tend to be specialised according to the features of the local systems. The regional level provides an optimal framework of reference for analysing the linkages between the Triple Helix actors and, given its collocation between global and local, represents a very interesting perspective for analysing how government institutions may successfully promote technology transfer and innovation.

The purpose of this paper is to analyse an exercise recently carried out in Lombardy, and to highlight the pioneering approach adopted by the regional government in order to foster the cooperation between universities, research centres and firms, by making a pro-active and innovative use of public procurement.

Data and results

In 2004 the Regional Government of Lombardy completed a Foresight Study, the RISE (Research, Innovation and Economic Development) Project, for selecting the most relevant emerging technologies for the long term economic and industrial growth of the industry (see Roveda et al., 2007). These technologies fell in three basic areas: ICT, Biotechnologies, Advanced Materials. In this way the Regional Government aimed at improving the regional capacity of developing advanced technologies.

In 2005 the A3T Project (Analysis of Application Areas and Technologies) was launched. The rationale for this new exercise was the selection of application fields in which research and innovation projects could be designed in order to improve the quality and the performance of the services provided to citizens and firms and, in the same time, to strengthen the international competitiveness of the regional industry.

The implementation of the A3T project required, in the first place, the consultation of experts in the fields of ICT, Biotechnologies and Advanced Materials: the analysis that had been previously carried out in the RISE exercise was deepened and updated, looking for upcoming opportunities and potential applications of innovative services and products based on the emerging technologies. After that, experts from many social and economic disciplines were interviewed regarding the proposed applications, evaluating them in terms of attractiveness through a large set of indicators, and finally selecting the most relevant ones. Based on the results of this prospective investigation, some pilot projects were finally launched. What is worth noting, is that the calls were published not just in terms of technical requirements for the innovative applications to be provided, but most of all in terms of the capabilities needed by any industrial and scientific players; that is, firms and research centres were spurred not just to develop new products, bust most of all new competences. In this way the Regional Government played a very active role, since it did not limit to promoting the cooperation between public research centres and industrial firms on generic themes through a simple financial support, as in the case of technology voucher, but it selected the specific research and innovation projects to be carried out.

On this regard, the methodological approach of the A3T project was characterised by the continuous involvement and interactions between the main stakeholders: from regional government, as policy makers and representatives of the demand and the needs of local citizens; from universities and research centres, as providers of scientific and technological knowledge; from leading firms, as providers of manufacturing capabilities. The purpose of the paper is to describe the pro-active role and the ways (mainly the organizational processes) by means of which the regional government fostered and steered the linkages among the other axes of the Triple Helix.

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O-101 HOW MUCH THE ROLE OF THE OTHER? UNIVERSITIES AS POLICY-MAKERS IN THE ENTERPRISE INNOVATION ARENA

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Introduction

The triple helix model considers the university-industry-government relationships as one of relatively equal and interdependent institutional spheres, which can overlap and take the roles of the others (e.g. Etzkowitz 2008 and 2002). In this research, we illustrate the case of universities taking the role of governments in the area of enterprise innovation. We argue that universities should play the role of implementing policies and use discretion to some extent according to the programmes' scope of action, which was contractually agreed with the policy administrators. However, in 5 of the 6 case studies of this research we found excessive discretion and the consequent change of the role of the university personnel from policy-implementers to policy-makers. Importantly, our assessment of the public interventions was very negative, which highlights the relevance of the research. We explain the reasons for the excessive discretion.

State of the Art about the Topic

To my knowledge, there is no research about universities taking the role of governments. In contrast, in the areas of public administration and political sciences, there is a long-standing debate between two positions regarding discretion and the effect of this on policy-making. Firstly, we have the view from those who argue that discretion exists at street-level (e.g. Lipsky 1980, Lindblom and Woodhouse 1993, Ellis et al. 1999, and Maynard-Moody and Musheno 2003). In this situation, policies tend to be made as much from the street-level by policy implementers, as from the heads of policy agencies. The second position regarding discretion is from those who propose that there has been a shift in power in favour of policy-makers as result of improved and effective policies and procedures (e.g. Howe 1991, Clarke and Newman 1997 and Langan 2000).

Research Focus and Methodology

We developed 6 case studies of public programme assistance to e-business innovation initiatives in small and medium enterprises (SMEs), in order to uncover and illustrate the existence of discretion at programme level. After that, we analysed the context of the cases in terms of the complex procedures and behaviours in the policy process, which are determinant for the practice of discretion at street level. The policy process includes policy-making (European Union Directorates-General and a regional partnership), policy administration (the Regional Development Agency and a University Association), and programme implementation (specialised units within a University).

Findings

Policy-makers are pressured to show the delivery of a high quantity of services but being very efficient in the use of resources, which diverted the auditing and control indicators and procedures to address these political imperatives, and not the quality and targeting of the services. In addition, the policy administrators that performed the auditing and control activities are mere contract managers, who do not know about technology and business. What is more, their organisations took relevant roles in designing the public policies or had connection to the organisations that delivered the programmes, which creates a conflict of interests. Another relevant finding is that policy-makers used extensive and ambiguous policies, probably as a strategy to distance themselves from the consequences of the particular and complicated decisions to balance the demand of services, SME needs and programme resources. Accordingly, if we take into account that programme managers could write broad proposals in order to access public funds, the breadth of the policy definitions can be exploited by them to formalise the discretion of their consultants in each intervention. The data also shows that there is the risk that programme workers and auditors could misinterpret the numerous and vague phrases of the policies, which probably allowed public interventions to stray even from broad policy statements.

Contributions and Implications

This research uncovered the duality of roles at street-level in the enterprise innovation policy arena. Although discretion is necessary, we consider excessive the discretion exerted by the University personnel in the case studies. Policy implementers took the role of policy makers as a result of political interests at the highest levels of government, inappropriate evaluation mechanisms, lack of knowledge and intriguing collaboration of the policy administrators, as well as broad and ambiguous policies. These findings represent relevant and novel contributions for the triple helix model. In general, the issue of discretion was not researched before in the context of innovation policy. The origin of discretion seems to be rooted in the political decisions taken at the highest levels of government. For this reason, we recommend to study policy-making for SME innovation using the political economy framework. In addition, given the deficient support and excessive discretion in programmes, we conclude highlighting the need to research the entire context that direct programme workers towards objectives that are far from society goals (e.g. power over SMEs, demand for programme services, worker alienation, etc.).

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O-090 PUBLIC PROGRAMME CONTEXTS AND THEIR INFLUENCE ON ENTERPRISE INNOVATION: THE CASE OF UNIVERSITY OUTREACH ACTIVITIES

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Introduction

The assistance to enterprise innovation is a priority in the agenda of many governments. However, some studies have questioned this type of government support (e.g. Martin and Matlay 2001 and Mole 2002). One typical way to materialise this assistance is via public-funded programmes implemented by universities (specialised units), which should interact with other programmes and private providers in order to fulfil all the needs of enterprises. This research found serious problems in 6 public programme interventions that assisted small and medium enterprises (SMEs) in their e-business innovation activities, which is drastically different than the results of the formal auditing and evaluations carried out by the policy administrators (the Regional Development Agency and a University Association). The aim of the research is to illustrate the e-business innovation processes of the SMEs and the public assistance that they received, as well as to explain the influence of the programme contexts on the outreach activities of universities in terms of worker goals and organisational performance.

State of the Art about the Topic

Two core concepts used in this work are the innovation process (a series of stages that enterprises pass through in order to innovate: agenda-setting, matching, redefining, restructuring, clarifying, routinizing and infusion) and the assistance process (a series of stages that public programmes pass through in order to assist enterprise innovation: selection, design, delivery, connection and follow-up). The innovation process is part of the diffusion of innovations (DOI) theory of Rogers (2003) and the assistance process is our invention. We also used the street-level bureaucracy (SLB) theory of Lipsky (1980) to help to understand the programme contexts in which public services are implemented. In the most part, the research based on the DOI has focused on determining covariance and correlations amongst variables, and not on understanding the time order of events and the rational of human behaviour in innovation processes (e.g. Fichman 2004 and Jeyaraj et al. 2006). With regard to the SLB, Johnson (2005) pointed out that the SLB has not been used explicitly in the study of SME policies. To my knowledge, it is the first time that the DOI and the SLB are combined to study the interactive phenomena of enterprise innovation and public assistance.

Research Focus and Methodology

We developed 6 case studies in order to illustrate the e-business innovation processes of the SMEs, the public assistance that they received by the University as well as the context that influenced the decisions and actions of programme workers. After that, we used an inductive approach with the data of all the cases, in order to formulate more concrete models that explain SME innovation processes, SME needs, programme contexts, programme worker goals, programme organisation performance and other relevant issues.

Findings

After the analysis, we defined a classification of 5 types of innovation contexts (simple, low-complexity, medium-complexity, complex and high-complexity), which explains the extent that innovation processes are under the control of SMEs as well as the external support that could be required. In addition, we designed a classification of 4 types of programme contexts (chaotic, misleading, optimum and unsustainable), which explains the choice of goals of programme workers (programme, social or SME goals) during the assistance processes as well as the potential performance of programmes in terms of the quality of their services and outputs. After this, we use both, the innovation context and programme context classifications to illustrate in detail the potential behaviour of programme workers at each stage of the assistance processes.

Contributions and Implications

This research gives relevant theoretical contributions to the triple helix innovation model. We developed the assistance process concept, the classification of innovation contexts, the classification of programme contexts as well as the model to explain programme worker behaviour in the assistance processes. In addition, we demonstrated why the most negative and undesired type of programme context, i.e. chaotic, is probably the most common context in which programme workers operate. Finally, we reflect on the limited capabilities that programme organisation managers and universities have in order to correct and develop contexts that improve and direct programme activities towards social goals. This responsibility relies more on policy-makers at different levels of government (i.e. European Union Directorates-General, central government Departments and regional partnerships). We recommend a more systemic and institutional analytical approach to understand and intervene programme contexts.

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O-075

The effectiveness of university-industry relations: The importance of regional absorptive capacity

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There is a widely held belief that the role of universities as regional development agents revolves around a closer relationship with the industry, mainly based on the transfer of academic research outputs. This idea has been supported by a large body of economic research that highlights the benefits of the so-called "science-industry relationship," and describes university research as one of the engines of industrial innovation (Henderson et al., 1998; Kaufmann and Tödtling, 2001). Additionally, it has been also pointed out that the interaction with the industry provides lecturers with access to important financial resources and relevant knowledge, both of which can impact positively on their scientific performance (Breschi et al 2007; Gulbrandsen and Smeby, 2005). In other words, all these studies come to justify the interweaving of universities in the economy and point out that University-Industry relations (UIR) not only have a positive effect on firm's performance, but also on the development of academic research.

In this context it is not surprising that the promotion of university-industry relations has become a major element within both the innovation policies and the strategic plans of the universities. However, it is worth noting that many if not most of the studies that support the positive effect of UIR, although valuable, are hindered by a focus on a limited number of technologically developed environments and intensive knowledge industries (Laursen and Salter, 2004). In this line, it might be advisable to wonder whether the positive effects induced by a closer relationship between university and industry are also manifest in a technology follower region or in a region with a low absorptive capacity. This issue becomes more relevant taking into account the growing importance of regions in the design of innovation policies and considering that the region is also the main setting in which universities must define their role as development hubs.

This paper aims to analyse the effectiveness of UIR in a Spanish region with a low absorptive capacity: The Valencian Community. In this region, total expenditure on R&D as a proportion of regional GDP is lower than the Spanish average, and the productive sector is characterized by a concentration of traditional low-technology sectors and medium and small enterprises with low R&D expenditure. As regards human capital, the percentage of the region's population with higher education is two points lower than the national average; the difference doubles if we consider this group as a percentage of the employed or active population (Azagra et al., 2006).

In order to examine in detail the effectiveness of UIR, the analysis is carried out considering both the effects of UIR on firm's innovative performance and their effects on lecturers' scientific production. To do this, we have designed two data sets. The first one is comprised of more than 600 innovating firms located in the Valencian Community, which have answered two waves of the Spanish Innovation Survey (2003 and 2005). Using this data, we examine the impact of cooperation with university during the period 2001-2003 on subsequent firm's innovation output in 2003-2005. The analysis also controls for the potential impact of other innovation activities, as well as for the effects of different firm's characteristics.

The second data set contains information of more than two thousand faculty members from two more important universities of the Valencian Community, who have conducted research projects and/or have been involved in formal UIR activities during 1999-2004. Using this data, we analyse the effect of UIR activities carried out by lecturers with firms located in the region on their scientific production (measured as the number of articles published in journals indexed in the Thomson ISI database during 2003-2004).

The results of the firm level analysis reveal that cooperation with universities has no significant effect on product and process innovation. Additionally, the results of the lecturer level analysis indicate that the linkages with regional firms do not impact positively on lecturer's scientific productivity. In contrast, when the relations are established with foreign firms, the lecturer's scientific productivity is favoured. These results come to suggest that in regions with a low absorptive capacity, UIR would hardly result in a virtuous circle, such as it has been recognized in other contexts, based on the improvement of firm's innovative performance as well as the improvement of lecturer's scientific production.

The above results have important implications. On the one hand, they show that in regions with a low absorptive capacity, the universities rarely act as direct source of knowledge for the firm's innovative activities; therefore, in these regions, the promotion of UIR based on the transfer of academic research outputs does not seem the most appropriate innovation strategy. On the other hand, the results indicate that in this kind of regions, the linking with the industry - although is a major source of funding for university - can inhibit the development of university research, which can involve considerable costs in terms of production and diffusion of knowledge.

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Triple Helix VI) Conference Madrid, October 2010

O-076 Technology Transfer in a Public Brazilian University

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Brazil is responsible for 2,63% of the world scientific knowledge, however in spite of the brazilian scientific production to be growing and of quality, the knowledge transformation in applied technology to the industrial sectors is very low (MCT 2009). One of those indicators can be seen by the patent applications in the USA. In 2008, Brazil deposited 499 patent applications in USPTO, superior Number to Latin American countries like Argentina (139), Chile (63) and Mexico (269), but inferior China (5.148), India (2.869) and a little below Russia (531). (USPTO 2009)

Besides the fact presented above, it is verified that in Brazil the universities and research institutes have been increasing their participation in the total number of patent applications in the country (Nunes & Goulart 2007), could come to enlarge their role as collaborator in the development of new technologies and incremental innovations, presented like this great importance for the productive section in the search of innovations. Among the several forms of technology transfer resulting of the academic research, it can highlight the licensing of patent / patent applications and the creation of new companies – start-ups.

In Brazil, the practice of the formal technology transfer between universities and Brazilian companies is recent. This relationship intensified with the creation of legal instruments, as the Law n.º 10.973/04, denominated Innovation Law, that has an objective promotes the innovation through the technology transfer between Technological/Scientific Institutions and Companies. This legal instrument forced Technological/Scientific Institutions to create their nucleus of technological innovation(NIT) to manage their innovation politics.

Besides this Law, it's important to mention the occurrence of other instruments as the Law n.º 11.196/05, denominated Good Law, that motivates the masters and doctors recruiting, as well as it grants fiscal incentives for the companies that accomplish cooperation with technological/Scientific institutions and new financing lines to the technological research made available by the Research Foundations Support.

In this context, it is emphasized the University of São Paulo (USP), that now is the largest Brazilian university with close by 5.638 professor and 87.182 students, responsible for approximately 35% of the Brazilian scientific production indexed in Institute Scientific Information (ISI) in 2006. (USP 2009). In order to manage her innovation politics, it was created the Innovation USP Agency in 2005, linked to the Rectory of the University of São Paulo that is promoting processes of improvement of the protection and technology transfer of the results from the researches reached by the university.

This way, it becomes relevant to verify the process of technology transfer realized by the Technological/Scientific Institutions and the reached results. Thus, the objective of the present article is to analyze the difficulties and results of four licensing processes (two are exclusive license agreements and two are non exclusive) realized by the University of São Paulo.

So, it was delineated a study of descriptive character and qualitative approach, using as research strategy the case study. For data collection, it was realized some interviews and participant observation.

It was observed that in the case of non exclusive license of patent applications, the process is less bureaucratic and it allows the direct negotiation with the company, minimizing possible conflicts and take less time. It is verified that this model is indicated by the literature (Nelson, 2004), as well as being more appropriate in many cases for treating of knowledge originated in public institutions, with different degrees of maturity and that it should be diffused broadly in the society, observing possible opportunities of developing relationships for the technological progress.

In the cases of the exclusive license agreements, the direct negotiation isn't possible, because in the understanding of the legal department of some Brazilian public universities, there is the need to notice the technology for subsequent reception of offers of the potentials interested companies. That interpretation consequently turns the most bureaucratic and slow process.

Another sensitive aspect due to the negotiation absence in the exclusive license contracts is a limited adaptation to the benefits to the both parts. Of the procedural perspective, there are a need of making the contract analysis fast by the internal legal department and internalize the licensing process.

Besides, it was possible to observe the profile of the companies that licensed the technologies and it was observed that three are start-up and technological base companies and one is a medium company of chemical industry. These cases illustrate the impact that an innovation can have for the growth and technological improvement of these companies, exemplifying the paper of the enterprising university, in that the university is capable to cooperate with companies and other institutions of the society realizing the paper of generating qualified human resources and also the research and extension function through partnerships to promote economical development, as ETZKOWITZ (2004) highlights.

Through this analysis it was possible to verify the weak and strong points of each license agreement and, in this way, help the improvement of the technology transfer process realized by USP through her Innovation Agency. It can be useful for other research institutions that have similar paper and actions.

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O-052

Between Myth and Reality: Developing a Technological Innovation System in Alternative Energy in the UAE

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Introduction

The United Arab Emirates (UAE), in particular the Abu Dhabi emirate, have recently embarked on a very ambitious path of developing a technology innovation hub in the area of alternative energy, focused on solar technologies. This goal is part of Abu Dhabi's aspiration to diversify its economy and transition towards a knowledge-based economy. The success of this initiative is highly dependent on strategically nurturing innovation potential at different levels in the public and private sector.

Hence, the economic transformation and diversification require a focus on creating an environment conducive to innovation and entrepreneurship. To support the formation of an innovation system, various organizational and institutional initiatives were initiated, such as a research university, and a clean tech fund.

In this paper, we use the conceptual framework of technological innovation systems [1] to examine how public research institutions participate in this formative stage of the innovation system and support the regional transformation process. In addition we explore their inter-relations and dynamics with other actors in the innovation system, such as the private sector and the government. Innovation studies rarely explore these dynamics in the context of developing countries, and are entirely lacking for oil-rich countries in the Middle East.

Literature review

The experience of developed economies suggests that at the core of a knowledge-economy is a strong innovation system where a set of private and public actors, and various entrepreneurial resources interact in a dynamic way to sustain the process of technology development and commercialization. The innovation systems and Triple Helix literature argues that among these actors, universities and research laboratories are the engines that drive and sustain innovation, supported by an institutional framework shaped by a strong science and technology policy [2,3,4,5].

While there is ample research on the concept of innovation systems in different industries and geographical locations, the role of universities and other public research institutions, as one component of the innovation system, has not been deeply understood [2,6]. Despite some attention to the importance of university-industry linkages to the local economy [e.g. 3] and formal mechanisms of technology transfer (i.e. Bayh-Dole Act), little attention has been paid to informal institutions supporting university linkages (e.g. networks of collaboration) [4]. Relative to this work, we seek to elucidate the micro-level mechanisms through which public research institutions contribute to innovation and industry development.

Research focus

Our paper seeks to examine how public research institutions interact differently with other actors in the innovation system, in particular the private sector and the government, in the process of creating a new industry where knowledge creation is being emphasized. The geographical setting of this research, the UAE, a high income-developing country where the government is the supreme decision maker, allows us to examine whether the role of public research institutions varies from more established industrialized economies with a different governance structure.

The emerging nature of the innovation system makes it possible to examine if such actors play different roles in the initial stages of regional diversification and industry creation. Such analysis allows us to expand the existing literature on innovation systems by emphasizing on the internal dynamics that are taking place between various actors, in a different socio-economic and political context.

Methodology

We use case study research to examine the current environment for innovation and industry development in the region. The principal mode of data collection is in-depth semi-structured interviews with firms, scientists and administrators at universities, policy makers, utilities, and other stakeholders. Between February-August 2009 we conducted 26 interviews. We selected companies involved in different aspects of the solar industry including manufacturing, system integration, trading and consulting. Apart from company background and operations, we also gained information on how they perceived the potential for innovation and development of the solar energy sector in the UAE and the Gulf Region, why they had chosen to located their business in the UAE, whether they collaborated with any of the UAE universities, what barriers their business had come across, and what policies they consider effective for stimulating solar industry development and regional diversification.

Findings

Given that the industry and the innovation system is in formative stage, we find that the role of universities varies from what has been previously discussed in the context of developed innovation centers. In particular, we find that universities need to serve the private sector much closer, and also participate more actively in government programs for local regional development. In this respect, universities act as strategic partners for the government and the private sector in the regional transformation process.

Contribution and implications

Most literature on innovation systems has studied retroactively the process of innovation and development of industry clusters. However, our paper examines the emergence of an innovation system and its dynamics, giving us the opportunity to explore the applicability of existing conceptual frameworks. In addition, findings point to key policy recommendations on how to strategize optimal interactions between research and academic institutions, the private sector, and the government, with the ultimate goal of fostering innovation and regional development.

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O-017 Characterising Triple Helix linkages: Analysis of the flow of resources and the strength of link

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Research Topic

Social relationships are central to Triple Helix, yet notably difficult to measure and analyse. The establishment of linkages between the different types of actors has been considered as one of the processes through which knowledge flows across different institutional spheres, but are also seen as an outcome of policies oriented to the improvement of these flows (Molas-Gallart, Tang & Morrow, 2000). It is understandable, then, that efforts to define and collect indicators of university-society relationships (so-called Third Mission indicators) have predominantly focused on clearly identifiable inputs (number of employees in technology transfer, investments in spin-offs, etc.) and outputs (for instance, technology commercialisation indicators, income from licences) of knowledge transfer activities. While such measures have their uses, we believe that the analysis of social links remains a crucial yet understudied aspect of the efforts to measure Triple Helix Linkages, and to develop innovative indicators.

In this sense, some relevant efforts have been made from the Social Network Perspective, addressing topics such as the structure of collaborations in research projects and journal papers (Meyer & Bhattacharya, 2004), the identification of academic research networks that facilitate academic publications (Lowrie & McKnight, 2004), and the analysis of the relationship between social networks and academic career (Etzkowitz, 2000).

Paradoxically, most studies focus on the actors themselves and there are only very few studies taking individuals' relationships as their unit of analysis (Link, Siegel, & Bozeman, 2007; Palmberg, 2008). The investigation of the characteristics of the links between the individuals involved in knowledge creation on the one hand, and transfer processes on the other, deserves more attention among the efforts to measure Triple Helix linkages.

In this paper we propose an approach that focuses on the relational features of social linkages established by researchers in the field of nano-materials. We expand the concepts of Granovetter (1973) and use them to measure the relationship between, on the one hand, the ties which researchers establish with other academics, with governmental research organisations, and with firms, and, on the other, the interchange of resources through those linkages.

Methodology and data

The paper studies the social relationships of researchers with other Triple Helix actors (i.e. academic and public research organisations, and firms), and examines whether the characteristics of these social links are related with the interchange of resources in each relationship. In order to do so, we use primary data obtained using a survey, launched during April and July 2008, conducted in Spain. The unit of analysis is the relationship between two agents. With the relationships reported we constructed a dyadic data set.

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Drawing on this data we used cluster analysis to classify and characterise different types of social relationships, based on the flow of resources interchanged by the two agents involved in the social. The variety of resources considered to identify types of relationships include (1) information related to advances and discoveries in general, (2) information that is personalised or adapted to the receiver's needs, (3) knowledge that the receiver consider difficult to acquire from another source, (4) professional advise, (5) access to other researchers, (6) access to funding, and (7) help to establish a reputation as a researcher. We analyse these relationships separately for each of the Triple Helix spheres (being university, government, and industry). The paper also develops and test measures of tie strength.

Finally, we use non-parametric tests to study the relation between the different kinds of linkages (obtained through cluster analyses) and their well-known indicators from social network studies, such as the degree of trust, friendship, frequency of communication, etc. We search for significant differences in relational behaviours depending with whom and in which sphere the researcher maintains a relationship. We also identify the relationships in each sphere which provide with more resources to the researcher to accomplish his/her research and transfer activities.

Results

The study identifies three main types of relationships developed by researchers, which repeat within each of the three institutional spheres:

- 1. Relationships with high levels of resources flow,
- 2. Relationships with low levels of resources flow,
- 3. Relationship with intermediate levels of resources flow.

Our results show a direct positive relation between the level of resources exchanged in each type of relationship and the strength of the link as defined by Granovetter (1973). In fact, we observe a positive and significant relationship with some of link strength indicators, such as trust, friendship, and reciprocity.

In this sense, our study provides interesting insights for the analysis and understanding of the influence of Triple Helix relationships on knowledge creation and transfer. Our contribution is related to

1. the proposal of new ways of measuring and classifying the relationship between different spheres of the Triple Helix, by using social Network perspective

2. the potential implications of these measures with regard to the understanding of the factors that have an impact on knowledge transfer and creation through different actors.

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P-004 STUDY OF THE IMPACT OF EXTERNAL SOURCES OF KNOWLEDGE OVER INDUSTRY THROUGHOUT R&D AND INNOVATION

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INTRODUCTION AND STATE OF THE ART REVIEW

Nowadays the importance and relevance given to innovation and knowledge as drivers of wealth is clearly evidenced. In a knowledge-based economy, knowledge is one key input for production (Foray 2006) therefore the generation, diffusion and application of knowledge is crucial for today's modern societies. In the process of production and consumption of knowledge several actors take part and play different roles. On one side is science aiming to increase the knowledge stock available and its use for production (Mokyr 2002: 31-35). Then there is the industry which employs knowledge for commercial and manufacturing purposes (Mokyr 2002: 39-41). According to Arnold (2004) these linkages between science and society contribute to increase the knowledge-intensity by developing a virtuous circle. The highest is the number of linkages between science and industry; the highest is the knowledge-intensity of production and consumption in a knowledge-based economy.

Knowledge allows not only the generation of new knowledge but other several outputs like new ideas, new technologies or new inventions for example. These novelties have the capacity of generating economic benefits for both society and industry once they reach the market. When they do, they are better known as innovations (Fagerberg 2006). For the industry, innovation is a great asset because it is the path to competitiveness (Abramo et al 2009: 498). Although when the knowledge stock of industry is incomplete, the private sector solves the missing skills and lack of expertise by engaging into cooperation activities with other agents (Arnold 2004: 11). Therefore, when specific skills and knowledge are missing is when external sources of knowledge emerge as key partners. Hence, research organizations have a noteworthy role for ensuring the success of the innovation process (Arnold 2004: 4) and by cooperating with the industry, they contribute to increase the impact of R&D on economic growth (Van Beer et al 2008: 294-296). The difficulty however exists in valuing the efficiency of the agents to facilitate innovation and growth. Even if innovation is considered so important, there is no single universally accepted measure of innovation (Freel & Harrison 2006: 294). The challenge is within the complexity and difficulty to measure the impact of R&D and innovation (Aschhoff & Schmidt 2008; Bozeman 2000; Bozeman & Coker 1992; Izushi 2003; Shapira et al 1996).

Geisler (2001) points out the disparity on the perception of an outcome and the difficulty of how to measure benefits as two barriers for properly assessing the impact of R&D and Innovation. Izushi (2003) and Shapira et al (1996) agree on the biases introduced by the time lag existing between the moment when the impact-inflicting activity took place and the perception of the inflicted impact. According to some studies, the time lag between funding of basic research and commercialization of it results can vary from 17 to 19 years (McMillan & Hamilton 2003: 187). Last, but by no means least, is the bias introduced by attribution (Shapira et al 1996: 191). As the term implies, it deals with fact that an impact could be a consequence of several variables and its magnitude or intensity depends upon them.

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Madrid, October 2010

All of the above does not only imply that assessment is difficult. It also reflects how little is known about the impact of research on industry (Beise & Stahl 1999: 395) and a need for a stronger and improved "control theory" for the national systems of innovation (Arnold 2004: 7) that allows to value the effectiveness of its R&D and innovation activities. Government R&D managers are urged to maximized as much as possible the contributions of scientific and technical knowledge (Bozeman & Rogers 2001: 417) but without an assessment method to determine if the objectives are properly and effectively achieved, it is difficult to justify resource allocation. Therefore, this study focuses on enlarging and strengthening the body of knowledge on impact assessment of R&D and innovation from the relationship between research organizations and the industry. To achieve such goal, this research aims for analyzing the impact-assessment literature to study how the scientific community has addressed several issues within this topic. To do so the following research inquiries are stated:

Which are the most studied impacts of R&D and innovation from the relationship between industry and research organizations? Is there any difference in how the scientific community analyzes the impact from different types of external sources of knowledge? If so, what are those differences?

According to impact-scholars, which are the determinants of the impact in the relationship between research organizations and industry?

What are the implications of how the impact of R&D and innovation has been studied so far for policy-making?

METHODOLOGY

For properly answering a research inquiry, it is necessary to find the proper research method. The method selected was the technique commonly known as systematic review of the literature. The reason to choose this research tool is because it allows "the researcher both to map and to assess the existing intellectual territory, and to specify a research question to develop the existing body of knowledge further" (Tranfield et al 2003: 208). Despite the fact that systematic review is a recent research method, it has reach great consensus among the scientific community over the steps to be taken during the process (Tranfield et al 2003: 214). Tranfield et al (2003) describes the process consisting on three main steps: 1) Planning the review, 2) Conducting the review, and 3) Reporting and dissemination.

FINDINGS AND CONTRIBUTIONS

The understanding of how the impact from R&D and innovation has been studied will allow determining the weaknesses and strengths of the study of the impact. Also it will contribute to establish start points for developing the R&D and innovation assessment theory since there are several deficiencies that are to be fulfilled like a common framework for evaluating the contributions of R&D and innovation and empirical evidence based on findings from several studies. Moreover, the study could support future similar studies and quality information for improving the science and technology policy-making processes.

Triple Helix VII Conference Madrid, October 2010

O-140 Analysing entrepreneurial architectures

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It is widely accepted that the notion of the 'ivory tower' university is outdated. New imperatives have demanded universities to be more economically and socially orientated and accountable institutions (Kerr, 1963). Etzkowitz (2008) has described this transformation, which has seen universities emerge as key societal institutions, in terms of a 'second academic revolution'. However, Jencks and Riesman (1968) identify the practice of universities engaging with industry to be as old as universities themselves. However, the second academic revolution has marked the formalisation of this role, colloquially known as the Third Mission(*), alongside teaching and research as a core mission of the contemporary university (Laredo, 2007).

The Third Mission has been narrowly defined in terms of transfer technology (Hackett & Dilts, 2004), although come to include all activities (involving social and economic engagement) that are not traditionally defined as teaching or research (Jongbloed et al., 2008). The extension and intensification of this mission has been largely driven by public policy, with a view to realising the wider socio-economic value of higher education institutions and public research organizations (Godin and Gingras, 2000). More specifically, this policy turn has required that publicly financed institutions demonstrate returns on investment by augmenting alternative revenue streams, disseminating knowledge and innovations to the market more effectively, and realising wider societal benefits through community engagement.

As a result higher education institutions and public research organizations alike have been confronted with the imperative to become more entrepreneurially orientated and socio-economically engaged. However, given the sector is highly heterogeneous with wide-ranging research capacities and teaching foci across the spectrum of basic and applied research, responding to the imperative of the Third Mission can be seen to poses a major challenge. Indeed Nixon (2004) notes that there is no single model or archetypal entrepreneurial university, but rather multiple models with common characteristics. As such, while the Third Mission can be understood as a common imperative, the paper considers whether it has yielded institutionally specific responses or whether there has been strategic convergence among the approaches of different types of institution and/or across the sector as a whole? Moreover, the paper considers what implications these findings might have for public policy design and evaluation?

Vorley and Nelles (2008, 2009) have recently introduced a framework with which to analyze institutional transformation in response to the Third Mission. They argue that the Third Mission has challenged higher education institutions and public research organizations to develop their entrepreneurial architecture. Its effectiveness is predicated on the ability of an institution to embed entrepreneurial activities within existing teaching and/or research capabilities, and emphasize the concurrent development of all missions by coordinating the different elements of the architecture: structures, strategies, systems, leadership, and culture. Therefore, while there is no single accepted model of an entrepreneurial university, entrepreneurial architecture provides a common framework to guide and analyze internal change.

This paper investigates whether there are similarities in how entrepreneurial architectures have evolved in different types of institutions, and what this means for the Third Mission. Drawing on empirical evidence from a study of higher education institutions and public research organizations in France, Germany and the UK, the paper considers the impact of the Third Mission in an institutional context. The study identifies institutions and considers the impact of institutional difference, regional economies, and policy contexts. In principle, entrepreneurial architectures should evolve to facilitate Third Mission engagement by developing structures, strategies, systems, leadership and culture to capitalize on institutionally-specific strength and capacities. Consequently, we expect to find different patterns of architectural development and engagement by institution type – patterns that we anticipate hold to a certain extent across regional contexts. For instance, are certain aspects of entrepreneurial architectures weakly or relatively strongly developed in one regional setting compared to others? If so, what might account for such differences? Ultimately, this project aims to contribute a greater understanding of the effects of Third Mission policy on institutional change. If specific patterns emerge this may suggest a need to consider Third Mission policy (and expectations) differentiated by institutional types and highlight the strengths and weaknesses of different regional approaches to encouraging institutional entrepreneurship.

Notes

* The term 'Third Mission' is predominantly used in an Anglo-European context. In the US the third mission of the university is service provision, and the forth mission is maximising the socio-economic benefit from government-funded research. While the missions do not map directly, the Anglo-European interpretation of the Third Mission includes those activities classified under the third and fourth mission in US universities.

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O-104 The co-evolvement of local development - From the triple to the quadruple helix model

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Local development processes in Finland embrace the idea of co-evolution. In the triple helix model, the co-evolution provides a justified explanation of the dynamics and motivation for the co-operation between organizations. The organizations influence their environments, each other, and vice versa (Baum & Jitendra 1994; Lewin & Volberda 1999). This dynamics has been obvious in the adoption of technologies and in the practical efforts to embed technological innovations in work environments, social services and everyday life (Gregory 2003; Sotarauta & Srinivas 2006). It is also visible, when a participatory approach to technology is applied in city regions and neighbourhoods.

Innovation policies have traditionally implied a hard neo-liberal ethos and the use of tools associated with the new public management in the Nordic countries (Pettersson 2007). However, in the era of open innovations and participatory planning, innovation policies should embrace the idea of co-evolution that is supported by appropriate measures and resources. Therefore, I argue that the triple helix model is a viable concept, but it needs to be updated to a 2.0 version that also includes NGO's, SMS and local neighborhoods. In this approach, the triple helix will be transformed into a quadruple helix that will embrace the same co-evolving dynamics, but with a different pattern. The top-down, professionally led processes become more complicated, self-evolving networks. The aim of the paper is to introduce and discuss the quadruple helix model by explaining its context, preconditions, possible methods and outcomes on the basis of an empirical case study in Helsinki.

This co-evolving quadruple helix approach was applied in the Ubiquitous Helsinki-project, funded by the Finnish Funding Agency for Technology and Innovation (2007-2009). The consortium comprised several companies, the Helsinki Neighbourhoods Association (Helka), Helsinki University of Technology and the Technical Research Centre of Finland. The project aimed at the development of ubiquitous services of everyday life and events in the centre and two neighbourhoods of Helsinki. Ubiquitous meant here a multi-channel delivery of services (Web, digital and mobile TV, cell phone, RFID). The implementation of the project has meant constant iteration between the developers and users in the co-piloting of some digital services to be delivered through the social media. The project enhanced the collective capacity and social capital of the 56 neighbourhoods of Helsinki through the support to the development of their local web-sites. This took place by the provision of mobile and semantic web tools that were produced together with the research group and ICT-enterprises. The piloting was coordinated by (Helka), who steered not only the objectives of the ICT-tool development, but also their production and maintenance requirements.

The traditional innovation process was turned around completely in this project. The users were not outside from the development process and not a passive object for the development. On the contrary, they were brought to the same operative level with enterprises and the research unit. This approach required a new kind of development methodology. The Learning-based network approach (Lena) provided a method to enhance the co-evolution between the four Ps – private, public, people partnerships. It also provided a set of tools to analyse, plan, implement, monitor and evaluate the development process in an iterative way. Lena was originally developed within participatory projects with young people and women, and later on applied in the context of time policy and time planning (Horelli 2006; Horelli & Wallin, forthcoming). The methodology is based on communicative and post structural planning theories (Booher & Innes 2002), as well as the theory of complex coevolving systems (Mitleton-Kelly 2003).

According to the results, the co-evolving approach seems to have the potential to enhance the adaptation of technological and social development on the local level by connecting the four Ps to the co-production of services. Thus, it is possible to transform the traditional triple helix policy model to the quadruple helix one with surprisingly small efforts. The latter might give impetus to new stakeholders who so far have not been established, nor recognised except in the so called "living lab"-conditions (Mitchell 2008). The local development initiatives already contain a basic structure and methodology for this kind of joint efforts. The living labs and other empowering joint efforts on the local level will provide a desired middle path to a regional development that simultaneously promotes objectives from several policies without loosing sight for local realities.

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P-031 Context Factors Moderating the Impact of Incentives for University Patenting

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Ever since the advent of the "second academic revolution" (Etzkowitz et al., 2000; Etzkowitz, 2003), universities around the world have strived to design incentive systems in support academic patenting activities. Advancement of economic development through rapid transfer of innovative laboratory science into commercially viable products and services has emerged as the "third-mission" in addition to the two more conventional roles of research and teaching. Traditional universities are rapidly transforming themselves into "Entrepreneurial Universities" (Etzkowitz, 2000) and instruments for improving economically less dynamic regions (Degroof & Roberts, 2004). Federal budget constraints and public policy debates have further increased the pressure from governments to commercialize intellectual property generated by universities (O'Shea, 2008; Wright, 2004).

Wilhelm et al. have shown in extensive case studies with scientists and university administrators in the US and Germany that the propensity of academic scientists to patent their research results can be influenced by a range of incentives and context factors. They have also conceptualized these incentives and context factors to take effect on both individual and institutional level. The incentives identified include financial gains, reputation increase, provisions pertaining to career advancement and technology transfer process improvements. However, the context factors identified by this study cover a much broader range of aspects, i.e.:

- on an institutional level:

- the commercialization culture within the research unit,
- the communication culture within research unit,
- the general proximity of the research results to application,
- the historical context of technology transfer culture and history,
- the research university's overall commitment to technology transfer (expressed in the mission statement, culture, history and set-up),
- the structure of potential target markets and
- the characteristics of commercialization partners.
- on an individual level:
- the age of the scientist,
- the career phase of the scientist and
- the amount of industry experience (outside the research university) of the scientist (Wilhelm et al. 2009)

A literature review suggests that are at least two more contextual factors which need to be incorporated into a comprehensive model of incentives for university patenting. Scholars have repeatedly pointed out gender inequalities in view of university patenting (Rosa and Dawson 2006, Whittington and Smith-Doerr 2005, Thursby and Thursby 2005). Furthermore, the role of the work contract structure (fixed term or open-ended) remains elusive. In some circumstances, fixed term contracts for academics have been perceived as disadvantageous in the past (Bryson 2004). In this paper, we would like to focus on the complex interplay of these context factors and advance a refined model based on classic organizational theory (Cyert and March, 1963; March et al., 1958; Simon, 1976), principal-agent theory (Eisenhardt, 1989; Jensen and Meckling, 1978) and descriptive decision theory (Elbanna, 2006) in preparation of a large scale empirical survey. The results are expected to help administrators and scientists to negotiate incentive systems for university patenting that are both effective and custom-tailored to the specific requirements on site.

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P-019

Conception of the Development of China Low-carbon Economy Based on Triple Helix Theory

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1 Introduction

A Low-carbon economy, a term that refers to an economy which has a minimal output of Greenhouse Gas emissions into the biosphere has become a popular topic as global warming became a widely accepted phenomenon affecting every country in the world.

2 Conception of China Development of Low-carbon Economy

It is a kind of economic structure based on low-carbon emissions, low consumption and pollution. Low - carbon economy is the most important way to shift from high energy consumption, high material consumption, high emission model of development as well as lifestyles to sustainable development models. Its nature is to improve energy efficiency and create a clean energy structure, and its core is innovation - technological, innovation and ideological innovation.

3 Introduction of Triple helix of University-Industry-Government

Triple helix of University-Industry-Government is a new mode of innovation. The innovative mode of triple helix provides a better reference of organization system for economic development of low-carbon. The essay uses some research methods, such as survey method, quantitative research method and test method, and applies triple helix theory to conceive the development of China low -carbon economy.

4 Conception of the Development of China Low-carbon Economy

This part is the research focus of this essay. We pay more attention to the problem about triple helix in the development of Knowledge "Cbased cities and connecting region and talk about the development of China low-carbon economy based on triple helix theory. It can promote the development of economic growth and social development.

Specifically, some measures must be taken by government, industry and university. Firstly, Government is the pioneer and leader in low-carbon economy. Government should play an important role in low-carbon economy, such as promoting low-carbon culture and cultivating concept of low-carbon society strategic, planning for low-carbon economy and mode of reforming, promulgating corresponding laws and regulations and integrating use of finance, taxation and other economic means.

Secondly, industry is the main carrier for implementing low-carbon economy. Industry should optimize industrial structure, develop low-carbon industry, establish the spirit of low-carbon economy inside the industry, carry out the social responsibility of the enterprise and accelerate the technological innovation by enterprise.

Finally, university is the guarantee of the development of low carbon economy. Such as supplying the innovative support for the development of low-carbon economy, training creative talents and creating the ideological basis for low-carbon economy, and so on.

5 Conclusions

In conclusion, the development of low-carbon economy should rely on the leading of government, the practice of industry and the promotion by universities. Government should implement the policy of low-carbon. At the same time, government should monitor and regulate the behavior of enterprises and support university in the research and development of low carbon economy. Industry should carry out the national low-carbon policies and regulations to save energy and reduce emission and cooperate with universities to increase the investment on research to put new energy, new materials and new technologies into practice. University is the main body of innovation in low-carbon economy. It should study on the related issues of low carbon economy and low carbon society systematically for the national innovation. At the same time, it should promote scientific and technological achievements of low-carbon economy to the industrial transformation through the patent transfer, joint development, science and technology industrial park and other forms.

Keywords: triple helix theory; low-carbon economy; University-Industry-Government; innovation.

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O-088 Key Ingredients of Innovation: the Case of SMEs in England

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It is almost universally accepted that technological advance and innovation are the most important sources of productivity growth, competiveness and social and economic wellbeing (Edquist and McKelvey, 2000; Wynarczyk, 2007). Novel and hightechnology product developments are seen as an effective way of giving companies a leading edge over competitors and open new and niche markets (Lawson and Longhurst, 2006). Increasingly research and policy attention has come to focus on the innovative small and medium-sized enterprises (SMEs) as a key source of employment and economic potential. Innovative SMEs appear, therefore, to be vital parts of a dynamic process of national and regional economic development (Wynarczyk and Thwiates, 2000). The SME's capacity for innovation and new product development has become a focus of EU, national and regional SME policies (e.g., Gray and Allan, 2002). Evidence appears to justify the desire for improved technological performance in many firms, individuals, industries and economies and the needs to identify and support those factors capable of 'making a difference'. As a result, extensive encouragement takes place in terms of, for example, R&D collaboration and technology sharing between firms and with other sectors such as the university (e.g., Narula, 2002). The importance of infrastructure --hard and soft elements-- to support innovative activity at the national, regional or firm level is acknowledged but creativity remains essentially a human activity whether as an individual working alone or in a team, whether in the public or private sectors. Fundamentally, it is people who create knowledge, manage businesses and innovate (Science and Innovation White Paper, 2008). However, while the lone inventor remains an important player in the technological process, in today's world it increasingly means the well-educated and trained professional employee (Freeman 1971) working in research teams.

This paper builds upon a recently completed project sponsored by the Economic and Social Research Council (ESRC) Science in Society Programme. The empirical investigation is based on a in-depth survey, via a dedicated questionnaire, of 80 innovative SMEs operating in several key scientific and technology related sectors (e.g., chemical). These firms have been selected on the basis that in the two years prior to this empirical investigation, they had been involved in new product development and innovation.

This paper aims to identify and analyse the cumulative factors (key ingredients) that contribute to the innovation and new product development: activities, processes and capacity building of SMEs. The key findings based on several rigorous, and multi-variate statistical tests indicate that innovation/ new product development activity of SMEs is a complex and multi-faceted process, highly related to and depended upon the cumulative effects of and interrelationship between several key ingredients, including, R&D expenditure, patent, size of the R&D team, R&D grants, as well as a well structured management team with complementary expertise. The paper will draw on secondary data sources on patent and R&D activities of SMEs, as well as UK government's national and regional science, innovation and R&D policies.

It is anticipated the key findings will contribute to the development of a more detailed and comprehensive conceptual and contextual multi-dimensional framework for the understanding and analysis of the process of and capacity for innovation and new product development of SMEs, in the light of wider government science, innovation and R&D policies. The findings will assist relevant policy makers and business support intermediaries in their efforts to design and implement policies and initiatives directed at promoting the continued growth of innovative SMEs as the main vehicle for economic regeneration, innovation, social welfare, and competitiveness.

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ST-09

Challenges facing China in pursuing indigenous innovation process reflection upon government-pulled triple helix

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Introduction

'Domestic Innovation Gap' has been identified as a national issue in China after 30 years' reform and opening up. The promotion from 'China Made' to 'China Create' is urgently recognized for long-term, sustainable success. Kinds of steps have been taken by all level government since 2006. It is necessary to analyze the challenges in pursing indigenous innovation based on the past 4 years' experience and reflect it theoretically and practically in time. That is this study's object and focus.

This study proceeds in the following manner. First, briefly review the literature regarding indigenous innovation and governmentpulled triple helix. Secondly, analyze the current situation of China's pursing indigenous innovation: policies, outcomes, contribution of government, industry and university in National Innovation System through documentation, interviews. Aim to find challenges internal. Next, study experience from other countries, aiming to find challenges external .Finally, provide the research findings and discuss their managerial and theoretical implications.

Literature Review

(1) Understandings of Indigenous Innovation

From available arts on indigenous innovation, indigenous innovation is mostly used to express Chinese term 'zizhu chuangxin' (Qingrui Xu et al., 1998; HuiYan, 2006; XieinLIU, 2007; C Shin-Horng &WP Pam, 2007; Xiaolan Fu & Yundan Gong, 2008). 'Zizhu chuangxin' can also translated as independent or homegrown innovation. Its ambiguity meaning has led to considerable confusion inside China and abroad. However, the "Medium-to-Long-term Plan for Development of Science &Technology" (2006) points to zizhu chuangxin as having three components: genuinely original innovation; integrated innovations, the fusing together of existing technologies in new ways; and 're-innovation', which involves the assimilation and improvement of imported technologies. Apart from the understanding indigenous innovation as 'zizhu chuangxin' as strategic element of innovation driven growth and learning-based economic development; PN Sopazi&TN Andrew(2005) hold the idea that The term indigenous innovation has the same meaning as the following terms: traditional innovation, rural people's innovation, farmers' innovation, local innovation and community innovation. Somehow, William Lazonick (2007) uses term 'indigenous innovation' with the same understanding of Shashank Mehta &Ravi Mokashi-Punekar.

In this study, the term 'indigenous innovation' has several meanings as follows: firstly, indigenous innovation is closely related with local and homegrown characters. It means that a kind of innovation can be called indigenous innovation on prerequisite that that innovation takes place in local such as inner enterprises, regions or nation but not abroad. Secondly, indigenous innovation doesn't mean R&D independently without collaboration with outside, as long as the core technology and intellectual property rights are grasped. It can be genuinely original innovation; integrated innovations, the fusing together of existing technologies in new ways; and 're-innovation', but not depend on foreign technology, Thirdly, indigenous innovation is not only a macro strategy, but also capability and mission for world's sustainability development.

(2)Research on indigenous innovation in China

From available literature, university-industry linkage is a highlight issue in 'indigenous innovation': the university, as the producer of knowledge and industry as the user need each other. When university-industry collaborates with each other, it makes university, industry themselves and 'indigenous innovation' sense. The rapid growth of the sub-regional economies in Santa Clara County in California (Silicon Valley) associated with the contribution of Stanford University, in and around Boston (Route 128) with that of Massachusetts Institute of Technology (MIT) (Saxennian, 1994) and the successful localities around Cambridge in the UK (SQW, 1985, 2000) should be good examples. In China, Projects and programs such as '985' and '211' were started to promote university research and technology transfer. However, most universities, especially those in the top rank, are public. There is a native university-government affinity instead of university-industry linkage, characterized government-pulled triple helix-- government typically pulls the other two spheres to achieve regional innovation, forming a government-pulled triple helix with one head and two wings. (Zhou, 2008). How and to what extent these highly supported universities performance in helping industry to develop indigenous innovation capability in government-pulled triple helix context (Etzkowitz & Zhou, 2007; Zhou, 2008) ? What is the challenges in the process? Some studies concentrating attention on technology transfer, subtle linkage of innovation capabilities and business performance(Richard C.M.Yam et al., 2004&Guan et al., 2006;K Chen & M Kenney, 2007) and limited studies from perspective of entrepreneurial university (Zhou, 2008; Zhou & Peng, 2008) can answer part of this question indirectly . Lan Jun(2008) comments that industry-university-research institution is the better reflect ion upon reality of China based on a system dynamics approach. Furthermore, Lucy Lu & Etzkowitz (2008) put forward the similar question from the strategic perspective. However, those are far from enough to disclose problems and paths in China's pursing indigenous innovation in government-pulled triple helix context.

Methodology and research design

Data will be collected through literatures, documentation, interviews and case study in China. The objectives are university, industry and government. Perspectives from university, industry and government are to be analyzed respectively and then find the cognitive gap and challenges internally. Second-hand case study, documentation and face to face interviews abroad will reveal challenges externally.

Expected Findings and contributions

This study may reveal a systemic analysis of China's pursing indigenous innovation(from Jan,2006 to Jan,2010) and find the convincing gaps and challenges internally and externally in both theoretical and empirical way. It is out of question that this study make sense in triple helix, but also is of the great value to the government for the reference in another perspective, which highlights the significance of this study.

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O-024

The Role of a Brazilian Business Incubator in Catalyzing a Response to Economic Downturn by Executing Government Innovation and Entrepreneurship Supportive Programs

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The severance of the last economic downturn has affected all countries regardless geography, and the recovering has been slowly and uneven. As result the policy makers are facing huge challenges, since their decisions today will affect the social welfare, not only tomorrow, but also in the long run. In this scenario, innovation and entrepreneurship are seen as two of the most important drivers of an effective response to these challenges (OECD, 2009) and the Brazilian government seems to have taken the right decision to improve the economy (Deutsche Bank Research, 2009) including the creation of programs to foment innovation and entrepreneurship.

Drawing on the analysis of a supportive program to incentive the development of new ventures based on knowledge creation, called First Innovative Enterprise (PRIME, in Portuguese), sponsored by the Brazilian Government and conducted by a group of business incubators, all over the country, this paper aims to explore the lessons learned from the first phase of the program implementation in one of incubators located Rio de Janeiro state. In this sense the following research questions were established: How can a business incubator help govern agencies to better invest in the knowledge economy? Why a business incubator is an interesting agent to execute innovation and entrepreneurship supportive programs developed by the government? What kind of contributions a business incubator can give to catalyze the interactive system of govern-industry-university? The paper reports on a revision of almost 200 hundred business plans, a survey with 64 knowledge based ventures entrepreneurs, interviews with the Brazilian innovation agency professionals, the interaction with area specialists – practioners and academics -, as well as the program statistics and partial results. The case method (YIN, 1994) was largely used to direct different aspects of the research analysis and the acquired learning have been used to develop new frameworks (EISENHARDT, 1989) that not only will serve as experience to practice recommendations but also to improve the theory in correlated areas.

This paper builds on the theoretical framework of Triple Helix (ETKOWITZ, 2009), in which the relationship between universityindustry-government generates an upward propeller of regional development that results from the flow of knowledge between universities and businesses, stimulated by the government in the form of general incentives – public policies, legislation, scholarships, taxation - and funding, that promote the companies competitiveness by increasing the capacity to develop services and products based on knowledge. The open innovation concept (CHESBROUGH, 2003) enlarges and makes each dimension of Triple Helix framework even more important to the local development of the regions.

Like some other regions around the world, such as Silicon Valley, Boston area, Bangalore (India) and Linkoping (Sweden), where entrepreneurial universities have been responsible to anchor the innovation and entrepreneurial ecosystem, in Brazil, some universities have demonstrated potential to generate wealth from transferring knowledge created in university laboratories and education departments to the society. Public Universities like Federal University of Minas Gerais, University of São Paulo and Federal University of Rio de Janeiro, along with a group of private institutions such as PUC Rio and UNISINOS, just to name some, are examples of this kind of university. Even though the flow of knowledge exchange between universities and businesses is just at the beginning, when compared to more advanced ecosystems, various initiatives have been taken by the government and universities to promote an increase in this process. Among these initiatives stand out the creation of new business incubators and science and technology parks that have become the catalyst of university-industry-government interaction.

Brazil has innovated on the concept of the business incubator, working as an environment for innovation and serving as a leitmotif for the junction of the triple helix, providing solutions and services that make difference to companies' growth and competitiveness. An incubator of excellence should be an "innovation habitat" that on the one hand facilitates the access to university labs and talented people and on the other work for the university helping to find problems and opportunities to apply the university knowledge generating wealth and social welfare. For the Brazilian government incubators should expand its role, also working as a facilitator for the search of financing, commercialization and internationalization.

This paper provides evidences that some incubators can play as a central actor in the building of the knowledge based economy, supporting the creation and growth of new ventures that will help the country to have more dynamic companies, stronger in research and development competencies, that will develop high technology goods and as a result be more competitive in the global arena.

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ST-03

Promoting growth of indigenous knowledge-based industry via the Triple Helix system: a case of the Thai dessert industry

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This paper explores the Triple Helix system as a framework for the growth of the Thai dessert industry. It examines the relationship between indigenous knowledge, networking of firms and technological capability development in this industry as well as the importance of policy initiatives for networking development and collaboration between industry, university and government agencies. The paper also explores the significance of social capital as a factor that facilitates networking and knowledge sharing.

Indigenous firms thrive largely on the basis of implicit knowledge; but there is a limit to which they could grow if they do not engage in knowledge exchange with other firms and organisations. Where there is such transaction, the knowledge base of indigenous firms would grow, increasing the scope for the firms to be creative and innovative, thereby enhancing the market appeal of their products and their risk disposition. Social capital building is important for firms to build their business confidence and seek to be competitive. But to what extent has policy intervention been effective in this respect? This is a question to be addressed in this paper through investigation of the role of such government agencies in Thailand.

Most of firms in the Thai dessert industry are Small and Medium-sized Enterprises (SMEs) and can be broadly set under three categories - namely, household-based firms, community-based firms and factory-based firms. The household-based firms are essentially traditional in character, and so operate on a cottage industry basis using traditional technology. The social and economic status associated with such firms would make them seek to work within limited targets, so that the scope for innovation and growth is limited, or, in the extreme, non-existent. But not all household-based firms are essentially the same in behaviour and performance, as some are more forward looking than others and would prefer to move on rather than remain locked in. Why some household-based firms seek to move on and others do not is an open question for investigation. It can however be argued that exposure to new ideas through networking and access government support would have significant implications for differences among firms in terms of the effectiveness of their management and organisation systems; the quality of their products and services; and the degree of their competitiveness.

By contrast to household-based firms, community-based firms would be expected to be innovative. They have social and economic advantages over household firms in that their community network facilitates access to finance and to sources of knowledge and information. Thus, unlike household-based firms, community-based firms would often find themselves engaged in knowledge exchange and knowledge sharing within the community of firms. On the other hand, the factory-based firms operate in a competitive environment. They are by definition expected to have the entrepreneurial flare that would enable them not only to withstand the pressure of competition, but also to innovate and set new standards in the industry as pioneers. But they also share the culture of household-based firms in that they tend to be somewhat reclusive and reluctant to sharing and exchanging knowledge, particularly with firms in the same industry. They would however share knowledge and best practices, albeit to a limited extent, with firms in the supply chain; and they would use their networks largely as a conduit for obtaining knowledge and information from other firms and organisations.

The co-existence of the three categories of firms in the Thai dessert industry suggests the possibility for the evolution of firms from household to community or factory-based firms, following policy and market stimuli. This paper will argue that community-based and factory-based firms are more receptive to new ideas than household-based firms and that the more entrepreneurially oriented firms in the household-based category are likely to evolve into entities corresponding to either the community-based or the factory-based firm categories. The choice of growth trajectories open to household firms is influenced by a number of factors including: the extent of resource endowment in terms of capital and management skills; government policy support; proximity to other firms; and perception of market risk. Those firms in the household-based firms, and those that are not so well-endowed would be expected to be in the community-based firms. But social capital is higher in the community-based firms than in the factory-based firms. Community-based firms are well networked, and this enhances interactive learning within the community of firms, and also the transfer of technological knowledge and management skills from research-based knowledge institutes. Whether community-based firms are more innovative than factory-based firms has, however, yet to be put to the test as will be attempted in this paper.

At present, government policy in Thailand is focusing on development of community business. The evidence base of this policy is not, however, all too clear particularly with respect to innovativeness of firms. In view of this, the aim of this paper is to explore the distribution of the innovative and entrepreneurial attributes mainly among community-based and factory-based firms. The paper also explores the extent of social capital for each category of firms and how this relates to the enterprise and innovative behaviour of firms in terms of networking with other firms, with government and non-government agencies, and with academia. The data for investigation of the research problem derives from a sample survey of 162 firms from the three categories of the Thai dessert industry and interviews with the owners or managers of 22 of these firms. Interviews were also conducted with relevant government agencies and universities to elicit information on the policy mechanisms and instruments of intervention for promoting the development of SMEs through knowledge sharing and exchange.

Triple Helix VII) Conference Madrid, October 2010

O-109 **Towards a New Taxonomy of Technological Regimes in Brazilian Manufacturing**

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Innovation is an important driving force behind the dynamics of firm competition in an industry. However, the ways in which innovation and technology occur in industries may be quite different amongst industries and countries. It is recognized that most of the knowledge applied by firms in innovation is appropriate for specific applications. So, the notion of technological regimes may be a useful concept for studying the differences in innovative activities. The concept of technological regime has been introduced by Nelson and Winter (1982) and is concerned with the technology upon which firms rely concerning problem solving activities. In the literature, there are two distinguished technological regimes: the entrepreneurial regime and the routinised regime.

Malerba and Orsenigo (1997) define technological regime in terms of opportunity and appropriability conditions, degrees of cumulativeness of technological knowledge, and characteristics of the relevant knowledge base. Using the European Patent Office database of patent applications of six developed countries, they found that two distinct groups of technologies emerge, which were labelled as Schumpeter Mark I (creative destruction) and Schumpeter Mark II (creative accumulation), and were relatively invariant across the countries examined.

Breschi, Malerba and Orsenigo (2000) examined the relationship between Schumpeterian patterns of innovation and the characteristics of technological regime, which were expressed in terms of technological opportunity, appropriability and contribution of science. The results showed a non-linear relationship between Schumpeterian patterns of innovation and the relevance of science for innovation.

Pavitt's model (1984) focuses on the determinants and directions of technological trajectories and defines taxonomy of the organizational and structural traits of innovative firms. The firms were classified into three categories: supplier dominated; production intensive and science based. This classification was tested by using data on innovation counts for Britain from the SPRU innovation database.

Marsili and Verspagen (2001) refine Pavitt's taxonomy, distinguishing five regimes: science-based regime; fundamental processes regime; complex systems regime; product-engineering regime and continuous processes regime, in order to test the robustness of the classification in the case of Dutch manufacturing. When grouping industrial sectors into the technological regimes, they expressed the properties of innovative processes by the level of technological opportunity; the level of technological entry barriers as a function of the specificity of knowledge; and the degree of cumulativeness.

All of these previous studies consider only the developed countries while grouping their industrial sectors within technological regimes. However, developing countries present a different dynamic in innovation and technological evolution so that the industrial sectors corresponding to the technological regimes may be different from the industrial sectors in Marsili and Verspagen's taxonomy.

The aim of this paper is to give insights into the characteristics of technological regimes and to classify Brazilian industrial sectors into these regimes, creating a new taxonomy of technological regimes. Using PINTEC (Technological Innovation Research) database from 2000, 2003 and 2005 of Brazilian industrial firms, a multivariate analysis is performed in order to classify the industrial sectors into technological regimes. The results demonstrated that (i) when industrial sectors are grouped according to Marsili and Verspagen's taxonomy, these technological regimes show no difference amongst each other with respect to the indicators built, and (ii) there are different technological regimes in Brazil, due to differences in industrial dynamics in this country, relative to the dynamics of industries in developed countries.

This paper intends to contribute to a better understanding of the differences between developed and developing countries in the dynamic of industrial evolution and technological change and of the role of technological regimes in a developing country like Brazil; moreover, this work creates a new taxonomy of technological regimes that suits better to the characteristics of Brazilian industrial sector. The main implication of grouping industrial sectors in technological regimes is that, according to the definition of Nelson and Winter (1982), a technological regime guides the actors involved in innovative activities towards developing heuristics, tactics, and objectives to solve a particular problem. Technological regimes, by organizing inter-industry differences into a few invariant categories, also help the government to elaborate an industrial policy aiming to improve Brazilian industries and to foster innovative activities.

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0-092

Increase in Effectiveness of Technology Development in Thai SMEs with Group Approach

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Technology development is one of the main important factors for driving competitiveness of Thai small and medium enterprises (SMEs) in the global market. The linear model for technology development starts from conducting research and development (R&D) innovation management, and transfer of technology. Investment in R&D of Thai Industrial sectors especially SMEs is therefore crucial for the innovation and Thai government implements many supporting schemes to promote R&D. However, due to high risk nature of R&D, investment of Thai SMEs in R&D is still very limited.

The Industrial Technology Assistance Program (ITAP) is a private sector support activity of the Technology Management Center (TMC) under the National Science and Technology Development Agency (NSTDA), Ministry of Science and Technology of Thailand. ITAP main mission is to support technology development of SMEs through technical consultancy service. Over 20 years, ITAP brings experts to Thai SMEs to work with the owners of the factories to apply technology for energy saving, loss reduction, process improvement, value creation and new product development. However, the number of projects which is related to R&D in comparison to the number of Thai factories is small.

The main scheme of technology development project by ITAP is based on single project approach which focuses on the needs of individual firm. Once the needs for technological development from firm are identified, ITAP acts as an intermediary that establishes collaboration between technical experts and entrepreneurs. This scheme effectively strengthens individual firm by providing an exact match between a particular need and a particular solution to the problem.

Although the single project approach is very successful, this method has limited impact. The single project approach works well with individual firm with high capability in technology absorption only. The consultancy fee for each company on the single project approach can be high. The expansion of activity is not possible due to one to one nature of the project (one expert to one factory).

At the beginning years of ITAP operation, Thailand still lacked technical experts in nearly all fields and, ITAP cooperated with many international organizations to provide high quality technical consultancy, such as; Senior Experten Services (SES) of Germany, Canadian Executive Service Organization (CESO) of Canada, Australian Executive Service Overseas Program (AESOP) of Australia, and Japan Overseas Development Corporation (JODC) of Japan. Employing foreign experts are normally expensive due to travelling cost and need of Thai moderators or assistances. In order to share the cost, a group of Thai SMEs of the same industry are invited to join the program to share the cost. In order to get the most benefit from the program, a more extensive program includes: seminar, visit of companies for problem diagnosis; short term consultants by foreign experts are carried out during two or three weeks of the visit if foreign expert.

Although group approach (one expert to many companies) for foreign expert is born out of the necessity to share the high cost of the project, it has provided new benefits to all parties participating in the project. Apart from benefit from cost sharing, a network is formed among the participating companies. The moderators and assistances gain knowledge both in technology and consultancy techniques from the foreign expert. The knowledge and experiences sharing through group activities offer multiplication effect on the technology development which is impossible in the single project approach. In some case, this approach initiates the emergence of Sub-Sector Innovation Network (SSIN) which draws more partners both in industry and in academic circles to the sub-sector.

Based on the experience gained from the group approach for project with foreign expert, this paper reports the application of the group approach to two groups of Thai SMEs,

The Thai dessert industrial development project was conducted since 2007. Normally, the Thai dessert SMEs are weak and fragmented with traditional, labour-based technology. They perceive each other as competitors and thus there is no link or any form collaboration. Realizing the opportunity for development, ITAP provided technological supports through various programs such as; production improvement, packaging design, product shelf life extension, and product development. ITAP also conducted technology trips to universities and research institutes to expose the entrepreneurs to new technologies such as drying technology, quality control and good manufacturing practices. The project includes technology visit to manufacturers relating to the Thai dessert supply chains. These activities create business and knowledge links and widen opportunities for growth and innovation of the industry.

The group approach is also applied to an agricultural industry. An intervention team comprises university lecturers, representatives from the Federal of Thai Industry, and local authority are formed. The pilot project "Mapping and Matching of Regional Innovation System in selected Agro-subsectors" was created with the support from ITAP and the German Technical Cooperation Agency

(GTZ). After field study, a program of raw material management was selected a case study. The implementation of raw material management resulted in common understanding of the necessity of the farm to comply with the international standards such as Good Agricultural Practice (GAP). Raw material management leads to the signing of supply contract between the group of farmers and the exporter. The network of farmers which can comply with GAP standard is formed, technology related to safe farm practice is transferred from the universities to the farmers. Price stability of fresh produce and guarantee of high quality produce are possible with this program. With continuous supports and strategic intervention, Nakornpratom can become a creative fresh vegetable cluster, in which its products can be exported worldwide.

In conclusion, the group project approach has effectively stimulated interactive learning, R&D collaboration, and technological capability development in the Thai SMEs. The group approach involves more steps of strategic innovation development. These efforts create a sustainable innovation network which is the starting point for SSIN. The success in SSIN will lead to the formation of innovative cluster which is very important to constitute to national innovation system and national competitive advantage.

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O-115

Analysis of the conception, molding and implementation process of Creative Enterprise Incubators in the state of Rio de Janeiro / Brazil: a contribution to the debate of the Triple Helix.

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Introduction

The article aims to evaluate critically and suggestively the dynamics of a government initiative in partnership with an entrepreneurial university at the time of generation of public policies to encourage innovative enterprises in the field of creative industries.

The case to be explored concerns the creation project of government incubators of creative enterprises in the state of Rio de Janeiro. This initiative aims to unite continuing and free entrepreneurship, innovation and culture education activities for cultural managers to accommodate 24 new developments in this industry.

Its conception occurred as a university incubator experienced the parallel development of various projects in partnership with government departments.

After a consolidation process of the incubator's work as a national and international reference - with tangible results and variable scope -, there was an invitation to replicate their knowledge on a wider scale.

It is understood that the processes experienced in small scale by the entrepreneurial university can be replicated on larger scales successfully. Key issues are highlighted in the analysis making contributions on, for example, how to measure the time and financial resources required by such initiatives.

State of the art

The object of analysis evokes the discussion of innovation, in particular the articulation of the Triple Helix (Etzkowitz, 2009) and its influence on the management and evaluation of public policies in Brazil (Barcelar, 2000).

It is known that in the analysis made in this article the theoretical perspective of the Triple Helix is reinforced by other approaches of fundamental importance, as the concept of open innovation (Chesbrough, 2003), which in a contemporary view surpasses the borders of enterprises and achieves the other dimensions of the triple helix. At the same time, the theory of the networks (Granovertter, 1978; Gulati, 1998) brings together the three fields of the helix causing the flow of people between these fields to accelerate the process of developing new solutions that generate social and economic impacts of high added value, as in the program reported herein.

The practical knowledge generated from the effort undertaken in this program feeds back the theoretical framework, promoting a new conceptual theory based on case study (Yin, 1988) that will help the process of generating knowledge of large application in the public policy area.

Another field of knowledge that will provide important subsidies to the analysis is the existing theories in the field of public policy when targeting the construction of innovation space, of consensus and of the triple helix itself; as well as the theory of action research (Thiollent, 2008) will give substance to the fact that the authors were and still are involved in the conception and ongoing implementation of the project focused by this critical analysis.

Additionally, the concept that contextualizes the creative industries will be briefly presented since this is the scenario in which are inserted the creative enterprises and incubators that address such project.

Research focus

It is understood that the description of the experienced processes and the critical analysis will form a rich product that deserves record not only for the singularity of the experienced object - a Brazilian government incubator of creative enterprises – but also for the paradigms orienting entrepreneurial universities on their daily activities, as executing agents of public policies. Additionally, such action may indicate paths to overcome problems faced elsewhere.

In this context, it is also important to consider the emergence of the concept of creative industries, and its importance appears associated to the approaches that identify their high potential of generating employment, products/services and wealth; whence their growing importance in the field of knowledge, market and government public policies at national and international level. According to UN data, this sector reaches a turnover of U.S. \$ 1.3 trillion per year, representing approximately 7% of Gross Domestic Product - GDP worldwide.

Methodology

The process and results of the conception and implementation of the project that became a public policy will be described considering the direct involvement of the authors. This fact will cause the theory of action research methods and case studies to be incorporated into this analysis, as well as into the other theories in the field of public policies, innovation and triple helix.

Findings

Several conceptual difficulties have been encountered during the development of the project which is subject of this paper. Therefore this critical evaluation of the process becomes important for the conceptual alignment and improved results of this initiative.

The process evaluated herein are coordinated by the client, who in this case is the Brazilian Government ordering servicer from the University. However, the Government works slowly, the bureaucracy is large, and political decisions directly impact on the management of activities, affecting basic features of project management such as cost and term, thus interfering on the quality of the final service.

What we see throughout the analysis is the appreciation of the interactive process, respecting the technical issues and the ever changing political directives. To create confidence among among triple helix players, the process should be managed in a cooperative way.

Contributions and Implications

Even with a project still in development, it is intended that the review of the process of conception and implementation subsidize the theories discussed in the article. This contribution is even more remarkable considering the concept of creative industries is still internationally debated, as well as the fact that this is the first experience of an entrepreneurial university implementing a project of government creative incubators in Brazil.

Madrid, October 201

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0-036

A PROPOSAL TO INTEGRATE THE UNIVERSITY INTO S&T PARKS & REGIONAL DEVELOPMENT POLICIES - THE EXPERIENCE OF UNIVERSITY OF SÃO PAULO (BRAZIL) CENTER FOR TECHNOLOGY POLICY AND MANAGEMENT

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The culture of innovation is a holistic concept that involves the creation process, the flow of ideas, the idea of sustainability and interpersonal relationships. From the perspective of a S&T Park as an innovation habitat, the role of the university is mainly focused on the creation process.

The flow of ideas, sustainability & interpersonal relationships aspects of the culture of innovation are usually understated. Nevertheless, they are essential, for example, to increase the involvement of companies in university processes such as cooperative research, to stimulate entrepreneurship, and to foster innovation habitats. These aspects are also relevant to integrate universities into governmental programs in charge of public policies for local/regional development.

Along this line, University of São Paulo (Brazil) Center for Technology Policy and Management (PGT/USP) took upon itself a challenge of transformation, by creating a new focus on knowledge and innovation-based local/regional development. The transformation had two components. Firstly in terms of subject, as PGT/USP, composed mainly of faculty from the University engineering, management and economics departments built its competence and got recognition in the field of industrial innovation management. Secondly in terms of nature, as the Center went beyond the traditional academic research agenda. In fact, PGT/USP assumed an active role in the knowledge and innovation-based development process of selected cities in the State of São Paulo, Brazil.

STATE OF THE ART

Since 2000, a PGT/USP research group centered its activities in the planning and implementation of innovation habitats, recognizing their importance as tools for local/regional development. These studies were financed by government agencies. The cumulative experience acquired by its research team allowed PGT/USP to develop a custom made model for involvement with medium-size cities. The model is based upon working with the public and private sectors, in order to articulate a local innovation system, and prepare the environment for the implementation of a technology park project.

RESEARCH FOCUS

This paper contributes to answer the research questions: "How can regions and/or STPs capitalize on the many benefits of a university culture? How can those interactions/relationships be integrated in to the larger knowledge ecosystem?"

METHODOLOGY & FINDINGS

This paper presents the conception of the proposed model, and describes the research-action- methodology that was applied. It also presents the results of two concrete experiences of application that validated the model.

The conceptual model consists of five steps. The first step is the diagnostic of the local innovation system, culture & infrastructure, comprising the following components: general indicators (infrastructure, history and culture); socio-economic indicators; science & technology indicators; characterization of the economic potential, vocation and activity; and, analysis of the innovation system and its financing. The outputs of this step are: (i) A reference report outlining the needs for the development of a local innovation system; (ii) an executive presentation to convey the report to public and private parties; and (iii) a proposal for PGT/USP researchers' participation in this process (including a draft proposal for a cooperation agreement).

The second step aims at intensifying the relationship with local public authorities in order to start the animation process, by means of attracting the attention of all public local/regional power levels. Initiatives to promote the idea and provide visibility include: (i) a dissemination seminar for local government; (ii) a public hearing to increase the general acceptance; (iii) a workshop with the private sector, including companies and trade local trade associations, dimensioned according to the characteristics of the specific business community; and (iv) a seminar to disseminate good practices, with the possible participation of speakers from abroad. The products of this step are: (i) project reference documents; (ii) letters of support from both public and private sectors entities; and, (iii) MOUs formalizing the collaboration between PGT/USP and the municipality.

The third step is the innovation system development and articulation, at the end of which the following products are generated: (i) a characterization of the innovation system structure, taking into account the local conditions, and depicting the pole paragon and its relevant clusters or networks); (ii) the diagnosed gaps in the local innovation system; (iii) a proposed way to articulate the scientific-technological collaboration of universities and research institutes; (iv) the knowledge management system; and, (v) a proposed way to integrate business enterprises into the local innovation system.

The fourth step is the conceptual project of the technology park, in case the previous studies show that there is a favorable environment and conditions for the implementation of such a platform in the targeted region. The output is a Conceptual Model of the Technology Park.

The fifth step consists in technical assistance for project implementation. The group experience stresses the importance of this step, as a "black hole" period usually appears after the technology park concept was established. This may hinder the beginning of effective implementation. Therefore, a permanent action of PGT/USP research group has turned out as necessary to stimulate and monitor the project development.

In the second part of this paper, the two most recent research-action experiences conducted by PGT/USP research group in the State of São Paulo are exposed: the Competitive and Innovation Pole and Technology Park of Sorocaba and the preliminary activities to enhance the Guarulhos Pole. These two cities are medium-size according to the Brazilian taxonomy.

CONTRIBUTIONS

The kind of methodology presented here can be replicated by other universities and regions, constituting a basis for the creation of similar centers. This enhances the larger ecosystem, and enables a win-win process that facilitates academic researchers to play a proactive role in the local/regional development process.

Triple Helix VI) Conference Madrid, October 2010

O-039 NC State's Centennial Campus – An Experiment in Public/Private Engagement

James Zuiches, North Carolina State University, USA

Introduction

In a span of 25 years, NC State's Centennial Campus has developed a reputation as a unique and national model bringing teaching, research and engagement together in public/private partnerships to stimulate economic development. The Centennial Campus has invested nearly \$1 billion in facilities, with 2.7 million square feet currently occupied. Additional facilities are under construction, and we have plans to grow to 9 million square feet when fully built out.

A master plan was developed for a set of neighborhoods that would combine academic programming, with corporate and governmental tenants, residential and food service facilities, recreational facilities including Lake Raleigh, and the new Lonnie Poole Golf Course, and partnerships with K-12 in the middle school and a proposed early college high school.

With its 18 start ups in the technology incubator, its 7 new corporate partners, and 45 on-going private, non-profit and public partners, the campus is a place to work to many and home for some. With its current 2,300 corporate and government employees, over 1,350 university faculty, staff, and post docs, and 3,400 university students, the campus is a vital educational hub and workplace. It also has 60 townhomes/condos and a magnet middle school with 600 students, so for families, school age children, college students and adults, it has the vitality of a small city with many neighborhoods.

The Technology Incubator on the campus is managed by the Industrial Extension Service. The Incubator provides a number of services to the tenant partners, such as counseling from the Small Business Technology Development Center, access to the Libraries, access to faculty and students, and most importantly an entrepreneurial network and culture within the Incubator in which small businesses learn from one another and often create new businesses out of the joint interaction. In 2008, the Research Triangle Institute was contracted to conduct an external evaluation of the Incubator and track 26 companies who had graduated from the facility. The graduating companies have had a major economic impact on the state including the creation of 894 jobs, \$75 million annual increase in the growth state product, and \$6.5 million in state and local tax revenues (RTI Economic Impact Analysis, 2008).

Criteria for Partner Engagement. Any company or agency which desires to locate on the Centennial Campus must have some formal partnership with faculty in departments and colleges. A sophisticated level of engagement would include joint development and sponsorship of seminars or lecture series, sponsoring senior design projects, hiring students through the cooperative program, mentoring and volunteering with students as well as serving as adjunct faculty, or as members of advisory committees or guest lecturers. A higher level of engagement would involve joining centers such as the Nonwovens Research Center in the College of Textiles. Most recently Elmarco, a Czech Republic company that makes equipment for the application of nanotechnology to textiles products joined and located its three-person U.S. headquarters on Centennial Campus. Similarly the donation of space and equipment, collaboration on new standards and protocols would fall into the category of strong partnering engagement.

The world headquarters of Red Hat is located in a separate facility. Red Hat, co-founded by an NC State graduate, is a leader in the open source software using the Linux operating system. Another company, MeadWestVaco moved all of its research, development, and marketing facilities onto Centennial Campus to create its Design and Innovation Center. MeadWestVaco works with faculty and students in five colleges.

Research Park of the Future. The Centennial Campus is the Research Park of the Future in that it creates an extraordinary level of both virtual and real proximity to the university's academic and research strengths and its students and faculties. The open innovation model applied in this setting accelerates technology and knowledge transfer processes from idea to execution, from laboratories to businesses and consumer use, and concept to innovation.

The culture of the academic university in multiple relationships is reflected in the Biomanufacturing Technology and Education Center (BTEC). BTEC provides a combination of lab and class work for high skilled jobs in North Carolina pharmaceutical companies. It replicates an operation capable of producing biopharmaceutical products and packaging them in an aseptic environment.

The Future of Centennial Campus. To honor the vision of Governor James Hunt, NC State requested state appropriated funds to build the James B. Hunt, Jr. Library on the Centennial Campus. This \$110 million facility designed by Snoheeta, is under construction and will be completed in 2012. Long range plans include the development of a conference center and adjacent hotel. This facility will be built by the private sector and increase access to the executive education programs.

We also have a long range vision for the Centennial Campus that includes a projected 12,500 corporate and government employees, 12,500 university faculty, staff, post docs, and students, and over 7,000 housing residents. Additionally, 2,400 support services personnel will be involved in the day to day life of Centennial Campus.

The Association of University Research Parks (AURP) named Centennial Campus the Outstanding Park of the Year 2007. However, it is not just a research park, it is an educational campus on which students of all ages and fields are taught, and research and public/private partnerships generate new knowledge and communicate that knowledge to students and industry, and create jobs through the creativity and innovation of the faculty and industry.

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O-068

The Impacts of Seed Grants as Incentives in the Knowledge Transfer Process

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Introduction

Creating incentives for faculty program development is a strategy often used by administrators in research and knowledge transfer offices. By using seed grants, matching funding, return of overhead funds, allocation of equipment and space, some believe that one can "nudge" faculty in directions that an institution considers high priority; however, the justification of such

incentives is often based on a philosophical position rather than statistical data.

This paper evaluates the impacts of the 80 seed grants provided by the University's Office of Extension, Engagement, and Economic Development from 2004-2009 to faculty and exempt professionals. Such competitive seed grants are available for innovative program development, professional development of the faculty member to strengthen skills in extension, curricular engagement in which students participate in community-based research, and partnership development - a crucial element in collaborative interdisciplinary and engaged programming. Proposals must address the use of seed funds to achieve sustainability through partnerships and internal or external funding sources.

Focus. The core hypotheses are that seed grants in extension, engagement and knowledge transfer will stimulate faculty interest in the third mission of the university, serve as incentives to develop programs, result in new partnerships, and serve as a platform to build a larger externally funded program in knowledge transfer and outreach activities. Few studies have treated these hypotheses in a testable fashion.

Research Review. Tornatsky, Waugaman, and Gray (2002) and Zuiches (2009) have argued that specific organizational structures and processes, such as incentives, must be in place to create a positive environment that encourages innovation, engagement, and beneficial impacts. A recent session at the National Outreach Scholarship Conference (Bruns and Kalivoda, 2008) was devoted to understanding what incentives exist to encourage the scholarship of engagement. Although the session identified multiple incentives, no evaluation of the impact of these incentives was provided.

The methodology includes a detailed analysis of the 80 grants awarded over the last five years, measuring the increase in number of applications and the success in bringing new faculty to the knowledge transfer process. It evaluates the development of partnerships with government, non profits, private sector, and other academic units and the likelihood of generating external grant proposals, awards, and impacts.

Results. First, an analysis of all five cohorts demonstrated an increase over time in the number of applications from colleges across the university. The average size of seed grant awards was \$8850, and range in size from \$2500 to \$10,000. Second, the 80 seed grant awards resulted in 95 percent of project leaders applying for at least one additional grant to support the effort. Detailed analysis of 29 awardees in the first two cohorts showed 93 percent applied for added funding, and 48 percent were successful. This success, moreover, often involved multiple grants, cumulating over time. Third, even for projects unsuccessful in growing programs with added grant funds, the creation of partnerships and the ability to generate funds from gifts and fees often sustained the program. Some programs have been terminated as faculty left the institution or simply completed the project.

A partial analysis of 47 of the 80 seed grants, by Lloyd (2009), showed that every grantee engaged others as partners, either internal to the University or externally. Partnerships included government agencies (30%), nonprofits (28%), business sector (30%) and student organizations (12%). Approximately 1/3 of the grants also generated a secondary partner, principally with Cooperative Extension. Overall, 69 different partnerships were developed to implement the projects. The full study will examine all 80 seed grants.

In a detailed analysis of individual projects, specific faculty have been extraordinarily successful in extending their programs beyond that of a seed grant. Three excellent examples include seed grant funding for forensic anthropology that resulted in a Center for Forensics Research and Education, and a recent NSF \$1.3 million grant to strengthen forensic sciences. Second, seed funding was provided to the General H. Hugh Shelton Leadership Initiative, which is now a Center and has developed four Shelton Challenge Summer Institutes for high school students - completely funded by gifts and fees. Finally, in the College of Design, a faculty member has built on one seed grant and generated eight community-based projects, leveraging \$247,000, and involving dozens of students.

The continuing analysis of the 80 seed grants will extend beyond anecdotes, aggregate the results, and further test the hypotheses outlined earlier, including a comparison with non-awardees and their external grant efforts.

Such a serious statistical analysis will contribute to our understanding of the role of seed grants as an incentive to support or change faculty efforts in the knowledge transfer process, outreach, extension and engagement programs.

Implications. So far, these results argue for a continuation, if not an expansion, of the seed grant program.

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