

Academic entrepreneurship in developing countries: the case of an Entrepreneurial Department

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ABSTRACT

The evolution of national innovation models expands the roles of the actors of innovation. In particular the triple helix model defines entrepreneurial universities as institutions that not only transfer knowledge in classrooms and scientific publications, but ones that engage in economic development through intertwined relationships with governments and industries. The typical cases describe the transformation of traditional universities into entrepreneurial universities following a top-down strategy with a strong leadership spreading such vision; however, many other cases of academic entrepreneurship follow a bottom-up approach. This article presents a case study of an academic department of a public university in a developing country describing one style of entrepreneurship from the bottom up. The importance of describing bottom-up approaches relies on the heterogeneity of the cases found in the literature, which in most cases are the way in which academic entrepreneurship is established in developing countries where the effects of innovation are necessary to increase their socio-economic growth.

Subtheme: Triple Helix practice and experiences

Keywords: Entrepreneurial University, Entrepreneurial Department, Triple Helix, University Transformation, National Innovation Models.

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Introduction

In the context of a knowledge-based economy in which production, diffusion and transfer of knowledge is key, more and more universities plan and develop entrepreneurial strategies (Rod 2006) that bring closer university and industry. The phenomenon has been explained by researchers as a response to a number of factors like reduction in public moneys (Mowery et al. 2001), need for income sources diversification (Bercovitz et al. 2006; Bernasconi 2005), and the pressure to increase the number and significance of the outcomes of public investment in science (Lazzeretti et al. 2005). Traditionally, the missions of research and teaching have been associated to universities to endow societies with skills and ideas for innovation that come from basic research (Göransson et al. 2009), while the entrepreneurial role is assigned to the industry which exploits the ideas coming from science and combines them with other productive factors to add value and bring economic welfare under a linear innovation vision (Godin 2006), or a non-linear perspective including improvements in the productive processes (Mahdjoubi 1996).

In contrast with the traditional configuration of national innovation models, the entrepreneurial university takes a proactive role in innovation, since it is not only a source of ideas that industry will further develop, but also an innovator agent performing basic and applied research and transferring the knowledge that comes from the collaboration with the industry and government. The partnership with the industry in the roles of innovation and economic development has not been far from controversy. The most conservative scholars argue that the entrepreneurial university may lose objectivity, independency and quality in research (Armbruster 2005; Washburn 2005), but many other authors highlight the benefits of alliances with industry regarding income generation and diversification, better approximation to real world topics for research and a faster knowledge transfer. In the last scenario, governments help to coordinate the actions of universities and industry by taking part in the alliances, as well as supporting the areas of basic research that result too risky or not attractive to be financed by privates (Etzkowitz et al. 2000), securing a balanced development of knowledge and innovation.

In developed countries, the entrepreneurial university as part of the national innovation models usually emerged from top to bottom, that is, from a university president or dean that promoted and guided the transformation of a traditional university (Lazzeretti et al. 2005). In developing countries, the emergence of the entrepreneurial university as part of the national innovation model seems to happen from bottom up, starting with small groups of researchers or academic units that initiate small knowledge transfer projects and slowly embrace third mission activities. Despite our best effort, we have not found bibliographic insights to explain the differences in establishing the entrepreneurial academic model, but from the observation and experience, the phenomenon may be explained by the number of doctorate researchers that are available for further development and the materialization of their scientific findings. Doctorate scholars find attractive opportunities in developed countries, while in developing countries the same individual may need to use time in consulting and in private projects to achieve a similar level of personal income and status. It is also worth to note that academic entrepreneurship not only follows a different path in developed and developing countries (top-down or bottom-up), but also seems to be based on different sets of factors facilitating academic entrepreneurship, which will be discussed later on. With the background of their own socio-economic-political context, universities around the world design and implement plans and strategies to transcend in national innovation models. The entrepreneurial university described in the Triple Helix model of innovation may be especially difficult to replicate in a developing nation, where cultural barriers and limited endowment of resources impose additional barriers to the complex and heavy/slow institutions averse to risk and comfortable with the performance of first and second missions. It is especially true in developing countries that the association to the entrepreneurial university paradigm is given by the activities performed by small academic units such as research centers, spinoffs, or private initiatives of research groups, however it may not be easy to find examples of entire universities with the entrepreneurial vision, mission and practice.

In this paper, we propose the study of smaller units inside universities as the foci of academic entrepreneurship and innovation. The small academic units may be constrained by the access to resources or by strict regulation and norms; however, these units can be more flexible and manageable while defining and implementing strategies for entrepreneurship, or at worst, produce minor damages when the strategies fail. We propose that the study of academic units smaller than the entire university can be good pilots to study the feasibility of implementing the key success factors described by Clark (Clark 2005), namely: diversification of income sources, strengthened steering capacity, extended developmental periphery, stimulated academic heartland, and embracing entrepreneurial culture. In order to explore and shed light on the feasibility of entrepreneurship in small academic units, the researchers responsible for this study described and documented the case of the Department of Management Control and Information Systems (DMCIS), at Universidad de Chile as a successful entrepreneurial department.

Background

The entrepreneurial university, contrasting the traditional teaching and research university, is generally seen as the educational entity that generates financial resources to cover operational expenses and re-invest the fresh funds in research (Chukumba et al. 2005; Meyer 2003). However, the entrepreneurial university is not just a self sufficient entity, but one core piece in national innovation system (Etzkowitz et al. 2005). It interacts with industries and governments to increase the social benefit from basic and applied research by speeding up and integrating different forms of knowledge and technology transfer. Performing the entrepreneurial role in society is often associated to the industry, but not to the university, generating controversy among the most traditional and conservative researchers regarding the independency, objectivity and quality of research (Armbruster 2005; Washburn 2005), when faced with the idea of an entrepreneurial university. In spite of the opposite opinions, whose analysis is not the aim of this study, a marked trend to transform universities into entrepreneurial ones is evidenced in the steady growth of conferences, academic publications, institutes, and cases documented (Cooke 2006; La Paz et al. 2009; Leydesdorff 2006; Tobia 2006)

In order to embrace entrepreneurship, universities design and implement entrepreneurial plans, which generally follow the logic of maximizing the facilitators and minimizing the barriers to entrepreneurship (Ramaprasad et al. 2007). The most typical facilitators identified in the literature are: creation of spinoffs, professional management of spinoffs, support for applied research, facilities for entrepreneurship, multidisciplinary research teams, development of biotechnology, computer technologies and material sciences, internal and external policies to defend intellectual property rights, entrepreneurial culture and support from the authorities (Clark 2004; Chukumba et al. 2005; Meyer 2003; Schulte 2004). Also, we can list the most common barriers identified in the literature: exclusive focus on basic research, unwillingness to change, great negotiating power in the industry, silos of knowledge, and in general, the absence of facilitators (Chukumba et al. 2005; Schulte 2004; Schutte 1999). If we describe the entrepreneurial university as one that coordinately maximizes facilitators and minimizes barriers to academic entrepreneurship (Ramaprasad et al. 2007), even so it is not certain to reach an advanced stadium of entrepreneurship especially when the entities to transform tend to be bulky and complex, where the culture is risk averse and the vision of embracing a third mission is often criticized (Armbruster 2005; Washburn 2005).

Analyzing the literature, we recognize common factors in developed countries, like the U.S., Sweden, UK, Canada and Australia, where the academic entrepreneurship is developed either on a top-down basis (Sutz 2000) with a national vision for academic entrepreneurship, or on a laissez-faire basis, in which the university is free to perform with limited or no constrains (Atkinson et al. 2010; Etzkowitz et al. 2005) as long as they have the culture and resources. A different situation is increasingly described in entrepreneurial university literature of cases established in developing economies, where the attempts to start up academic entrepreneurship are constrained by a lack of resources, ineffective incentives structures, early stage of entrepreneurial

culture in academia, and deficient legislation to protect intellectual property, just to mention the most relevant. In the last cases, attempts to catch-up the more advanced national innovation models through academic entrepreneurship seem to emerge in a bottom-up manner (Sutz 2000). For example, Federal University of Itajubá, in Brazil, initiated small entrepreneurial projects, such as the transfer of restaurant and cafeteria administration to alumni centers, which became into a management lab for students in business courses and industrial engineer (Almeida 2008). Other documented case is the relationship established between wool producers in Uruguay with academia through a small company connecting both actors to develop a device for quality control using a new treatment (Sutz 2000). Saad et al. (2008) describe the Malaysian and the Algerian experiences in establishing entrepreneurial universities. In both cases the support coming from the top (government) to assist the third role of universities and foster university-industry relationships exists; however, the impact of entrepreneurial universities in developed countries has not been replicated in Malaysia and Algeria, due to cultural limitations, bureaucracy, and statist control.

In spite of recognizing entire universities as entrepreneurial, the association of universities to the concept of entrepreneurship tends to base this concept on the performance of smaller units like research centers, institutes, or technology transfer offices, but not necessarily on the whole university. As mentioned, in many cases of universities situated in developing countries, the transformation of universities is a bottom-up process, and therefore, based on the performance of those small units that somehow can transmit and spread their vision across entire institutions. The present article proposes the study of academic units smaller than the university as the seeds of academic entrepreneurship, to test whether the same facilitators and barriers described in the literature of entrepreneurial universities are necessary and sufficient, and whether the five elements described by Clark are present in the spring of an entrepreneurial department.

Methods

The case study has been an essential method for the study of the social sciences (Denzin 2005; Miles et al. 1994; Yin 1994), and particularly, the national innovation models. In the Triple Helix conferences and scientific literature, a reported number of case studies reported this methodology as appropriate to describe and discover the complex relationships of variables under different legal, cultural, or political contexts that influence the outcomes of innovation and entrepreneurial university models. For example, in the University of Linköping, the School of Medicine pioneered in generating linkages with the industry and then other schools replicated the experience (Feldman 2007), while the University of Twente succeeded in invigorating socio-economic development and even recovery of a depressed industrial local economy with the transformation of the university (Lazzeretti et al. 2005). In order to discover the factors and their relationship that make possible academic entrepreneurship in units smaller than the entire university, the investigators responsible for this study argue that the case study method is appropriate to face the challenges proposed by our research question and to find evidence that help us explain and model bottom-up approaches of university transformation.

In developing counties, we think it is fundamental to develop a research track focused on the study of cases that explore, describe and model the influencing factors of successful academic entrepreneurship, and the roles that entrepreneurial universities can play in local or national innovation models. The same way as in Europe, America and incrementally in Asia the societal support for the development of entrepreneurial university (either in a top-down or laissez faire manner) has been one key to describe and prescribe relationships among governments, universities and industry, the organization of actors in developing countries within the appropriate frameworks will provide direction to the efforts of fostering innovation at the national level.

The empirical part of the manuscript is based on primary and secondary data collected and analyzed to describe the case of the Department of Management Control and Information Systems (DMCIS) at Universidad de Chile. DMCIS has designed and implemented an

entrepreneurial strategy almost from scratch as a vanishing department to one that currently grows in publications, academic programs, students, consulting, financial incomes and visibility. As a fast growing academic entrepreneur, DMCIS is an interesting case to document and analyze. A qualitative approach is adopted to investigate the data coming from semi-structured interviews with actors related to the spring of DMCIS's experience such as former Department Head and Faculty Dean, directive team in the early stages, and the president of Universidad de Chile. Also, data about publications, press articles, financial data, and human resources records (FEN 2009) was analyzed to reinforce the internal validity of the present study and its results. Currently DMCIS is an academic department that grows in prestige, faculty body, publications, students, income generation, and diversification of income sources, moving quickly from Mode-2 to Triple Helix model.

Case Study

The creation of Universidad de Chile in 1842 is recognized as one milestone of the Republic of Chile. Since its establishment the university has taken a key role in the socio-political-economic development. Until now, Universidad de Chile is the most important public university and one of the two most important traditional universities in the country. Part of the formal mission declared by Universidad de Chile is defined as *“assume with excellence the formation of people and the contribution to the spiritual and material development of the nation, by means of teaching, research, and creation in science, technology, liberal arts, arts, and the service of knowledge and culture in all extensions”*. The strategic objectives describe a complex university, among which we can mention “to be an integrated and transversal university”, “recognized as the university with the best academic body in Chile”, “nurtured by talented academics in research”, “performing research, creating top-level graduate programs”, and “be a sustainable university that assures resources management and academic autonomy”. The funding of public universities in Chile follows the global decreasing trend in the last decades, which has been described as moving from a state-funded to state-supported to state assisted (Economist 2005). In 2009, the income coming from the government reached 15% of the budget, while the remaining 85% was generated autonomously through the first, second and third mission activities. In spite of the reduced income from public sources, Universidad de Chile is accountable for the use of its total income, and restricted to the norms and controls of any public institution. At the same time, the private university sector has grown rapidly over the last two decades with freedom to operate, even if they receive some state funding.

The complex situation of structure and control with scarce provision of resources forces the academic authorities to foster autonomy in decision making at each Faculty, so they can generate the necessary funding for operating and keep growing. Independency is understood as freedom within the public sector normative framework, but at the same time, creates enormous differences in infrastructure, financial and human resources across the thirteen Faculties of the University. Each Faculty and their Academic Departments is then the core of funds generation and strategic planning to achieve the strategic goals of the university.

The Faculty of Business and Economics (FBE) was founded in 1934, the first of its kind in Chile. In the classrooms of the Faculty of business and economics of Universidad de Chile studied two Presidents of Chile, four Ministers of Economics, and five presidents of the Central Bank. Such leading position has been affected in the 80-90's decades, falling in the national and international rankings, and being surpassed by other two private universities in Chile, and by several others in Latin America. The situation has been reverted to re-position the Faculty at the top of the ranks in 2008.

FBE defines itself as a research and teaching institution, which offers three undergraduate programs and fourteen graduate programs in the areas of finance, economics, taxation, management, human resources, marketing, public policy and health management. In FBE, three academic departments conglomerate the researchers and disciplines relevant for FBE.

Operationally, each academic department is considered as an independent unit from each other, and is responsible for providing qualified Teaching Assistants to the different programs at FBE. The Faculty provides resources to each department resources that come from the public budget or from tuition collection, granting to each unit the freedom to generate additional resources that contribute to achieve the strategic mission and vision of the university.

The Department of Management Control and Information Systems (DMCIS)

DMCIS was created in 1991 to support the recently created undergraduate program named Engineering in Information and Management Control, which was also linked to Accounting. The main purposes of such decision were to differentiate the Faculty in the market, and to provide a response to the emerging requirements of the Chilean society for a professional capable of understanding technology, business and their relationship. The core areas of knowledge in DMCIS are: accounting, taxation, management control, and information systems. In order to establish the department basis, scholars with a strong focus in teaching from the School of accounting and auditing were hired.

Since its creation and until 2003, DMCIS was characterized as a teaching department, where the scholars were neither motivated to do research, nor the direction provided resources for investigation. In the same way, there were no incentive tools or controlling measures to foster research activity, and the twelve people in the department (6 Assistant Professors, and 6 Teaching Assistants either studying abroad or applying to doctoral/master programs), still saw their main and almost only contribution in undergraduate teaching activities. The lack of incentives may be traced back to the scarcity of resources, because DMCIS had an income generation as low as 40% of its budget while the FBE complemented the 60% necessary to cover the operations. These percentages are usually reversed in other departments, with an approximated 70% in autonomous generation and 30% of centralized support.

In the early 2000's DMCIS was perceived by FBE's authorities as an academic unit which contribution is in teaching undergraduates only, but not in scientific knowledge creation or diffusion, neither increasing visibility in the market, nor creating links with the industry for knowledge transfer. At the same time the other two departments in FBE were in a more advanced maturity stage with doctors performing activities in teaching and research, as well as creation of research centers, graduate programs, and formation of new academic breeds with doctoral students abroad in prestigious American and European universities. Entering in the XXI century, FBE urged to improve its prestige and reposition at the top-level of the local and international rankings. In such scenario, DMCIS was seen as an obstacle to achieve the goal for leading in prestige, because after twelve years of operations its main contribution was in undergraduate teaching, but all other expected contributions were not significant. In the words of the Dean at the time *"FBE was ranked second in Chile, and risking to be in the third position behind an emergent private university. Among the departments of the faculty, DMCIS was the weakest in several dimensions like a poorly endowed faculty body and no history of journal publications"*. Under the revealed perspective of DMCIS' performance emerged the idea of reconsidering the existence of the department and redistributing the budget to more successful units. The conclusion shared by the dean and the scholars in DMCIS was to *"leapfrog or disappear"*, even jeopardizing the existence of the undergraduate program.

At the time of the survival challenge for DMCIS, scholars recently incorporated faced two alternatives: *"move to another department in the Faculty or another University, or propose and execute an accelerated development plan for DMCIS"* (Assistant professor hired in 2002). PhD students abroad considered that working for DMCIS *"was not a real option to go back and settle"* (Instructor at DMCIS in 2003). Committed to preserve the existence of DMCIS and make it grow quickly to support and contribute in achieving the strategic goals of the university, three assistant professors formulated and presented an innovative project to the Dean. Facing the possible scenarios and the plan, the Dean believed in the plan and fostered the scholars to execute it as soon as possible to show the results that came quickly and are described later in this manuscript.

With the election of a new Head of Department for DMCIS, a three-stage process started with a re-structuring, followed by a development phase, and a currently ongoing consolidation phase.

Phase I 2003-2006: Restructuring

The new Department Head and the scholars engaged in the project faced a financial deficit for close to 20% of the annual budget, and a poorly defined department in terms of its core areas of interest, mission, and strategic objectives. Therefore, the first stage is characterized by targeting the equilibrium between the academic development and the need to generate income to finance research activities, teaching and projects. In this sense, the concrete aim was to generate the necessary funds to reach a publication rate similar to the other two departments in FBE in a timeframe of six years. Such ambitious goal required a new business model, certainly risky, but one that permitted DMCIS to do what a department had to do, and not just what the resources provided by FBE allowed.

The first change in DMCIS' business model was the definition of the expected contribution of each scholar, forcing each person to move from a passive position secured by a small but stable basic wage, to a proactive one, in which personal income depends on individual and collective performance, and aligning personal income with generation of department resources. A second change was to define and establish a number and areas of expertise of new scholars to be hired or formed. In order to achieve the second, DMCIS needed to succeed in the first, since attracting doctorate researchers implied increasing the salaries and general conditions for research.

Re-structuring also implied radical changes. After the new conditions for scholars, DMCIS was composed by five assistant professors including one person new to the department, and three doctoral students in Europe and America. The remaining group established a normative framework and hired three professionals to deploy the income generating unit based on Executive Education programs in the areas of interest of DMCIS. At the same time, DMCIS promoted the creation of an autonomous private unit that would support the growth by means of facilitating the operations of Executive Education Unit. The autonomous private entity presented great advantages compared to the traditional FBE instances to collect tuition and compensating faculty members for teaching services beyond their contracts. The private non-for-profit corporation allows FBE and DMCIS compete with other universities that due to their private nature, are not accountable to the state by their income generation and faculty body compensation systems.

By the end of 2006, DMCIS presented interesting results achieving 50% of the research goals proposed to the Dean, and structuring the department with ten assistant and instructor professors with doctorate or in the final stages of their academic programs, and five teaching assistants enrolled in PhD programs abroad. Also, two Master of Science programs were designed and approved to start in 2007, expanding the teaching activities from undergraduate and executive education to graduate programs. Along with research and teaching activities, financial performance improved as well. FBE increased the budget assigned to DMCIS in 180%, and the income generated internally with the assistance of the private corporation and the professionals in charge of the executive education unit raised in 2.300%. With the so far outstanding financial performance, DMCIS assigned research funds to each investigator, and allocated resources to create three research centers related to the areas of interest. Although it was not the primary focus, DMCIS appeared in the media and supported the visibility of FBE.

Phase II 2007-2009: Development

In 2007 DMCIS was already considered by the Dean as a robust and reliable project that supported the achievement of institutional goals, and was self sufficient to explore the incorporation and formation of new faculty members. The faculty body in DMCIS reached twenty assistant professors and nine teaching assistants coursing PhD studies abroad in prestigious universities; also five adjunct collaborators were incorporated to support teaching and research

activities. The two new Master of Science programs enrolled the first generation of graduate students, with an important number of participants in their first versions, and the undergraduate program gained a greater number of courses offered by DMCIS' professors with doctoral degrees, which increased the quality in education and the demand of prospective students. Figure 1 describes the evolution of DMCIS' faculty body composition.

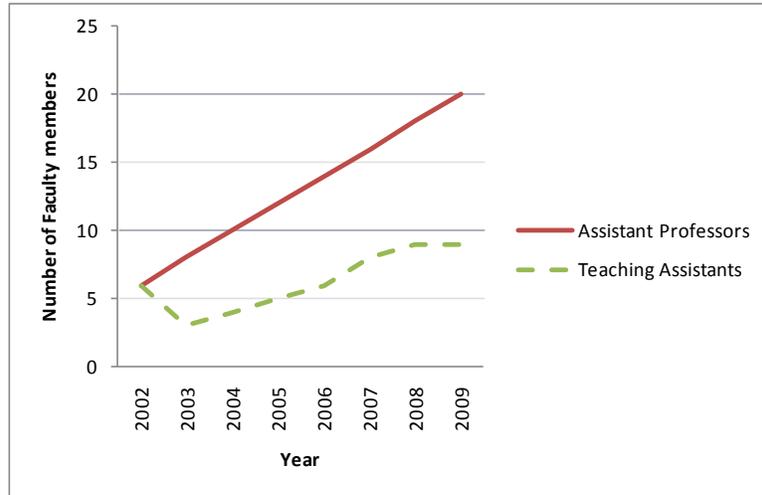


Figure 1. Faculty Body composition

The increasing availability of financial resources brought by the Executive Education Unit allowed DMCIS to increase the salaries of its faculty body, and provide funds for research projects and attendance to international conferences, expanding the possibilities to publish in ISI journals by means of research quality and networking. All the mentioned effects are positive; however, they convey a risk not identified so far: concentration of income sources on teaching activities. To manage and reduce the risk, the department created in 2008 a new unit for Project Development with two main objectives. The first is to explore new business areas of operation that bring fresh resources and diversify the income sources. The second is to better connect DMCIS with the market, so that applied research is meaningful to the companies seeking consulting services. Figure 2 shows the growth and sources of income in DMCIS.

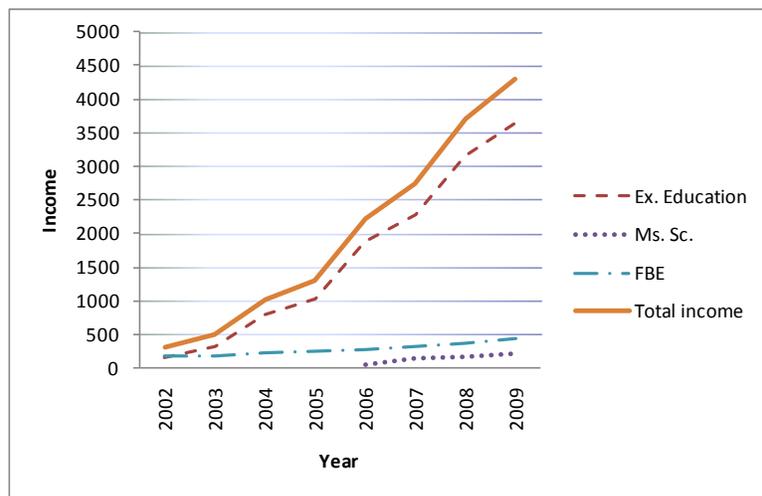


Figure 2. Income Generation

By the end of 2009, all numbers measuring financial and teaching performance of DMCIS demonstrate the successful implementation of the first two stages of the original project. Indicators are also auspicious in terms of media and visibility, number of students in undergraduate, executive education and graduate programs, but all the dimensions mentioned are benefited from a long term indicator of publications that strengthens prestige in the market, national and international university rankings, and academic community. Figure 3 describes the increase in research and publication activity. It is worth to mention that in research activity and publications DMCIS achieved in 2007 its goal of publishing at the rates of the other departments in FBE.

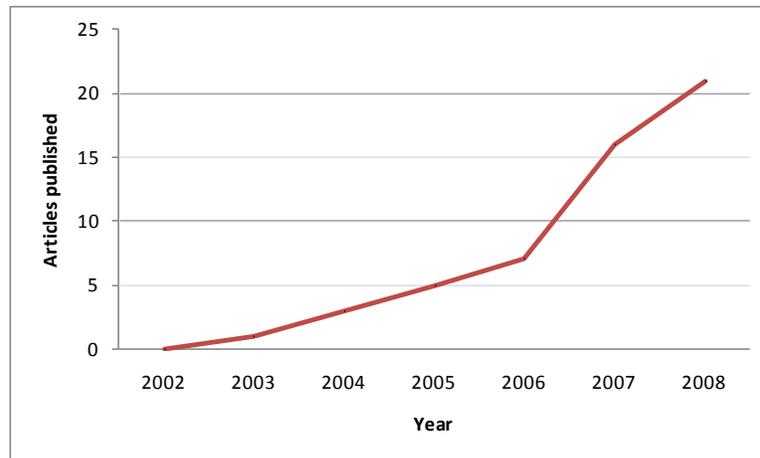


Figure 3. Journal Publications

Phase III 2009 to present: Consolidation

The consolidation phase started in June of 2009, with the milestone of electing a new head of department at DMCIS. The change responded to the need for a different type of leadership after successfully performing phases I and II and reaching the financial stability that DMCIS required to expand its core areas in research and teaching. We believe that the current phase can be more extensive and complex than the previous processes due to new forces affecting DMCIS.

From the financial perspective, DMCIS has reserves to assure operations for the following four years; however, its business model in executive education and projects development produce the margins to continue with the research and teaching activities without using savings. At the time this article was written, the faculty body was composed by 20 professors (2 Associates, 11 Assistants, and 7 Instructors), 8 young talents in the academic formation program, and 4 adjunct investigators. Finally, the composition and financial stability of DMCIS assure that this department makes contributions in the areas committed to FBE and Universidad de Chile in terms of publications, visibility, teaching quality in all programs, and income generation. The department gained its prestige in the Faculty and the market segments as a leader in the disciplines in which participates, being for example the first option for professionals pursuing executive education in Chile.

In spite of the auspicious statistics and perceptions, DMCIS faces today a number of risks to be managed to maintain the leadership and keep growing in prestige, visibility and support to achieve institutional goals. We categorized and described the risks as endogenous and exogenous. Among the many factors of success, the increase in number of faculty members is one key factor that allows growth in all missions; however, the incorporation of new members according to the plan that targets a composition with specialists in the four areas of interest (accounting, taxation, management control, and information systems) also needs to find the equilibrium in the dimensions related to the missions of the university, that is to say, teaching,

research, and extension. In order to do academic research and the activities associated (like attending conferences), DMCIS needs to generate resources, but in order to generate resources the department needs to involve the researchers in teaching and extension activities that consume the time and energy of researchers, exposing DMCIS to the risk of unbalancing performance towards income generation and reducing academic production. Equilibrium not only means having a balanced number of experts in each area, but also having experts who at least outperform two out of three missions, and fairly rewarding their contributions. Additionally, bringing new people into the organization presents the challenge of understanding and managing cultural changes, since the newcomers not necessarily know the history and achievements of DMCIS, or the strategic plans being executed. Along with the number of experts, the department becomes a more complex entity. Small groups (as in 2003) are easier to align, but as the human group increases in size and complexity, it is necessary to manage the leaderships and interests to a shared mission, avoiding or minimizing internal conflicts.

Exogenous forces appear as new variables to observe in the equilibrium. Before its growth, DMCIS was not perceived as a relevant actor, and its actions and strategies were designed, decided and executed without objections or observations coming from other units in FBE or the University. The prestige and positioning achieved make DMCIS a relevant and visible actor, empowered by its academic production and financial contribution changed the framework and distribution of decisional power inside FBE. Recognizing such forces and managing the politics requires new elements to study and define in the original project presented to the Dean of FBE in 2003, which will be considered in this study as consequences of maturation and consolidation.

Finally, visibility and income generation in a public university convey great responsibility before the State and the public opinion. In response to visibility and responsibility, the concept installed by the present authorities in FBE and DMCIS is to be cautious and transparent in performing all the activities that either generate or consume resources. If one thinks about the concept, it may be considered as a barrier for rapid growth, but it is actually a functional barrier that helps to protect DMCIS' image and financial health. Certainly, some business processes can be delayed by bureaucracy, but in the long term, such cautions assure that the image of DMCIS will be preserved and perceived as positive by all the stakeholders, ranging from prospective students to companies and government.

Conclusions

The further development of national innovation models, and in particular the triple helix, has gained increasing interest over the last decades. One important actor in innovation models is the university, to which triple helix calls entrepreneurial university. Our study proposed as unit of analysis a smaller unit inside the university, the entrepreneurial department as a way to invigorate innovation and create ties with industry and government to transfer knowledge with a bottom-up approach.

The relevance of describing and illustrating the bottom-up approach to incorporate the entrepreneurial concept in the university is especially critical in developing countries in which many times the initiatives for innovation emerge from personal or small group's initiatives instead of central policies from governments or top levels in universities. Bottom-up experiences of academic entrepreneurship seem to be heterogeneous, and therefore more difficult to generalize that top-down cases. The major contribution of this article is to demonstrate that small units like entrepreneurial academic departments can embrace the entrepreneurial vision and can be a start point to move from traditional university to an entrepreneurial one. The implementation of such approach, if well planned and managed, has the potential to strengthen the relationship with industry and government, to spread the entrepreneurial vision to the larger organization, and generate virtuous circles in revenue generation and academic production as part of socio-economic development. Also, reporting bottom-up cases of academic entrepreneurship can be

interesting as reference models to other faculties in situation of reduced budgets, and low academic production.

The case of DMCIS describes a particular form of entrepreneurship, not based on research outcomes in a first stage, but on its strengths in teaching. The key drivers of entrepreneurship at DMCIS are a) exogenous forces jeopardizing its existence, b) design, execution and control of a strategic plan, c) collective commitment to the plan designed, d) autonomy to make decisions and take responsibility for the outcomes, e) laissez faire type of support from the dean based on the quality of the strategic plan, and f) use of an specialized and independent unit to professionally manage the business of executive education. The drivers of successful entrepreneurship presented in the case are consistent with Clark's findings; however, consolidation does not assure stability, due to the reactions and actions of other actors affected by the decisional and political power re-distribution.

The implementation of the entrepreneurial strategy is not risk-free. In fact, several difficult decisions were needed to come up with a sound plan to convince the dean to support DMCIS. The first phases completed in the development of the department to foster the quick growth used as few rules as possible within the normative for public institutions; however, new definitions and decisions need to be made after the successful growth to properly manage the new resources and keep the balance among the research, teaching, consulting, and extension activities. It is remarkable that even under strict external regulation DMCIS is an innovator in strengthening the relationships with Government and Industry, and today, the same control in the use of financial resources is considered functional because it secures its rational use.

The researchers responsible for this study perceive a positive contagious effect to other departments in FBE. The successful development of DMCIS motivated the academic publication and income generation in other departments, which hopefully could be extended to other faculties in Universidad de Chile, and replicate the entrepreneurial bottom-up experience. The case describes how innovation and the entrepreneurial vision of DMCIS contributed to the re-positioning of the Faculty amongst business and economics faculties in local and international rankings, and what the success factors of the entrepreneurial department were.

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