

University-industry-government linkages - the internacionalization case of Pipeway Engenharia.

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Subtheme: - University-industry-government linkages.

Abstract

This paper presents the case of internationalization of Pipeway Engenharia Ltda 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.

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 Business, Idoborg, Sweden, 2001. RENNIE, M. Global competitiveness: Born Globals. McKinsey Quarterly, 4, p.45-52. 1993. Etzkowitz, Henry, 2008, The Triple Helix – University-Industry-Government Innovation in Action. Routledge. Etzkowitz, Henry, and Loet Leydesdorff (Editors), 1997, Universities in the Global Economy: A Triple Helix of University-Industry-Government Relations. (Cassell Academic, London).

The methodology of case study prioritizing qualitative character. The focus of research is the influence and importance of the Triple Helix in the process of internationalization of the company. 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. 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.

Keyword Description: Oil and gas industry; transfer of knowledge; internationalization of business and global company.

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1. Introduction

This article describes the process of internationalization of Pipeway Engenharia identifying the importance of technology developed through partnership between Government-University-Company. The article aims to understand the process of internationalization of a Born Global firm and identify, from the perspective of the theories presented, as the concept of Triple Helix supported this process and helped Pipeway to position themselves in the international market.

The studies of internationalization of firms themselves began in the 60s with the aim of analyzing the movements of capital, goods and services among nations (macroeconomic factors) and, subsequently, microeconomic factors (eg. the pricing of products) were also studied, giving rise to the various classical theories and empirical use today, as well as their differences and disputes.

At first, it is believed that these theories of the internationalization process are divided into two major groups of theories: The Economic Theories and Organizational Theories.

The study then proposes to investigate the role of technology (born from the concept of partnership Triple Helix) in the process of internationalization of a firm "Born Global", Dib (2008). For this, we performed an analysis of the internationalization process of a Brazilian company that operates in the service sector (inspection / maintenance of pipelines) in the area of oil; characterized by significant technological advances, having started its internationalization less than three years after its founding, and currently has more than 40% of its revenues from overseas operations.

With reference to the first years of operation of Pipeway can say that they were marked by technological challenge to develop and implement a new pipeline inspection tool initially for the Brazilian market.

Overcome this initial challenge, the technological factor then becomes the great advantage of the company ahead of its competitors, namely, the advantage of ownership (technology) of the Eclectic Paradigm of Dunning (1988) and subsequent Internalization of the Buckley and Casson (1976) are presented as fundamental characteristics of the internationalization process of Pipeway became the keynote of the company until the present day.

The Pipeway's customers include large companies such as Petrobras. Currently, it also provides services throughout Brazil and almost all of Latin America and has subsidiaries in Argentina and the United States. Nevertheless, the company also provides tools (equipment) through leasing Partner worldwide presence and prospect opportunities in areas that concentrate the exploitation of oil and gas, for example, Gulf of Mexico, North Sea and west coast Africa.

2. Research Problem

Identify the role of Triple Helix in the internationalization of "born global" Pipeway.

How the Triple Helix influenced the process of internationalization of the company, identifying the process of creating Pipeway and how the relationship between university, company and government can generate differential for high tech companies which by virtue of its market and world trends, born increasingly global?

3. Objective

The research aims to describe and analyze the influence and importance of the relationship Triple Helix in the internationalization process of a Brazilian company active in the market inspection/maintenance of pipelines, the Pipeway. We also intend to investigate how the roles of government, university and company were instrumental in generating the technology, knowledge and philosophy of the company especially in its internationalization process. Moreover, it aims to contribute to a better understanding of the impact of the relationship between industry, academia and government in the process of internationalization of Brazilian companies.

3. Theoretical

First, the study starts with the Economic Theories and their main line of research, the Eclectic Paradigm of Dunning (1988). Later, make a brief summary of Organizational Theories and the Phenomenon of "Born Globals" for being Pipeway of a company classified in this category by Costa (2010).

Continuing the formation of theory in this study follows a brief description of the Triple Helix concept.

3.1. Economic theories

Economic theories have their origin from the eighteenth century based on macroeconomic factors, such as the Industrial Revolution, having been the first theories of the internationalization process of firms to be studied more consistently.

However, it was only from the work of Heckscher and Ohlin (1950), with its Proportion Factors and Linder (1961), with the idea of similarity of Demand (Cancellier; NETO, apud Machado-DaSILVA; SEIFERT, 2004) which is can say that there was the actual beginning of the economic theories of internationalization are currently using.

Among the various existing economic theories we highlight the Theory of Market Power of Hymer (1960, 1976), Theory of Internalization of Buckley and Casson (1976, 1998), Theory of Transaction Costs of WILLIAMSON (1975), Eclectic Paradigm of Dunning (1977, 1980 and 1988), among others.

3.1.1. Eclectic Paradigm

The theory of the Eclectic Paradigm (Dunning, 1988, 2000) applies the concept of transaction costs (Williamson, 1975) and internalisation (Buckley, Casson, 1976; Rugman, 1981) to decisions of internationalization of the firm. This theory tries to explain what characteristics of firms and markets to stimulate internationalization through FDI, distinguishing this process in terms of product characteristics and market conditions.

The Eclectic Paradigm also known as the OLI (Ownership - Location - Internalization), says the company will only become internationalized through direct investments abroad if it has significant advantages of ownership, location and internalization on its potential competitors (Dunning, 1980, 1993).

And it is this context of globalization which is the Pipeway because its case was based on the benefit of ownership (technology) and internalization (control technology

in Brazil) from Dunning (1980), becoming such a front differential to external competitors.

With these advantages (ownership and internalization) the company then developed intangible assets exclusive and specific to its own capabilities, eg.: ownership of specific technologies (business field of technology Pipeline Internal Gate (PIG) Exhibition 1); expertise (training of internal staff) ; access to research (in partnership with the University PUC-Rio and research centers), mark etc. that favored in its internationalization process.



Exhibition 1 – PIG

3.2. Organizational Theories

With regard to organizational theories, such as: the Uppsala School (Johansson and Vahlne, 1977, 1990); Andersson, 1997), they emerged in counterpoint to the Economic Theories, whereas, using these theories (economic) companies were basing their decisions purely on internationalization solutions (pseudo-)rational in order to maximize their financial returns (Carneiro; Dib, 2007, p. 4).

Organizational Theories don't explain all cases of internationalization, as well as economic theories, there are aspects that can change the sequence of actions taken, such as: market potential, the relationship with customers and suppliers, the role of the entrepreneur etc., and so, other organizational patterns have emerged in academia, such as the Networks (Hilal, Hemais, 2003), Entrepreneurship (Coviello, 1995; McDougall, Oviatt (1997), Andersson, 2000), the phenomenon of Born Globals (Costa, 2010) etc.

This context, Hilal and Hemais (2003), recall that the theories of internationalization based on organizational have evolved greatly over the years and much to the concept of social networks, where globalization is no longer based only on resources and commitment to aggregate the exploitation of contacts and relationships.

Thus, among the existing organizational theories that are better suited to the case study of Pipeway are: the theory of network relationships of Hilal and Hemais (2003), whereas, it was through this that was established a joint venture with the American

partner and its opening a subsidiary in Houston, United States, and the phenomenon of Born Globals.

3.2.1. Born Global

The first certainty in relation to the phenomenon "Born Global" is that it doesn't fit easily into any of the traditional models and theories about internationalization (Rialp et. al., 2005). However, it is assumed that its name has appeared in the Theory of International Entrepreneurship.

The concept itself of "Born Global" emerged in 1993 from the consulting market, that is, five years after the Theory of International Entrepreneurship, who was born in academia, so the concept can be considered too recent.

A key feature that differentiates the Theory of International Entrepreneurship refers to their coverage, because while international entrepreneurship includes companies that have internalized, the phenomenon "Born Global" includes companies that have already been born global.

Therefore, and in order to homogenize the concept will be used in this study the definition of "Born Global" as companies that have emerged with globalization, the result of technological advances, therefore, more common in high-tech sectors, began operations international a few years after its founding and have significant share of its revenue (25% minimum) from overseas operations which encompasses the Pipeway Engenharia this profile.

3.3. Triple Helix

The Triple Helix is the interaction between university, industry and government in a spiral in which, besides the normal flow of knowledge from universities to the productive sector, there is also a reverse flow from industry to academia (Wolffenhütel, 2001).

This concept is characterized by the dynamics of innovation in an evolutionary way, where relations are established between three institutional spheres, involving three distinct players: universities, private industry and government, as the three distinct parts of a single propeller.

As shown in Exhibition 1, the State plays a leading role in the concept of the Triple Helix. Friedrich List, in his book *The National System of Political Economy* (1841), highlighted the State's role in coordinating and implementing policies for long-term development of industry and the economy as a whole (Freeman and Soete, 2008). The formulation of public policies that foster innovation, promote the reduction of uncertainties and stimulating investment in technological innovation by other agents that compose the system are functions of the state.

In addition to inducing innovation, the State has a role in maintaining a stable macroeconomic environment, reducing economic risks and leveraging financial companies. The State should also promote credit lines to stimulate innovation in businesses and universities/research institutes, and a broader approach, but not least, invest in the country's education system, based on the formation of intellectual capital a nation (Salerno and Kubota, 2008).

Universities and research institutes, in turn, are primarily responsible for developing the scientific and technological knowledge, from basic research and applied foundation for innovation in enterprises. Especially in Brazil, such agents are important

promoters of innovation, since they concentrate much of the skills and research infrastructure of the country.

Guaranys (2003), states that several paths can be traced in the formation of a region based on the Triple Helix. One of the highlights the importance of an enterprising university to give assistance to the region in the transitions of technological paradigms and enable creative reconstruction.

Companies are the principal directly responsible for innovation, the locus of the innovation process because they have the mission to capture the knowledge of science and technology develop, produce, market and distribute the technology or knowledge derived from it, promoting economic development and local levels. Should be prepared to produce knowledge internally, owning or associating with research labs, organizing the information needed to establish a basis for generating ideas and new knowledge to support this innovation process (Santos et ali, 2006).

These three key players, State, University, Company, constituting the basis for interinstitutional relations of a National Innovation System, must still be backed by a solid educational system, a system of efficient market and a financial system consisting of strong institutions capable of investment.

The Triple Helix model examines the extent of internal transformation of each of the propellers, as noted in the development of links between business and society, government and society, and university and its mission of economic development.

Another dimension examined is the creation of an area of consensus, a new organizational mechanism that aims to link the actors involved. Analyzing the region's resources and creating the space for consensus, it is possible to articulate the different actors so that the integration allows the creation of an 'innovation space'. (Aranha, 2009).

Based on this series of trilateral relations between business, government and universities in different regions with different stages of development, and thus systems socioeconomic and cultural values distinct historical, the Triple Helix model of the final results from the convergence of these three worlds, which can be represented by three factors: the actors, institutions and regulations. (Etzkowitz, 2002)

So, the basic strategy to achieve innovation in its various dimensions is the structuring and maintenance of supportive environments for cooperation between these three major players, thus minimizing the distance between them. A good example of such an environment are the science and technology parks, which consolidates a set of efficient mechanisms in the process of technology transfer/knowledge infrastructure of scientific and technological research (universities, research institutes etc.) for the production structure (industry).

4. Case Study

4.1. Pipeway Engenharia

Through two institutions, the CENPES (Centro de Pesquisas e Desenvolvimento Leopoldo Américo Miguez de Mello) connected to Petrobras and CETUC (Centro de Estudos em Telecomunicações) on the PUC-Rio was established in early 1986 a partnership aiming to develop some equipment aimed at optimizing the operations of Petrobras.

Within this partnership, in 1990, engineers of both institutions met with the goal of developing a technology capable of performing the inspection of pipelines using magnetic tools. During research conducted in laboratories at PUC-Rio, was developed inspection technology geometric (PIG), a technology capable of performing inspection

of pipelines using electromagnetic sensors and devices for inspection, rehabilitation and cleaning of ducts.

This technology was extremely important to the business of Petrobras. However, neither the oil nor the university had initial interest in commercializing this knowledge, because it was unrelated to its core activities.

Thus, born in 1998 the Pipeway Engenharia, through the leadership of one of its founders, José Augusto Pereira, who in a small room of the Genesis Technology Incubator PUC-Rio decided to compose a company to commercially exploit technology that arose in the laboratories at PUC-Rio the technology of Geometric PIG.

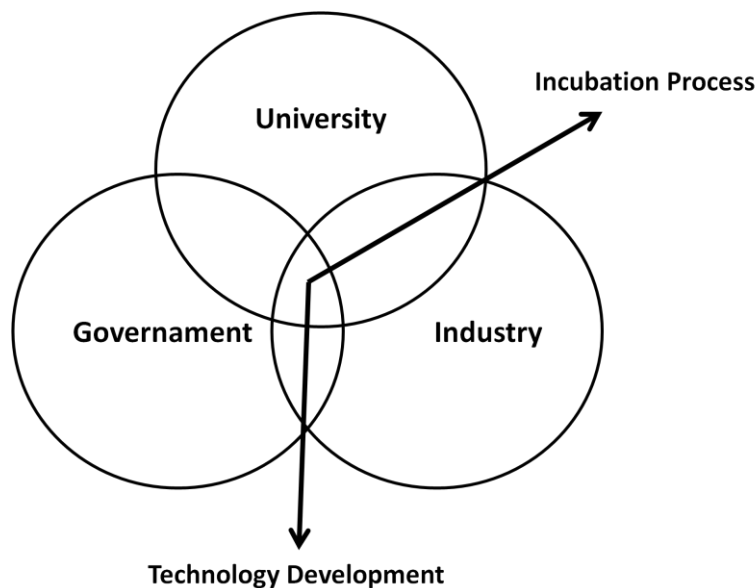
Jeanvrot:“ The Pipeway has its origin from the leadership of "Guto" that was the one who actually decided to create the company. It was born capitalized on technological knowledge and intellectual capacities of the participants and non-monetary values ...”

With technology "hands" starts the process of incubation Pipeway that occurs between the years 1998 and 2000, the company conducted at this time, a series of research and development of pigs of different sizes, supported by laboratories PUC-Rio and counting with funding provided by FINEP (Financiadora de Estudos e Projetos), an institution under the Ministry of Science and Technology.

From the research and development kits (Petrobras, PUC-Rio and Pipeway) and supported by funding from FINEP, the Pipeway in 1998, obtained a license for commercial exploitation of the geometric inspection technology. In contrast, the company paid royalties to both the PUC-Rio, as Petrobras.

During the period that had the support of the Genesis Incubator, the Pipeway finalized the process of developing the tool PIG held technological forecasting and its adequacy and ownership for the market, and develop the business plan to venture east. In the incubation phase of the Incubator Pipeway obtained support for structuring the business and to identify the needs of potential customers.

As illustrated in Exhibition 2, with technology development and support of the Incubator was possible to optimize the resources needed for business development.



Exhibition 2: Triple Helix on Pipeway Case

Thus, Pipeway, a Brazilian company, met a demand in the domestic market for technology PIG, since the domestic market was largely dominated by foreign companies.

José Augusto: "... demand had, we had the technology more mature than met that demand "(...)" So the vision of Pipeway as company grew along with it ..."

In Brazil, the largest pipeline operator Petrobras is over 70% of the entire network of pipelines, so there was great interest by the same to promote the development of local suppliers of this technology while avoiding dependence on suppliers external.

The search for local suppliers had two foci of action: to obtain the understanding of technology and cost reduction PIGs at first. Already in a second moment, not least, the speed in hiring the services was critical for Petrobras, as in many cases could not be the PIGs at the desired time, since they were busy with other ventures abroad.

Developed the technology needed to build the equipment, which was made only after the closing of its first contract in 1999 with Petrobras, for verifying the integrity and proper functioning of the stretch Paulínia (SP) - Porto Alegre (RS) Brazil-Bolivia pipeline.

That same year, seeking a larger space for its activities, the company left the incubator and moved its headquarters to a larger area in the municipality of Rio de Janeiro also doing a partnership with an international call Tuboscope for performing other services Brazil.

As the services provided by Pipeway were not offered by many competitors, mostly foreign companies, it soon became known in the Brazilian and Latin American. It is estimated that only in the period 1999-2007 the Pipeway has conducted about 270 inspections, which equates to approximately 15,000 km of pipelines.

Contracts have been won in Chile and Uruguay (2002), Bolivia (2003), Venezuela (2003), Colombia and the United States (2007) among others making Pipeway increasingly internationalized.

Today, Pipeway works in an area of 1,500 square meters in the same city, and provides services throughout Brazil and almost all of Latin America and has subsidiaries in Argentina and the United States. In addition to serving these countries, the company provides tools for partners worldwide presence. And about 40% of company revenues now comes from operations in international markets.

Pipeway continues over the years by maintaining close relationships with research centers of companies and universities, thus, developed and obtained licensing of some high-tech products from the same, such as an ultrasound scanner that can perform work similar to the geometric inspection of the hulls of ships and submarine platforms in the future.

5. Method

This research is a case study and is qualitative; works with descriptions, comparisons and interpretations, trying to understand a specific phenomenon, and thus providing a better view and understanding of the problem space "(Malhotra, 2006, p.154).

The study was conducted in three stages:

- Firstly, the literature review investigated the topics relevant to the study: theories of the internationalization process and the Triple Helix.

- Then, based on literature review defined the information to be gathered in the company Pipeway and prepared the interview guide to be used. Having chosen the form of in-depth interview, was then drafted a screenplay based on the goals and conceptual framework of the study, structuring the main points of research to be analyzed.

- In sequence was performed to collect data through interviews and documentary research.

The interview was conducted with three directors and an operations manager, responsible for international equity of the company. To conduct the interviews was to draw up a pre-structured based on the literature developed for the study. This roadmap was intended only as a guideline to give interviews, so giving the interviewee freedom to express their opinions on subjects not treated the same.

The documental research was conducted through files supplied by the company, refers to data available on the internet and literature appropriate to the subject.

6. Data treatment

Interviews were recorded and later transcribed to the paper version.

After this attempt was made to analyze and process the data obtained by the evolution of the company's internationalization process in the light of literature and theories of internationalization that were used in this work (economic and organizational theories), as well as the Triple Helix concept.

7. Analysis of results

Pipeway basically "born" focused on technological development, through the process of technology transfer from PIG geometric and, at first almost exclusively directed to the Brazilian market.

However, its leaders realized that since the beginning of its foundation the participants in this market were international companies by nature; few and important, but large, thus, the basic premise for the founding of Pipeway was that internationalization would be a natural way to be followed.

In a brief analysis of the internationalization process of Pipeway Engineering from the viewpoint of economic theories it appears that its creation was based on one of the main features of the Eclectic Paradigm of Dunning (1988), namely as regards the advantage of property (technology) and later deepened by the inclusion of internalization advantage ..

Regarding internalization can be said that the company is protecting its knowledge and technology by building most of the parts and equipment in Brazil, besides doing all testing at its headquarters. Pipeway owns the patent and licensing of all equipment that created or developed, and therefore believes that its intellectual property is protected.

However, there were not economic factors that dictate the internationalization of Pipeway, but the development of a national technology that could be tested and applied in Brazil allowing her a better position in the Brazilian market and its rise to the international market. For this to occur, was of fundamental importance the interaction that Pipeway conducted with the University PUC-Rio and Petrobras Research Center (CENPES) facilitating technological innovation and obtaining new inspection technologies.

During this study it was realized that the only economic theory doesn't explain by itself the internationalization of Pipeway, since, due to the gradual and sequential insertion in international markets the Uppsala School (Organizational Theory) shall contribute to their understanding, since the initial Pipeway operations were made in countries with lower psychic distance (Argentina), knowing and learning about these markets and then going to countries with greater psychic distance (United States) with greater investment and planning.

Nevertheless, the Pipeway Engenharia, although it can be included within various economic and organizational theories exist can also be studied from the perspective of the phenomenon "Born Global", since the nine characteristics that define a company belonging to this group only one fails to reflect the current state of international development just because of their activity restricted only to the American continent at the moment (Costa, 2010, p.121).

Pipeway's big bet for the future is on the U.S. market through its subsidiary Pipeway international. The U.S. market is a market pulverized and dynamic, since there are about 200 companies and pipeline networks, so the work of prospecting being developed becomes incessant. And to access this market Pipeway availed himself once more in its ownership advantages and internalization, as they were by those who were conducting a joint venture with a North American partner.

To understand the impact of the relation of the triple helix, we carried out interviews with the main partners of Pipeway addressing the issue. Of the points raised, we stress that the managers clearly shows that the relationship between the university, government and the company had an impact on the internationalization process of Pipeway, both in structure and growth of the company, whether the image is generated and used as a marketing strategy, or even the use of the resources provided by the government that sustained growth and is therefore possible that the company was able to compete and operate in the international market.

Through the interview was realized that the incubation process in Genesis itself does not directly impacted on the internationalization of Pipeway, but without any doubt, in the growth of the company. The possibility of being in the incubator without having to worry about a lot of problems in the beginning the company was very important, especially because it had access to consultancies.

The availability of resources by the Government impacted in the process of company growth and the internationalization process from the moment that with this help Pipeway replaced by a certain size and a number of tools to position the company in the international market, so the resources available were important to the company's growth.

José Augusto : “ The relationship between the company, university and government is a virtuous cycle, where a company uses to generate the university technology through a funding program of the government. From this the company launches a product, pays more taxes, generate more jobs, so the government is automatically paid and the university benefits is basically that fact that professionals trained by them are absorbed by companies. Emerging a new idea, the cycle begins again and everyone receives more benefits”

We also found through this study that the continuity of the relationship between company, university and government contribute considerably to maintain competitiveness in domestic and foreign markets.

8. Contributions and Implications

The Brazilian oil industry was forced to go through a series of transformations in recent years, especially with regard to its technological and competitive environment, thus promoting the emergence of small and medium enterprises (less bureaucratic) willing to face new technological challenges and explore new market opportunities both nationally and internationally.

Several studies based on various theories proposed to explain why internationalization by which a Brazilian company seeks foreign market. However, it was difficult to propose an appropriate and consistent under the theoretical point of view, it is difficult to establish their validity.

Given this, to try to identify some of the characteristics about Brazilian companies seek foreign markets as well as its process of internationalization, the study is timely for the business, since it proposes to understand the consequences of internationalization on national economy

In addition to the points raised above, we believe that this study contributes to the discussion on the impact of Triple Helix in relation to the process of internationalization of a company. Although it was a study with a Brazilian company, we believe that the results suggest that the relationship between university, company and government benefits and helps in the process of growth and internationalization of these organizations.

This work also makes it appropriate for the academic, since it will contribute with empirical information needed to evaluate the process of internationalization of a Brazilian company in a recent international expansion.

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