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Procedia - Social and Behavioral Sciences 52 (2012) 25 – 34

Procedia
Social and Behavioral Sciences

10th Triple Helix Conference 2012

Dealing with cultural issues in the Triple Helix Model implementation: a comparison among Government, University and Business Culture

Victoria E. Erosa

Guest Professor, University of Applied Sciences, Hochschule Bremen
International Graduate Center
Suederstr. 2, D - 28199 Bremen, Germany

Abstract

Implementing a model to foster the interaction among Government, Academy and Business seems to require more than the model definition and the expected operational programming and budgeting. The concept of Triple Helix as innovation strategy is based in the participation and collaboration of three entities with different objectives, being a common goal setting considered as the means for harmonization of the cultural diversity involved in the activities of the three partners. While Government Policies, Norms and Regulations works in a cultural environment characterized by structured guidelines, compulsory duties and control, University activities are guided by the knowledge creation and diffusion usually taking advantage of the open environment prevailing. Business culture has as main difference the profit orientation and the efficiency search in order to create value to the shareholders. Under these different objectives, Governments are economic development oriented, Universities are knowledge oriented and Businesses are profit oriented, representing three cultural operational environments. To understand the complexities of the cultures that must work together to foster innovation results, a research study was conducted using Hofstede's Cultural Dimensions as a main analytical framework to identify the culture characteristics of each one of the parties involved in a Triple Helix operational Model.

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Keywords:

Government; University and Business Culture; Cultural Dimensions; Innovation Policy; Innovation Strategy

I. Introduction

The concept of Triple Helix as innovation strategy is based in the participation and collaboration of Government, Academy and Industry (Business). Success is expected upon the basis of the coordinated interaction among the three entities, which is not easy to perform during the operational processes and day-to day tasks. In consistency with their nature, each of the partners works to reach a specific objective, therefore while Government Policies, Norms and Regulations works in a cultural environment characterized by structured guidelines, compulsory duties and control, University activities are guided by the knowledge creation and diffusion usually taking advantage of the open environment prevailing. Business culture has as main difference

the profit orientation and the efficiency search in order to create value to the shareholders. Under these different objectives, Governments are economic development oriented, Universities are knowledge oriented and Businesses are profit oriented, representing three cultural operational environments. Is in this context characterized by cultural diversity where Innovation Cycle takes place from founding to development, diffusion and adoption, creating a broad theoretical framework which involves Regional Development Theory (Government' actions Framework), Technology Transfer Theory, Diffusion and Innovation Theory (Academy/Research activities Framework) and Strategic Management Theory (Industry/Business Framework). In the operational dimension all these entities work under the Organizational Behavior Theory umbrella due to the existence of and Organizational Culture that shapes and permeates the operational performance, processes and attitudes and working practices as well. The complexity of this Theoretical Framework is presented in Diagram 1.

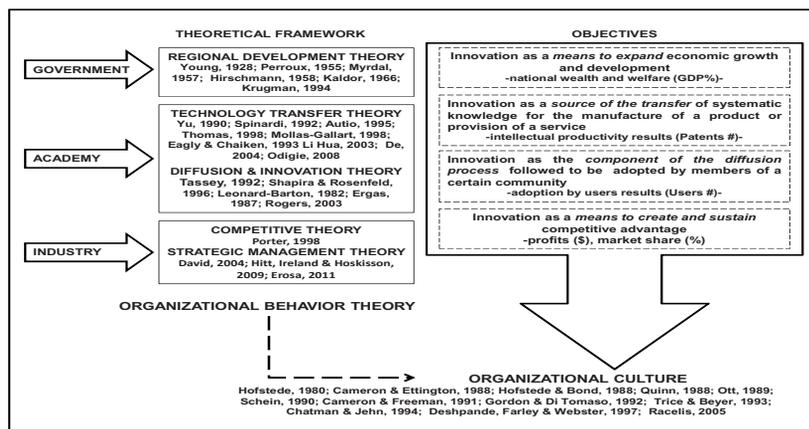


DIAGRAM 1. Role of Innovation as enabler of the Triple Helix Partner Institutions' objectives

II. Theoretical Overview

2.1 *Government & Innovation.* Grounded in Economics, the theories of Regional Development support the key role of the manufacturing sector on economic growth. Perroux [1] Growth Poles Theory underlines the importance of industry for regional growth, while on the Economic Growth dimension, Kaldor [2] introduce the notion of the effects of increasing returns in manufacturing to the macro-economic dynamics, declaring in the first law of his Cumulative Causation Model (CC) that the growth rate of the manufacturing production is positively related to that of the GDP (Gross National Product). The referred effects include "learning by doing" and technological innovations. According to Kaldor's second law, a dynamic relationship between the production rate and the productivity growth rate exists, therefore if the production growth rate improves, the productivity growth rate will improve as well (Kaldor's-Verdoorn's Law). Working upon Young concept of increasing returns [3], Kaldor introduced the concept of "economies of scale" to explain macro-economic growth from demand and supply sides in the manufacturing sector. Central to the Cumulative Causation Model [3], [2] is the notion of manufacturing as the engine of economic growth. From this framework the importance of Innovation to expand economic growth is derived due to the general acceptance that industrialization accelerates the rate of technological change throughout the economy [2: 112]. An important perspective to this theory is provided by Myrdal [4] who distinguished clearly growth from development, introducing the term "development" as a concept that includes besides the demand and supply also institutional and political factors. Myrdal's Development Theory allows the possibility, and suggests the requirement, of social reforms by introducing policies. These theories support Government participation in Innovation Policies definition as well as in the Innovation platform and mechanisms, -such as funds and tax benefits,- operations. Other important development theories such as Rostow's Economic Development Stages [5], suggests the importance of innovation for country's development stage whose range goes from the traditional economy based

on agriculture to the “developed countries” also known as industrialized countries where technological innovation is a source of global competitiveness. Later evolution of this theory leads to Krugman’ [6] definition of “high development theory” which is considered by this author as “the view that development is a virtuous circle driven by external economies-that is, that modernization breed modernization”, a direct reference to the importance of innovation for economic development. Under this framework, as a means to reach their economic growth and development objectives Government institutions and agencies foster innovation implementing policies and mechanisms to rule and support Academy and Industry activities in the matter. The requirement of a revision of the role of the Government in Development [7] has been suggested for some Latin American countries [8] since two decades ago.

2.2 Academy & Innovation. While Government Policies, Norms and Regulations works in a cultural environment characterized by structured guidelines, compulsory duties and control, University activities are guided by the knowledge creation and diffusion usually taking advantage of the open environment prevailing. During the final decades of the last Century, Universities change gradually their education and research orientation into a new venue of entrepreneurship, introducing a new profile termed by Smilor [9] and by other authors “Entrepreneurial University” [10], [11], [12], [13]. Under this perspective Academic work responds to social and economic context requirements, contributing actively on economic development through technology transfer and innovation diffusion, mainly to the industry sector. The view of Technology as the ensemble of theoretical and practical knowledge and skills used by academy and firms to develop and produce goods and services [14], is consistent with the conceptual approach for Technology Transfer mentioned in the work regulation of the United Nations [15], where is viewed as the transfer of systematic knowledge for the manufacture of a product or provision of a service. Traditionally Technology transfer has been conceptualized as the transfer of hardware objects, but today also involves information [16]. This view is related to the movement of knowledge of products and services from one firm to another, as in the case of knowledge embodied in new physical products or disembodied in other forms of technical knowledge [17]. Another approach to Technology Transfer is related to the transfer mode or method [18], [19]. Innovation results are subject to be registered as Intellectual & industrial Property, deriving rights to the owner, being the most used figures the patents and the trade marks. In consequence, Patents and Trademarks are used as indicators of research and academy productivity regarding innovation activities. Following Rogers [20 :12] concept, an innovation is an idea, practice or project that is *perceived as new* by an individual or other unit of adoption, while diffusion is the *process* by which an innovation is adopted by members of a certain community. This view also involves the dissemination of know-how and technical information, as well as further adoption by users [21]. Regarding this topic, Leonard-Barton [22] pointed that usually the end user of the innovation is not the decision maker person. The implication of the difference between adopter and end user [23] for the diffusion of the innovation is that firms are adopters and operative personnel or the end customers are users. Decision making depends on the adopter firm, competence and skills development refers to individual users.

2.3 Industry and Innovation. The term industry refers to a given number of organizations working to satisfy the same market requirements. To reach its business objectives, each organization, or firm, defines a business strategy from which operational activities are derived. In this context the concepts of competitive advantage and value chain emerge, being the first related to the capabilities and skills in which the firm excels in comparison to their business rivals [24 :8], and/or to the non-imitable characteristics [25 :4]. On the selected business strategy. Competitive Theory through the value chain concept [26], groups the firm’s activities in primary activities and support activities, includes all the activities that create value to the firm. The first type of activities is related to production, distribution and marketing while the support activities enable the primary activities development. In this second type are the R&D activities from which innovation results. Strategic Management Theory concepts related to capital intensive type strategies [24], [27] are conceptual blocks of a framework that supports the importance of Innovation as a means to generate new product development and new processes design oriented to enhance the firm’s competitiveness. Upon this premises, Business culture has as main difference the profit orientation and the efficiency search in order to create value to the shareholders. The culture perspective has been considered as a key component for economic growth [28].

III. State of the Art

Focused on business, a large amount of literature reveals that interest in the concept of Organizational Culture has been growing in the last three decades [29], [30], [31], [32]. In early 90s, studies accumulated in the area were systematized by Alvesson and Berg [33], being of interest of this paper research on the field of organizational effectiveness and performance such as the studies of Reynolds [34] and Gordon & Di Tomaso, [35]. Further research interest evolved to the relationship between industry characteristics and organizational culture [36]. Studying organizational culture differences in different countries [37], [38], reported big differences in the individual-collective dimension and the reactive-proactive dimension. The study of Deshpande, Farley and Webster [39], incorporated organizational innovativeness to the analysis of the effect of organizational culture, climate and customer orientation in the firm’s performance of five countries, finding that successful firms develop a common pattern of drivers of business performance which include organizational innovativeness, a competitive culture and a friendly climate. This model adapted from Cameron & Freeman [31] has an organizational cognition approach. In the theoretical research perspective, Denison [40] identified four basic views of organizational culture stressing different functions of culture: Consistency, Mission, Involvement/participation and Adaptability, the first two views tend to encourage/promote stability; the second two allow for change and adaptability. While Schein [41:12] provided a formal definition of organizational culture: *A pattern of shared basic assumptions that the group learned as it solved its problems of external adaptation and internal integration, that has worked well enough to be considered valid and, therefore, to be taught to new members as the correct way to perceive, think and feel in relation to those problems.*

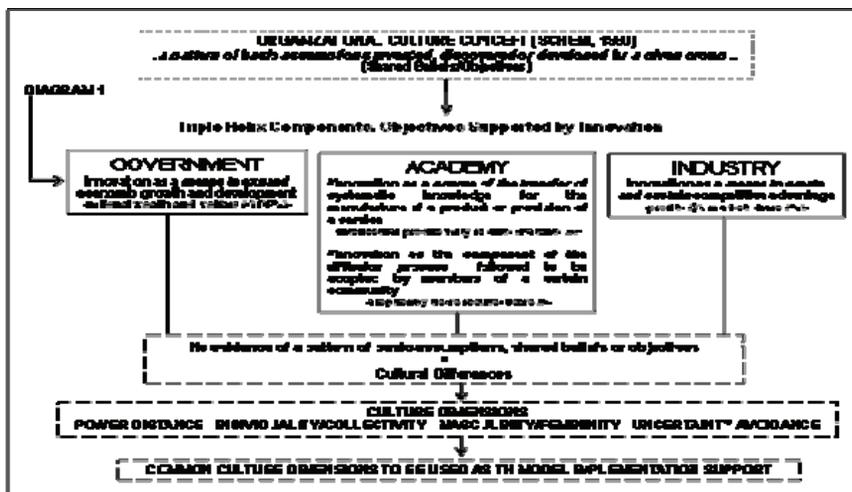


DIAGRAM 2. Conceptual Framework for the Research Study focused on the Comparison among Government, University and Business Culture in the TH Model implementation context.

Upon the ideas of Denison [40], Cameron and Quinn [42] provided a typology for organizational culture: Hierarchy Culture, Market Culture, Clan Culture and Adhocracy Culture. This typology has been widely used as predictors of organizational culture variables such as the Corporate Responsibility. A key contribution to assist in identification of cultural differences is Hofstede’s [43] Dimensions of Culture Model. The basic model identifies four Dimensions of Culture: Power Distance, Individualism, Masculinity, Uncertainty Avoidance. A fifth dimension –Long Term Orientation- was added by Hofstede, [44] after conducting an international study in Asian countries. From the literature review in the matter, no evidence was found of studies focused on comparison of cultures associated by a common interest, such as innovation. This topic seems to be consistent with the notion of cultural differentiation which refers to somewhat distinct, though not necessarily conflicting cultures associated either by different organizational aspects or by a common interest. This notion differs from the notion of subculture who refers to different cultures developed among distinct occupational groups such as

those associated with some professional areas. Due to the existence of a cultural differentiation suggested by the differences identified in the objectives –goal oriented/problem solving instrument- of each Triple Helix (TH) component, the organizational culture concept is considered as a key element to be introduced for the TH Model implementation. To assist in the identification of the characteristics of each organizational culture regarding innovation the Culture Dimensions Model seems to be the adequate analytical tool due to its orientation to the cultural differences notion. Being considered as a key component of the conceptual framework of the study (Diagram 2) beliefs and objectives developed by and within the organizations, consistency emerges with the Contingency Management Perspective (CMP), which is the dominant perspective in modern organizational analysis. CMP treats organizations as open systems that need careful management to satisfy and balance internal needs and to adapt to the external environment [45]. A word of caution is given by Racelis [46] pointing a limitation of this approach because even when is possible to identify and test the elements of culture, there are no extant scales or inventories for purposes of empirical analysis and surveys. The Conceptual Framework is operationalized in the following research questions:

- RQ. 1. ¿Which are the characteristics of the Organizational Culture of the three main partners of the Triple Helix Model?
- RQ. 2. ¿Which are the common cultural characteristics that support Triple Helix Model operative actions?

IV. Methodology

To understand the complexities of the cultures that must work together to foster innovation results, an exploratory research study was conducted following the single case method [47] in a developing country considering the Government Policies defined to support Science and Technology activities funding, which are oriented to benefit or have an impact on the R&D activities of a major National Institute for Technical Education who in exchange must produce innovation to be used by the industry. Considering the Country as Unit of Analysis, three organizations with different objectives were analyzed using a multiple method approach [48]. Longitudinal analysis of performance indicators such as patents registers are considered as results source, while Hofstede's Cultural Dimensions are used as a main component of the analytical framework developed to identify the culture characteristics of each one of the parties involved in a Triple Helix operational Model, as they are considered to be a finite set of key dimensions able to describe and compare organizational culture across a large range of organizations [35]. Focused on data analysis to develop explanations (Explanation Building) for the phenomenon studied through careful analysis of the relationship with the inherent facts identified, basic culture dimensions of the three TH Model main partners were identified. Yin [47] defines Case Study as a way of conducting empirical social research to investigate a contemporary phenomenon within its real-life context, especially when the boundaries between the phenomenon and the context are not clearly defined. In this research, description method is used to provide clarity to the identified relationships and to provide sense to the study object, this method do not predetermine dependent variables but instead is focused in the complexity of the phenomenon under study as new components appear [49], [50]. Description methods are a valuable tool to gain coherence among components of a SC and to give sense to results interpretation [27]. Data collection methods included a first stage of semi structured interviews to first top level managers who attend technology transfer and innovation diffusion at the National Polytechnics Institute (Academy), researchers members of the Mexican Academy of Engineering (Academy) and Innovation Projects submitted for founding register reviewers (Industry). A second stage of data collection refers to policy documents (Government) and official released data review. Each set of data from the interviews was grouped in meaningful dimensions using Content Analysis technique to build a Condensed Matrix from the groups of results. Due to publishing requirements only two of the eight resulting tables are included in this paper.

V. Findings and Interpretation

5.1 Culture Characteristics. As a Triple Helix Model Unit to be analyzed the characteristics of the three institutions were identified regarding innovation activities. Table 1 describes the main characteristics of each of them, as well as their relationship when implementing actions to promote innovation activities. Results

suggest that innovation is considered in a dual perspective according to each institution actions, the first correspond to a view in which innovation is subject to *promotion* programs through the public funding program, explained by the fact that the institution’s objectives stated by the Public Institution Operational Law [51] are consistent with the theoretical purposes of economic growth and development. The innovation public policy implemented under this perspective is centralized into a public organizational structure, responsible as well of the management of international formation relations through a scholarship programs. In this way the funding of innovation ranges from human resources preparation to firms support for implementation. Firms also can apply to banks and financial institutions for loans at regular interest rates. Under the second perspective, the innovation infrastructure of the educational institution is offered to industry as a *service provider* as well as the expertise. In the invention venue, patents resulting from internal research and technology developments are offered to the production environment, as an ownership requirement for technology transfer, representing an action of technology commercialization, which is a sale as well. The analysis is centered on this activity. With this perspective, the number of firms with covered requirements to access to the innovation funds (7 567 firms in the register) exceed widely the number of firms asking for information about technological services (about 5 each month, according to interview information).

Table 1.
Innovation Perspective in the Unit of Analysis

GOVERNMENT National Council for Science and Technology	ACADEMY National Polytechnics Institute	INDUSTRY Firm’s applications for Innovation Projects Funding
<p>*According to Mexico’s National Science and Technology Law (2002):</p> <p>(1) Operates Public Policies regarding the growth of national capacity for scientific, technological, innovation and researcher formation with the purpose of national solving problem, economic growth and rise the welfare of the population, and</p> <p>(2) Encourages national industry technological development and innovation in particular in industry with better conditions for competitiveness.</p> <p>*Manages the national budget for Science and Technology promotion (0.4%-0.5% of Mexican GNP). Average growth rate of 4% per year.</p> <p>*Defines and manages Financial Programs with special interest rate to support Innovation at firm and educational institution level</p>	<p>*Provides technical education as the State Institution created for that purpose</p> <p>*Develops technology and innovation through research activities managing its own R&D budget and external sources as well</p> <p>*Operates an Organizational structure to support technology transfer to industry and Innovation (Functions were created or restructured in 2010), including:</p> <p>(1) the Polytechnic Unit for Enterprises Development and Competitiveness is the link with industry, negotiates services, manages innovation projects, provides intellectual property registry advisory, elaborates contracts, etc</p> <p>(2) the Business Incubator operating a decade</p> <p>(3) the Technopolis, where internal innovation is prepared for commercialization</p> <p>*The regional perspective of technical education is updated (2011) creating in three regions of the country the model of “Technical Education Cluster” in which services of training, startup creation and technological services for industry are provided as well as education services.</p>	<p>*In consistency with the funding program regulations, applications are presented by firms working in/for the manufacturing sector of all country regions</p> <p>*Projects oriented to Technology Transfer, Innovation or competitiveness support based on technology platform update</p> <p>*Projects involving an educational institution or a consulting firm</p> <p>*Firm’s registered on the National Register of Science and Technology Firms</p> <p>*Projects oriented to benefit firm’s competitiveness and/or export capabilities</p>

As Cultural Dimension 1. *Power Distance* refers to the distance or inequality, that exists and is accepted by the group, organization, institution or society, seven items were identified from the interviews material. Information condensed in Table 2 reveal high power distance between the Government Agency and the Industry due to the high hierarchy recognized for the fund source institution. In Cultural Dimension 2, *Individualism*, eight items were identified related to the importance of teamwork for innovation activities. As Innovation is not a

“single music man” activity, this is a key dimension related with innovation-organizational-culture that affects directly the construction of common objectives among TH partners. Individualism/collectivism is related to the degree to which action is taken considering the participation of all the interested in the matter. Under the analyzed scenario, Individualism seems to be a common characteristic of the three TH partners, reflecting that innovation activity is considered as a Personal-goal oriented activity instead of a process-goal result/achievement. Self-centered characteristics are identified. This information suggests that the lack of collective orientation produce unarticulated action efforts and create an invisible barrier to accelerate the desired innovation rate, at the time that innovation culture remains underdeveloped as a complete notion

Table 2.
Condensed Matrix. Cultural Dimension 1. Power Distance

ITEMS	GOVERNMENT	ACADEMY	INDUSTRY
1. Type of Communication channels between Top level management & Innovation Users	Publishes in different media the period to submit Innovation Projects for funds using Web mail, Web communication, Web project-manager, electronic signature of documents. No personal contact unless specific notice	Personal interviews, event participation, personalized written communication, web communication. Public Relations contact in Cameras and related Industry Organizations	In search of funds, consult, react and/or respond to Web submission periods. React to contact with academy though personal communication. Monitors and follow up funds release or services contract authorization
2. Dominant partner in determination of the Firm's Innovation requirements	Funds requirements presented by the firm in the application should be supported by evidences or diagnosis. Funds authorization could be for partial amounts	The firm ask for a specific service, sometimes the service is a technology position or competitiveness diagnosis	The firm accepts: * the results of the application as well as observations of the Government Agency. *technical proposals from the educational institution
3. Negotiation practices among TH partners for services providing	Decides about the fund amount to be authorized. Has full authority to accept or deny the application	Presents budget to potential customer usually subject to revision and negotiation	Negotiate prices of the service with academy, introduces free-issues such as student's social services and internships; accepts results from the Government Agency with no complain
4. Procedure for firm's innovation services requirement determination	Firm's diagnosis, consultant diagnosis, research support	Technical diagnosis Analysis of firm's requirements	Internal diagnosis, profit/sales analysis, Third party diagnosis
5. Dominant partner in determination of the firm's innovation services requirement	The firm through its application	Both firm and institution	Top management level trough sales/profit analysis and/or strategic management business practices.
6. Communication procedures between partners	Budget control procedures (reports). Mail and written communication	Personal communication, written communication	Follows communication procedures determined by the selected partner
7. Communication procedures for budget control	Contract and written Reports upon budget program	Contract and payment invoices	Follows communication procedures determined by the selected partner

Regarding Dimension 3, *Certainty* is related to risk aversion, meaning the extent to which people is more comfortable with a structured working environment/context, with written rules, regulations and fixed working places in which the organization has control over the assistance, performance and even employee's attitudes. High risk avoidance reflects rejection of ambiguous or unpredictable situations, which are part of the day to day innovation work. Innovation by nature deals with risk, changes, different attitudes and creation, therefore requires frequent movement from comfort zones. Results reveal a highly structured environment in the

analyzed Government and Academy institutions regarding innovation promotion environments, reflecting high risk aversion in two axes of the Helix in matters related to budget management. Uncertainty is not considered for managerial purposes producing a hard layer in which “managing by the book” leads to results such as the overlapping of the projects authorization release with the planned project due time. The “supply orientation”/tailored projects perspective of the two public axes differs from successful institutions with a “demand pull” view, where alliances between academy and industry enables focused innovation, reinforce the research platform creation and foster the innovation culture development. Dimension 4 deals originally with the Masculinity/Feminine attitude in terms of *proactive-reactive* attitude of the organization when facing their operational or business environment. In this research eight items were identified from the interviews analysis. The achievement dimension map developed for this analysis, provide results that suggests a highly reactive attitude for all the TH partner institutions, which is not consistent with the expected proactive attitude of innovation leadership based organizations. The collected information suggests a culture in which is missing the organizations ability to identify, understand and translate signals from the competitive environment to internal perspectives, to promote behavioral changes oriented to support innovation efforts successfully on time and results.

5.2 Productivity: Patents Registered at National Level. As explained previously, in this research the second referent of innovation activity in Mexico is defined by the innovation efforts that lead to inventions for which patents figure is used as performance indicator. Derived from a longitudinal follow up, an analysis of the patent register evolution during the last two decades revealing two relevant facts: first, even when the filing and the granting have growth in the two decades (from 8 212 in 1993 to 14 212 in 2010 according to data of the Mexican Institute of Industrial Property. August 2011) the proportion in the patents filed vs files granted is almost the same (around 75%); second the ownership of the patents by nationality of the proprietor is dominated by patents belonging to firms/persons from the United States of America, representing around 10% the number of patents owned by Mexican firms/persons. The patent registers distribution by technology area of relation reveal a dominant concentration in the use and consumer goods, making sense with the new products development to perform under the market focused perspective and competitiveness protection of the USA firms.

VI. Conclusions

Main differences in Culture characteristics are identified for the three TH partners, derived from the differences in the main objectives. Regarding cultural dimensions, differences are identified in the risk aversion dimension of two axes of the Helix, one referred to funding policies and the second related to innovation aligned to demand pull. In the cultural dimensions arena, the three Triple Helix partner institutions analyzed in this paper reflect multiple cultural orientations being two of the axes directed to critical objectives of growth and development [56], [57], [58,] and the third axe oriented to business competitiveness. The analysis shows the presence of a strong type of culture in two axes consistent with the Cameron & Quinn type [46] of Hierarchy Culture due to its basis on rules, specialization, separate ownership and impersonality, that support structured operations. The industry axe reflects a market culture profile being market focused with core values settled in competitiveness and productivity [57]. Individualism appears as a main challenge to work with to pave the road for innovation culture. From these characteristics emerge as a critical challenge the management of differentiated cultures and the creation of synergies across them to implement innovation models of the Triple Helix kind. Differences in organization’s objectives and in findings regarding culture dimensions differences on the axes are meaningful conclusions that lead to innovative solutions as the differentiated cultures have Innovation activity as a common context they can be articulated and reinforced around a coherent set of value chain process-perspective as a shared objective, even when uncertainty and ambiguity are common as correspond to innovation as an adhocracy type culture, in order to avoid cultures overlapping or cultural clashes as result of the operational process and objectives of each of them. The idea is grounded on Denison’s [40] perspective of organizational culture about a consistency view, in which a common perspective, shared beliefs and communal values among organizations will enhance internal coordination and provide meaning and sense of identification and involvement to their members, in this context around Innovation activities.

6.1 Policy Implications. Even when results are limited by the exploratory nature of the study, culture dimension results, as well as productivity indicators, suggests that the process to support Innovation activities will benefit from an intense revision of the role of each institution under a Value Chain perspective, considering that competitiveness at national and industry level is the main quest for all of them. A main policy implication is to define the coordinated processes in terms of synchronization and alignment, taking advantage of the experiences on the field gained by the industry on the matter.

6.2 Directions for Further Research. Culture Differences in the Triple Helix partner institutions seems to be a new research venue that requires attention at international level either in the theoretical field as in the empirical perspective. Research questions are open to different industries, countries and academies, combinations for analysis are multiple being available a multidisciplinary research universe to be discovered, yet.

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