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**A LITERATURE REVIEW ON ENTREPRENEURIAL
UNIVERSITIES: AN INSTITUTIONAL APPROACH**

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A LITERATURE REVIEW ON ENTREPRENEURIAL UNIVERSITIES: AN INSTITUTIONAL APPROACH ¹

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Abstract

It is now generally accepted that globalization process and internationalization have modified the roles of main agents of social and economic changes. In this case, Universities have been affected by new responsibilities such as regional economic and social development, the reduction of public funds, and the educational market competence. On this, universities are being required to operate more entrepreneurially, commercializing the outcomes of their research and spinning out new, knowledge-based enterprises. In this context, the main purpose of this paper is to revise the literature about the environmental factors that affect the creation and development of the *Entrepreneurial Universities*. With this aim the study adopts institutional economic theory, and more specifically the works realized by North (1990, 2005), to focus on the formal and informal factors that facilitate or retard the phenomenon of an entrepreneurial university. The main contribution of this paper could be help design policies that will stimulate the entrepreneurial activity of universities and stimulate, therefore, their contribution to the development of the modern knowledge economy.

Keywords

Entrepreneurship, Intrapreneurship, Universities, Institutional Economics

Classification

M130 – Entrepreneurship (New Firms: Startups)

I280 – Education: Government Policy

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A LITERATURE REVIEW ON ENTREPRENEURIAL UNIVERSITIES: AN INSTITUTIONAL APPROACH

1. INTRODUCTION

It is now generally accepted that universities are an important instrument in the facilitation of the contemporary knowledge – based economy. Since much knowledge is developed within universities and government research establishments, they are seen as important catalysts for regional economic and social development, through the spin-off of new, innovative enterprises that add value through knowledge creation. Hence it is largely, though not exclusively, for this reason that Governments around the world, and not just in Europe, are attempting to create more *Entrepreneurial Universities* (Kirby, 2002b).

Increasingly higher educational institutions are being required to operate more entrepreneurially, commercializing the results of their research and spinning out new, knowledge-based enterprises (Kirby, 2005). According to Etzkowitz (1998, 2003 and 2004), Etzkowitz and Leydesdorff (2000) and Etzkowitz et al. (2000) “universities are currently undergoing a ‘second revolution’ these days, incorporating economic and social development as part of their mission. The first academic revolution made research an academic function in addition to teaching. Now the emerging entrepreneurial university integrates economic development as an additional function (Etzkowitz, 1993; Ropke, 1998; Laukkanen, 2000).

In this sense public administrations and other institutions have begun to establish supporting measures to create favorable environments for entrepreneurship at the university level and motivate the interaction between these organisms and universities. At the same time, the analysis of entrepreneurship within the university curricula and entrepreneurship training programmes has attracted the interest of researchers (Leclerc, 1985; Kirby and Mullen, 1990; Kirby, 1992; Brockhaus, 1992; Carsrud, 1987, 1991; Vesper and Gartner, 1997; Kolvereid and Moen, 1997; Veciana, 1998; Laukkanen, 2000; Shane, 2004) who have assumed that entrepreneurship education can have positive repercussions for the creation of new ventures.

Also, the university culture (such as: values, norms, attitudes, etc.) are central to the development of entrepreneurial activity within the universities (Smilor et al, 1990; Peters and Etzkowitz, 1990; Doutriaux, 1991; Birley, 2002, etc.). Nevertheless this area of study remains underdeveloped because the majority of the studies had followed other approaches such as academic capitalism, commercialization of

knowledge and triple Helix but not considering the environmental factors, with this argument, is detected an investigation opportunity.

The main purpose of this paper is to revise the literature about the environmental factors that affect the creation and development of the entrepreneurial universities. With this aim the study adopts institutional economic theory, and more specifically the works by North (1990, 2005), to focus on the formal and informal institutional factors that facilitate or retard the phenomenon of an entrepreneurial university. Also a model to analyze *Entrepreneurial Universities* is proposed.

The method used to aim this objective was a literature review integrated with three different data sources: *Books* (13), *Academic Journals* (122) and *Working Papers* (8). The most important basis of this paper was the Academic Journals related with Entrepreneurship, Higher Education, Technology, Management and Strategy, and others. The majority of them are listed on the social citation index and journal of quality, and the time period analyzed was from 1965 to 2005.

In this context, the main journals consulted were *Journal of Business Venturing*, *Entrepreneurship: Theory and Practice*, *Research Policy*, *Higher Education*, and others. The selection criteria of the papers were the key words: *entrepreneurial universities*, *university organizational structure*, *university corporate governance*, *university support measures to new ventures*, *entrepreneurship education programs and courses*, *university entrepreneurial intentions*, *university entrepreneurial role models*, and others.

Finally, the contributions of the paper are: (i) use of institutional economics to analyze the *Entrepreneurial Universities* and to organize the literature in this topic, and (ii) designing policies (to analyze one reality that still remains under-studied, such as the environmental factors that affect the development of entrepreneurial universities, could and should be very useful to design and formulate public policy to improve this specific environment).

After this introduction, the paper is composed by the following four parts: (i) link between *Entrepreneurial Universities* and *Institutional Economics*, (ii) the environmental factors that condition the creation and development of *Entrepreneurial Universities*, (iii) the *Entrepreneurial University Model*, (iv) conclusions and future research lines.

2. LINKING ENTREPRENEURIAL UNIVERSITIES AND INSTITUCIONAL ECONOMICS

There are several definitions about *Entrepreneurial Universities*³ and the literature review not shows a consensus for one (see Table 1). However, there are a few similar characteristics in them that reveal the importance of factors that affect at these universities, for example: the high interdependence with the government and industry firms, the different sources of income, the entrepreneurial activities of all community members (students, academic and faculty), the implementation of different strategies to improve the creation of new venture and the adjustments in its organizational structure.

Table 1. Principals definitions of Entrepreneurial Universities

Year	Author	Definition
1983	Etzkowitz	"Universities that are considering new sources of funds like patents, research under by contracts and entry into a partnership with a private enterprise"
1995	Chrisman, et al.	The Entrepreneurial University involves "the creation of new business ventures by university professors, technicians, or students"
	Dill	"University technology transfer is defined as formal efforts to capitalize upon university research by bringing research outcomes to fruition as commercial ventures. Formal efforts are in turn defined as organizational units with explicit responsibility for promoting technology transfer"
1998	Clark	An Entrepreneurial University, on its own, seeks to innovate in how it goes to business. It seeks to work out a substantial shift in organizational character so as to arrive at a more promising posture for the future. Entrepreneurial universities seek to become "stand-up" universities that are significant actors in their own terms"
	Röpke	"An entrepreneurial university can mean three things: the university itself, as an organization, becomes entrepreneurial; the members of the university -faculty, students, employees- are turning themselves somehow into Entrepreneur; and the interaction of the university with the environment, the "structural coupling" between university and region, follows entrepreneurial patter"
1999	Subotzky	"The entrepreneurial university is characterized by closer university-business partnerships, by greater faculty responsibility for accessing external sources of funding, and by a managerial ethos in institutional governance, leadership and planning".
2002a	Kirby	"As at the heart of any entrepreneurial culture, Entrepreneurial Universities have the ability to innovate, recognize and create opportunities, work in teams, take risks and respond to challenges"
2003	Etzkowitz	"Just as the university trains individual students and sends them out into the world, the Entrepreneurial University is a natural incubator, providing support structures for teachers and students to initiate new ventures: intellectual, commercial and conjoint"
	Jacob, et al.	"An Entrepreneurial University is based both commercialization (customs made further education courses, consultancy services and extension activities) and commoditization (patents, licensing or student owned star-ups)".

Source: Own elaboration based

Thus, some definitions express, implicitly or explicitly, the phenomena of *intrapreneurship* or process that goes on inside an existing firm, in this case institution, and leads not only to new business ventures but also to other innovative

³ Term used by Etzkowitz (1983) to describe the universities that improved different mechanism thought their scientifics to contribute to the regional development and increase their incomes. Additionally, other terms used to describe this type of universities has been: *University Technological Transfer* (Dill, 1995), *Innovative Universities* (Clark, 1998; Van Vught, 1999) and *Market Universities* (Slaughter and Leslie, 1997).

activities and orientation such as development new products, services, technologies, administrative techniques, strategies and competitive postures (Antoncic and Hisrich, 2001).

In this paper, based on Clark (1998), Kirby (2002a) and Etzkowitz (2003), an *Entrepreneurial University* is defined as an university that have the ability to innovate, recognize and create opportunities, work in teams, take risks and respond to challenges, on its own, seeks to work out a substantial shift in organizational character so as to arrive at a more promising posture for the future. In other words, is a natural incubator that provides support structures for teachers and students to initiate new ventures: intellectual, commercial and conjoint.

In this viewpoint, the impact of the institutional theory seems to have drawn the attention to the institutional or contextual - cultural, social, political and economic - factors as determinants of entrepreneurship. In this situation, university entrepreneurship education in general, and specifically *Entrepreneurial Universities* can be considered as ones of the most important institutions.

In this sense, institutional economic theory and more concretely the works “Institutions, Institutional Change and Economic Performance” and “Understanding the Process of Economic Change” by Douglass North (1990 and 2005, respectively) will be used as theoretical framework of this research due to its adequacy in the study of both formal and informal institutional factors, as environmental factors that affect the development of entrepreneurial universities and consequently the new firm creation at the university level.

Institutional theory develops a very wide concept of ‘institution’. North (1990:3) proposes that “institutions are the rules of the game in a society, or more formally, institutions are the constraints that shape human interaction”. Institutions include any form of constraint that human beings devise to shape human interaction. Institutions can be either formal - such as political rules, economic rules and contracts - or informal - such as codes of conduct, attitudes, values, norms of behaviour, and conventions, or rather the culture of a determined society. North attempts to explain how institutions and institutional context affect economic and social development.

The main function of institutions in a society is to reduce uncertainty by establishing a stable structure to human interaction. In this context, the theory proposed by North tries to explain not only how the institutions and their institutional changes concern the economic and social development; but also presents the analysis of the economic change based on a triple axes: beliefs – institutions – economy. In this perspective, to

understand how an economy works, is necessary to know the political, social and cultural factors that establish their institutional dynamics, and one way is studying the beliefs systems and make decision process (North, 2005)

For the present research and based on Institutional economic theory, Table 2 presents the environmental factors considered as framework for *Entrepreneurial Universities*. In this case, formal factors has been grouped into university organizational structure and university government, support measures to university start-ups and university entrepreneurship education programmes and courses; and informal factors into an university attitudes to entrepreneurship, entrepreneurship programmes and subject at the university (how –teaching methodology), and role models and the academic-university rewards systems.

Table 2. A framework for Entrepreneurial Universities

Formal Factors	Informal Factors
<p><i>University organizational structure and university government,</i> Mission, Organizational structures, Strategic Management, Professionalized university manager, Independence, Flexibility.</p> <p><i>Support measures to university startups</i> Information, consultancy, incubators, centers to new firm creation, science parks, others.</p> <p><i>University entrepreneurship education programmes</i> Doctoral, master programmes and undergraduate courses (what and where-transversally).</p>	<p><i>University attitudes to entrepreneurship,</i> Students, faculty members, academic and other university employees.</p> <p><i>Entrepreneurship subject at university</i> How-teaching methodology.</p> <p><i>Role models, cases and university rewards systems</i> Success students, faculty members, academic or other university employees. University rewards systems.</p>

Source: Own elaboration based

3. ENVIRONMENTAL FACTORS CONDITIONING THE CREATION AND DEVELOPMENT OF ENTREPRENEURIAL UNIVERSITIES

In this section theoretical models and empirical studies about Entrepreneurial Universities are presented considering the environmental factors (formal and informal) that conditioning the creation and development of these type of universities.

Theoretical models

In the literature review are identified the following five theoretical models associated with *Entrepreneurial Universities*. In each one, there are elements associate with formal and informal factors proposed previously.

The first model is suggested by Clark in 1998, which examined five European universities⁴ and recognized issues associates with the entrepreneurial transformation of these universities. He identified that a university to become more entrepreneurial when it has an institutional transformation follows five elements or pathways: three associates with formal factors, a strengthened steering core, an expanded developmental periphery, and a diversified funding base; and two with informal factors, an integrated entrepreneurial culture and a stimulated academic heartland.

Afterwards, Etzkowitz *et al.* 2000 explained the mechanism and emergent structures to development *Entrepreneurial Universities*. It can be obtained thought of next formal process: i) internal transformation that includes a revision of existing tasks, ii) trans-institutional impact with projects that help to archive a stabilization, iii) interface process where a centralized institution to became decentralized and iv) recursive effects with the collaboration of trilateral organizations. Interestingly, Sporn (2001) built a model for studying the adaptation of higher education and connect the university structure and environmental forces thought the management, governance and leadership. In conclusion, she shows six formal factors (missions and goals, the structure, the management, governance and leadership), one informal factor (organizational culture) in the adaptation process, and one moderator (environment).

The next model was proposed by Etzkowitz, 2004. The *Entrepreneurial University* model was integrated by a set of five inter-related propositions derived from his analysis of entrepreneurial academic development in USA, Europe and Latin America. This is a guideline for institutional renovation that includes the follows formal factors: capitalization of knowledge, interdependence with the industry and government, independence with another institutional spheres, hybrid organizational forms and renovation in every time. And recently, Kirby (2005) offer seven strategic actions intended to promote an enterprise that has been identified as formal factors those strategic actions related with the organization, the endorsement, the incorporation, the implementation and the communication. And as informal factors those actions related with the promotion, the recognition and reward, and the endorsement.

In this perception, Table 3 shows the integration of theoretical elements of each model following the idea of North (1990 and 2005). At fist light the majority has identified both formal and formal factors in their studies and it helps to determinate the factors proposed in this paper.

⁴ The five institutions were: the University of Warwick (England); the University of Twente (the Netherlands); the University of Strathclyde (Scotland); Chalmers University of Technology (Sweden); and the University of Joensuu (Finland).

Table 3. Theoretical models about Entrepreneurial University

Model	Formal Factors			Informal Factors		Moderators
Clark, 1998	A strengthened steering core	An expanded developmental periphery	A diversified funding base	A stimulated academic heartland	An integrated entrepreneurial culture	
Sporn 2001 Model	Mission and goals, Structure, management, governance and leadership		Networks, conglomerates and strategic alliances		Culture	Environment
Etzkowitz 2004 Model	Interdependence with the industry and government and independence with another institutional spheres	Hybrid organizational forms	Capitalization of knowledge		Renovation	
Kirby 2005 Model	Incorporation Implementation Communication Organization.		Encouragement and Support	Recognition and reward.	Endorsement. Promotion	
Proposed in this paper	University organizational structure and university government	University entrepreneurship education programmes		Teaching methodology and academic reward systems	Institutional values, university attitudes towards entrepreneurship, role models	Macroeconomic and microeconomic influences that affect at higher education
		Support measures to university start-ups, university incubators and others entrepreneurial activities				

Source: Own elaboration based

Empirical studies

The key empirical studies cited in this section are summarized in Table 4. The main considerations are related with the objective, the theoretical framework, methodology and findings about *Entrepreneurial University*. Interestingly, in the period from 1995 to 2005, the number of investigations is more than fourteen and predominantly has been realized in Europe (England) and Oceania (Australia).

The evidence reveals a tendency to use case studies to explain this phenomenon; possible reasons of that are related with the embryonic characteristics of this issue into *Entrepreneurial* field, and with nonexistence of a robust theoretical framework to help us to understand. It is supported by Gartner and Birley (2002) that clarify that there are some topics in this field that sometimes is difficult to use quantitative methods.

The main justification of them is the impact of academic entrepreneurship activities in the regional development, and the necessity to understand the transformation process of these institutions. It is demonstrate through of their objectives because tried to explain the entrepreneurial activities related with production, dissemination and commercialization of knowledge, and describe university transformation process. In this way, key topics are related with formal factors as entrepreneurial activities, entrepreneurial vision, transformation process, strategies, structural changes and alliances with other institutions.

Table 4. Empirical Studies selected into Entrepreneurial Universities

	Author	Unit of Analysis	Objective	Theoretical framework	Methodology	Findings
Formal Factors	Keast, 1995	Alberta, Canada	Identify the entrepreneurial activities and organizational structure to promote research	Entrepreneurship	Interviews with the vice president and director of research	Entrepreneurship and associated activities or initiatives is becoming increasingly important to administrators
	Chrisman, <i>et al.</i> , 1995	Alberta, Canada	To identify the impact of the entrepreneurial activities	Entrepreneurship	Personnel interviews	Identification of administrative role, the impact of funds reduction and different types of entrepreneurial activities.
	Bernasconi, 2005	Universidad Catholic de Chile	Describe the transformation of a university under the pressure of privatization	Entrepreneurial Universities (Clark, 1998)	Secondary sources	The results suggest the orientation to market as a means of survival and growth under the pressure of privatization, than a result of a Triple Helix strategy of university.
	De Zilwa, 2005	Australian Universities	Provides a profile of the actions taken by universities to diversify their revenues streams	University categories and contrast levels of independence	Secondary data from annual financial reports by Australian Higher Education	Universities have used isomorphism tactics transforming themselves from being rigid bureaucracies to become more flexible network enterprises.
	Jacob, <i>et al.</i> , 2003	Technologic of Chalmers in Sweden	Describe and analyze the internal transformation process	Entrepreneurial Universities (Clark, 1998).	Interviews accounts with the principal actors in the internal transformation process	One important element required for innovation is macro (vision and implementation) and micro (university organization) level flexibility and diversity.
	Ranga, <i>et al.</i> , 2003	Universiteit Leuven	Explore the impact of science-industry relationship on the knowledge production of academic research groups	Knowledge production, Triple Helix	2356 publications in <i>Science Citation Index (SCI)</i>	Suggest that the academic research groups have developed a record of applied research without affecting the basic research publications.
	Brennan, <i>et al.</i> , 2005	UK Universities	To analyze the entrepreneurial activities and barriers	Academics y Corporate Entrepreneurship	Interviews and survey	Identification of different types of academic entrepreneurs.
	Lazzeretti and Tavoletti, 2005.	Dutch University of Twente,	To show that local economic relevance and international excellence are not incompatible objectives	Entrepreneurial Universities (Clark, 1998).	Direct observation, some interviews and documentation	A strong entrepreneurial vision and the adoption of different concepts of knowledge maybe the key to reach both local economic relevance and international excellence.
	Zhao, 2004	Australian Universities	Explore the issues associated with the commercialization of university research	Academic Entrepreneurship	Extensive interviews with academic entrepreneurs and commercialization managers	Identified and discussed the key issues in the study and proposed a series of recommendations to enhance the overall performance of university research commercialization.
	Slaughter and Leslie, 1997	USA, Australia, UK y Canada	To identify the structures to response the changes	Keynesian y Marxist Models	Interviews with academics and faculty members	Explanation and development the concept of academic capitalism
	Schmoch, 1999	Germany and USA	To analyze the interaction between the University and Industry	Knowledge transfers	Description about the interaction	Identification of similes and differences related with the formalization
Informal	Klofsten and Jones-Evans, 2000	Ireland and Sweden Universities	Examine the activities of academic involves with industry in two small European countries.	Academic Entrepreneurship	10 case studies 1857 structured questionnaire to all academics	Impact of previous entrepreneurial experiences among academics in both countries and their practical application in activities as consultancy and contract research
	Ryu, 1998	Yonsei University of Corea	Explore how Korean Universities and their professors have been responding to demands for creation knowledge	Entrepreneurial Scholarship	Semi-structured interviews with male full professors	Identification of strategic planning and the development of the academic services.
Formal and Informal Factors	Sporn, 2001	Universities from USA, Italy and Australia	To know the strategy to adapt at environment changes	Approaches related with environment forces and university structures	6 case studies of institutions facing changing environments and having a history of adaptation.	Identification of critical factors related with the adaptation process: environment, culture, structure, administration, governance and leadership.
	Poole, 2001	Australian Universities	To identify the type of international strategies.	Approaches related with International strategies	Interviews with the responsible of these activities.	Identification of the structures, perception of participants and the successful and failed factors.
	Clark, 1998	England, Netherlands, Scotland, Sweden, Finland	To explore the different organizational forms of entrepreneurial organizations	Globalization Entrepreneurship	Semi-structured interviews, direct observation and documentation	He identity the five core elements of entrepreneurial universities
	Heffernan and Poole, 2005	Malaysia, Kong Kong y Singapore	To identify the key factors associated with the relationship with others universities	International Education	10 case studies Interviews	Identification of key factors related with the trust, compromise, communication and culture.

Source: Own elaboration based

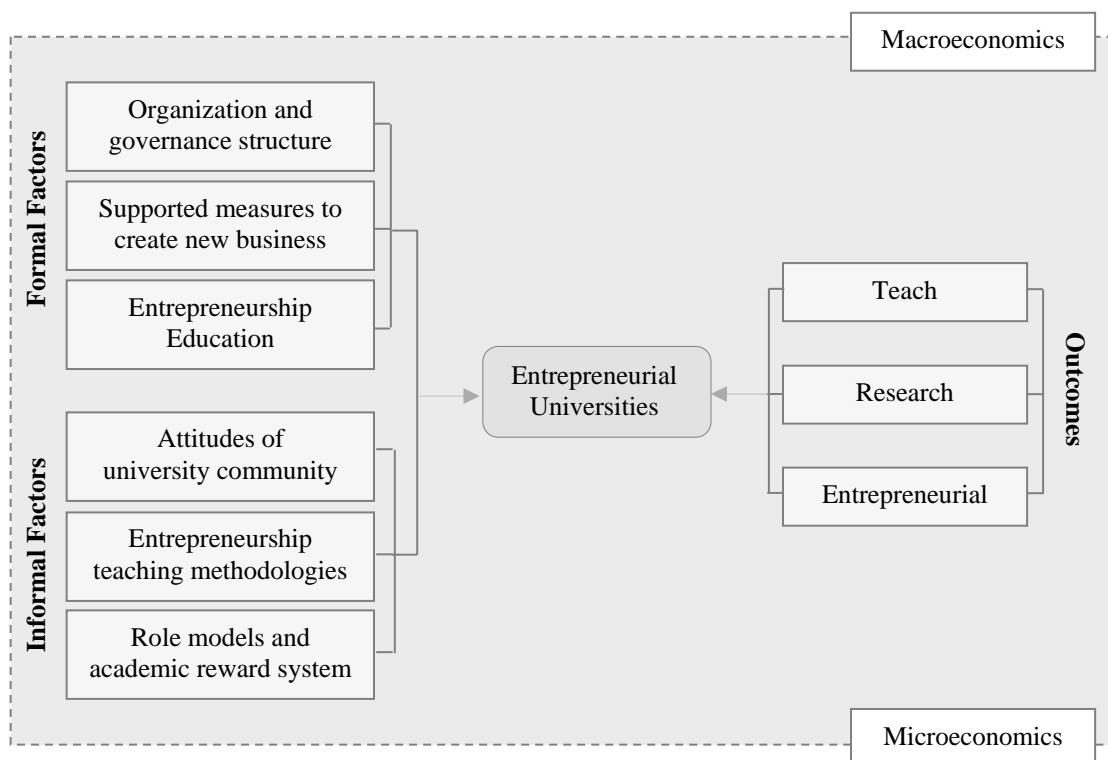
Additionally, the theoretical frameworks utilized are academic entrepreneurship; academic capitalism and entrepreneurial activities, and the data were obtained by semi structured interviews (perceptions of university community) and complemented with other sources (direct observation, internal documents, surveys and secondary data).

As first light, these empirical studies have contributed to literature with some important findings related with the identification of some universities considered as examples of *Entrepreneurial Universities*, their core elements, their adaptation process and organizational changes, their internal and external strategies, their different types of entrepreneurial activities and academic characteristics, the environmental pressures, practical recommendations, academic implications, and others.

4. ENTREPRENEURIAL UNIVERSITIES MODEL

Based on the literature revised and in the light of Institutional Economics, Figure 1 shows the proposed model to analyze the factors that affect the creation and development of Entrepreneurial Universities. Also, we consider the macroeconomic and microeconomic factors that can influence in this process and finally the outcomes obtained following the three mission proposed by Etzkowitz.

Figure 1: Factors of creation and development Entrepreneurial Universities



Source: Own elaboration based

From the model the following propositions are developed.

FIRSTLY, CONCERNING FORMAL FACTORS

University organizational structure and university government

In 1985, Drucker mentioned that the generation of entrepreneurial process in public institutions requires four elements: clear definition of missions, a realistic statement of obtainable goals, failure to archive objectives and constantly strive for innovation opportunity. Actually, in response to the demand of different stakeholders as: government, business, industry, labor organizations and students (Mok, 2005), within universities, governance, management and leadership structures are confronted a transformation, aiming at increased flexibility, efficiency and effectiveness (Sporn, 2001). In this context the organizational and governance structure are treated in the following part.

Organizational structure

A clear mission that guides the decision-making, planning and orientation of all members is a crucial puzzle of institutional management that remains how universities address their missions towards the external changes, the goals of society, contribution to the economy and continues rethinking (Etzkowitz and Leydesdorff, 2000). An *Entrepreneurial University* has a vision oriented toward quality, adaptation and entrepreneurial culture (Clark, 1998).

In consequence, an entrepreneurial culture is the principal indicator to develop a new climate for innovation, individual responsibilities, change, rewards and a win-win situation for the institution, and its faculties (Sporn, 2001) and help to development the university missions (teaching, research and entrepreneurial) simultaneously that otherwise might have been at odds with each others (Etzkowitz, 2004). As a result,

P1a. The greater clear mission transmitted to all university members, the greater the positive impact into an Entrepreneurial Universities.

At the same time, systems and process into university has been oriented to strategies and structures for academic development (Henkel, 1997). In this situation, university requires to transform the organizational structure to create a connection between teaching, research and administration functions (Etzkowitz, et al. 2000). In other words, universities need to be able of real strategic change where all community member must be involved and prepared to lead, but they must also work in partnership with administrators, in institutions that would be strong to the extent that there is a shared vision that makes the universities rather more than just the sum of warring departments (Dearlove, 2002).

In this direction, into university is necessary a mix of two new organizational forms: (i) trans-disciplinary and heterogeneous structures with interdisciplinary departments and hybridizing organisms (Gibbons, et al. 1994; Etzkowitz and Leydesdoff, 2000; Etzkowitz, et al. 2000; Etzkowitz, 2004), and (ii) networks, conglomerates and strategic alliances with the industry, government and other institutions (Sporn, 2001; Etzkowitz, et al. 2000). As a result,

P1b. The greater organizational structure with less hierarchical levels, the greater the positive impact into an Entrepreneurial Universities.

In this perception, the transformation of roles and responsibilities linked with quality controls, financial sources and development partnerships have modified the university strategic planning (Subotzky, 1999; Sotirakou, 2004; Deem, 2004; Middlehurst, 2004). On one hand, the concept of strategic planning had shown an orientation on financial resources (Thomas, 1980; Dube and Brown, 1983) and a market orientation (Smith and Cavusgil, 1984; Holdaway and Meekison, 1990; Amano, 1997).

In other hand, some universities are implementing resource allocation methodologies, planning procedures, management information systems, appraisal systems (Middlehurst, 2004) and business management strategic tools as balance scorecard (Lee, et al. 2000; Gullen, et al. 2003; Rodrigues, et al. 2005). It helps to employ diverse strategies to be more competitiveness, income generation and cost reduction, relevance, excellence and reputation (Shattock, 2000).

These new procedures to manage, new authority structure, and new ways of resource allocation need departments more entrepreneurial obtained towards process, organization culture and people (Todorovic, et al., 2005). In this situation, the managerial ethos is oriented to institutional governance, leadership and planning (Subotzky, 1999) and requires an university manager with professionalized, leadership and full-time job personal characteristics (Dill, 1995; Henkel, 1997; Sporn, 2001; Sotirakou, 2004). Thus,

P1c. The greater professionalized managers into the university, the greater the positive impact into an Entrepreneurial Universities.

Governance structure

According to Middlehurst (2004), internal governance is used to embrace internal management structures, decision-making and leadership roles. In this context, McNay (1995) mentioned that the university internal governance has changed over time in the following four different patterns: collegiums, bureaucracy, corporate, and enterprise. Recently, Deem (2001) and Dearlove (2002) aggregated other type denominate managerialism that involved on strategic planning by councils and chief executive

vice chancellors supported by senior management team of administrators and manage-academics.

In this transition, the change of governance has been named a shift from state control to self-regulation of the universities, with a supervising state as a consequence (Clark, 1983; Van Vught, 1988). The self-regulation is related with the concept of autonomy and it can be analyzed on two dimensions of purpose (cultural or utilitarian) and authority (centralized or decentralized) where results are different models of state governance and space of action for the institutions (Askling, et al. 1999).

For this reason, Etzkowitz, 2004 reveals that the capitalization, independence, interdependence, hybridization and re-flexibility help to development an *Entrepreneurial Universities*. In other words, it is not a place for hierarchy and bureaucracy because a horizontal coordination is the better way to share intellectual, financial and physical resources (Van Vught, 1999). Therefore,

P1d. The higher autonomy and co-operation with the state, the greater the positive impact into an Entrepreneurial Universities.

Support measures to university start-ups, university incubators and other related centers and procedures to new firm creation

The analogy between what entrepreneur do and what higher education do must be understood within the complex environment of public policy, and in relation to the demands which this environment places on higher education (Keast, 1995). A clear explanation about the link between entrepreneurship and university is because the first term represents an instrument in economic growth, a balanced regional development and for creating jobs; and the second one expects fulfill its obligations related with research, teaching and entrepreneurial though to be a fertile and benevolent environment for creating and fostering new products and process (Laukkanen, 2000).

In this context, Keast (1995), Van Vught (1999), Zaharia (2002), Etzkowitz (2004), and Grandi and Grimaldi (2005) make clear different instruments and mechanism, development by universities, to support the internal and external new firm creation as centers of small university business (consultant, knowledge update, industrial partnership), research facility (infrastructure, financial and human resources), research groups or quasi firms (publications, knowledge flows), liaisons offices (consultant, research and contracts), tech transfer offices (intellectual proprietary, patents, licenses) and incubator (tech enterprises, firm formation and graduate organizations). Additionally, there some authors that have investigated the specific characteristic and impact of each support measure (Dill, 1995; Mian, 1996; Koh, et al. 2005; O'Shea, et al. 2005, and others). In consequence,

P2a. The greater support measures development into the university, the greater the positive impact into an Entrepreneurial Universities.

P2b. The greater internal diffusion of support measures development into the university, the greater the positive impact into an Entrepreneurial Universities.

University entrepreneurship education programmes and entrepreneurship subject at the university (what and where –transversally)

Educational structures has both a regulatory and cultural dimensions linking with diverse features as governance, institutional diversity, access, conceptions of curriculum, labor-market linkages, and study finance (Witte, 2004). Actually, a common response to demand of stakeholders is a strategy oriented to promote the entrepreneurial spirit reforming the curricula to provide graduate students more creative, innovative and international (Mok, 2005).

In this perception, an academic graduate requires skills related with processing knowledge in professional field, willingness to change, multi-disciplinary, learning to lean, social intelligence and intelligent competitive skills (Van Vught, 1999). Universities had incorporated entrepreneurial educational programmes in undergraduate, master and doctoral educational levels (Carsrud, 1991; Robinson and Hynes, 1991; Vesper and Garther, 1997; Finkle and Deeds, 2001; Meyer, 2002; Katz, 2003).

The main objective of these projects is influence in the attitude toward the creation of new business (Krueger and Brazeal, 1994), the development of an entrepreneurial culture (Jack and Anderson, 1999), and to satisfy the necessities of the participants (Sexton, et al., 1997). In other words, motivated to believe that to be an entrepreneur is a real professional perspective (Schulte, 2004). For that reason,

P3a. The greater postgraduate entrepreneurial educational programmes into the university, the greater the positive impact into an Entrepreneurial Universities.

P3b. The greater entrepreneurial course into the academic undergraduate programs into the university, the greater the positive impact into an Entrepreneurial Universities.

SECONDLY, WITH REGARD TO INFORMAL FACTORS

University attitudes to entrepreneurship (university community)

In an *Entrepreneurial University* the key to fulfill their missions are developing entrepreneurial intentions in all community members (students, academic, faculty and employees). In this direction, the literature reveals that intentions are product of an entrepreneurial process, defined as functions, activities and actions associated with the perceiving of opportunities, and the creation of organizations (Bygrave and Hofer,

1991). It process has two seminar components: an event, represented by the definition or implementation of a new idea, product or service; and an agent, the individual or group of individuals that assume the responsibility to carry out the event (Morris and Jones, 1999).

Generally, the literature has explored the agent or potential entrepreneurs with different controvert perspectives to comprehension this phenomenon: (i) the personality characteristics that distinguish the entrepreneur from non-entrepreneur (McClelland, 1965; Brockhaus, 1980; Shaver and Scott. 1991; Forlani and Mullins, 2000; Abbey, 2002) and (ii) the demographic characteristics like gender, age, familiar antecedents, and education (Koh, 1995; Cohen, 1996; Crant, 1996; Stewart et al. 2003).

Also, in the last decade some authors analyze the environmental factors (specifically the informal factors as the attitudes towards entrepreneurship) affecting the decision to start the entrepreneurial career, in the light of institutional economics (North, 1990 and 2005). Additionally, during the eighties and nineties, six models had been developed with this propose: *The Entrepreneurial Event Model* (Shapero, 1982), *The Theory of Planned Behavior* (Ajzen, 1991), *Entrepreneurial Attitude Orientation* (Robinson, et al. 1991), *Intentional Basic Model* (Krueger and Carsrud, 1993), *Entrepreneurial Potential Model* (Krueger and Brazeal, 1994) and *Davidsson Model* (Davidsson, 1995a, 1995b).

The majority of them have been applied in undergraduate university students from business, engineer, medical, and others courses (Koh, 1995; Kolvereid, 1996; Tan et al., 1996; Crant, 1996; Tkachev and Kolvereid, 1999; Audet, 2002 and 2004; Kruger et al., 2000; Veciana et al., 2005); where the results reveal the existence of entrepreneurial intentions in the case of undergraduate students from business and sometimes from engineer courses.

In the case of academics, faculty and employees, there are a few studies that analyze the entrepreneurial intention in this population. In this direction, Louis, et al. 1989 explore the entrepreneurship into research university units identifying that the individual characteristics and attitudes are the most important predictor of academic entrepreneurship in large-scale science, earning supplement income, industry support, patenting and research commercialization.

Other study, analyze how the career of research scientific and engineers can be influence by entrepreneurial intention (Lee and Wong, 2004). In this sense, is considered the career anchor or the cluster of self-perceived talents, motives, and

values that forms the nucleus of a person's occupation following various types of jobs as security, autonomy, technical, managerial and creative. In view of that,

P4a. The greater students' attitudes to entrepreneurship, the greater the positive impact into an Entrepreneurial Universities.

P4b. The greater researches attitudes to entrepreneurship, the greater the positive impact into an Entrepreneurial Universities.

P4c. The greater faculty members' attitudes to entrepreneurship, the greater the positive impact into an Entrepreneurial Universities.

Entrepreneurship subject at the university (how –teaching methodology)

The main element in entrepreneurship education is the cultivation of teaching styles (Miclea, 2004). In this point, Sexton, *et al.*, 1997 mentioned the necessity to consider the motivations and necessities of potential entrepreneur. For this reason, Jack and Anderson, 1999, Fiet, 2000, 2001; Nijhuis and Collis, 2005 reveal that universities following the patterns of entrepreneurial education (theory about small and medium size enterprises manager) and compensate with external experiences sources (practices with business community). Consequently,

P5a. The greater existence of theoretical teaching methodologies, the greater the positive impact into an Entrepreneurial Universities.

P5b. The greater existence of practical teaching methodologies, the greater the positive impact into an Entrepreneurial Universities.

Role models, cases (culturally transmitted) and the university rewards systems

Venkataraman (2004) argues that if risk capital is combined with novel ideas, the result will be success for a few people and they become the new role models who show their peers that entrepreneurial success is not a theory. In this environment, there is nothing like knowing somebody who has undertaken an entrepreneurial venture and succeeded to make a challenge seem a feasible reality: which creates "possibility proof". He additionally mentions that the access to role models occurs in informal forums or meeting points like bars and restaurants, where the real learning happens.

In this situation, evidence reveals that role models support the potential of intentions models to predicting new creation (Casrud, *et al.* 1987; Kruger, 1993; Veciana, *et al.* 2005). Kirby (2005) argue that one of strategic actions intended to promote an enterprise is related with the promotion, the recognition and reward, and the endorsement. In this means, Bernasconi (2005) explains that an effective strategy in the process of transformation to *Entrepreneurial University* is new polices oriented to incentive the community members. These incentive systems should target not only individuals but also teams and can be promotions or salary raises (Miclea, 2004). Consequently,

P6a. The greater existence of entrepreneurs into the university, the greater the positive impact into an Entrepreneurial Universities.

P6b. The greater existence of a researches prominent into the university, the greater the positive impact into an Entrepreneurial Universities.

P6c. The greater rewards systems development by the university, the greater the positive impact into an Entrepreneurial Universities.

THIRDLY, WITH REGARD TO OUTCOMES

The university to fulfill three missions simultaneously that otherwise might have been at odds with each others and these are: teaching, research and entrepreneurial (Etzkowitz, 2004).

Teaching mission

Since the Medieval period, the mission of University has been the preservation and dissemination of knowledge toward the teach (Etzkowitz, 2004). Actually, the university educational goal is a graduate must become not only a job-seeker but also above all a job-creator (Schulte, 2004). In this perspective, the output of this mission would be a student spin-off or new venture (Chrisman, et al., 1995, Pirnay et al. 2003 and Benneworth and Charles, 2005).

Research mission

In the 19th and 20th century, the research mission became a legitimate function of the University (Etzkowitz, 2004). Actually, the university research goal is not only to publications but should be the sources of innovations in the economy and society, and starting point for the development of business ideas for new companies (Schulte, 2004). In this context, outputs of this mission would be academic spin-offs, academic spin-out, and academic spillover.

An spin-off is defined as a subpopulation of high tech start ups for the commercialization of research of public or private universities (Birley, 2002; Clarysse and Moray, 2004; Link and Scott, 2005; Lockett, et al. 2005; O'Shea and Allen, 2005), an academic spin-out is created when the license of a university or a signed invention creates a new company to exploit it (Lockett and Wright, 2005, Nicolau and Birley, 2003, and Di Gregorio and Shane, 2003), and an academic spillover is generated by education people and publishing articles for diffusing without any specific direct economic return (Chiesa and Piccaluga, 2004; Audretsch and Lehmann, 2005; Audretsch et al, 2005).

Entrepreneurial mission

In the 21st century, the entrepreneurial mission appear as a result of the collapse produced by the inevitable production of research results with practical implications and the external demand of greater utility from public findings (Etzkowitz, 2004). The university entrepreneurial goal is to cope with difficulties that may arise during the growth periods of new companies, should increase the subject of multidisciplinary research (Schulte, 2004).

In this viewpoint, outputs would be related with the number of new ventures or income from entrepreneurial activities as the incubation of new ventures (Mian, 1996; Clarysse et al, 2005; Bollingroft and Ulhoi, 2005; Markman et al. 2005), the patenting and science parks (Link and Scott, 2005) oriented both to university community and society.

FOURTHLY, WITH REGARD TO ENVIROMENTAL CONDITIONS

In this model, is not detailed but is important to consider the existence of environment conditions for entrepreneurship development. In this context, an *Entrepreneurial Universities* can be positively or negatively affected by two different macro and microeconomic conditions.

The first one related with demands and pressures produced by globalization and internationalization phenomenon, for example are: the change of higher education systems to standardize the study education in economic regions (Witte, 2004), the emergence of knowledge societies (Krücken, 2003), the development of new information technologies (Van Vught, 1999), and others.

The second one is integrated by dimensions such as government policies, socioeconomic conditions, entrepreneurial and business skills, financial assistance and non-financial assistance (Gnyawalli and Fogel, 1994; Abbot and Doucouliagos, 2003; Mok, 2005). In other words, it can be represented by the regulatory, cognitive and normative environment, of each specific country, proposed by Busenitz, et al. (2000).

5. CONCLUSIONS AND FUTURE RESEARCH LINES

Conclusions

In this paper was revised the literature about the entrepreneurial factors that affect the creation and development of the *Entrepreneurial Universities* adopting institutional

economic theory, and more specifically the works realized by North (1990,2005) focus on the formal and informal institutional factors.

In first light, the literature shows not consensus in the definitions about *Entrepreneurial Universities*. Based on the definitions proposed by Clark (1998), Kirby (2002) and Etzkowitz (2003) was delimited this meaning as an university that have the ability to innovate, recognize and create opportunities, work in teams, take risks and respond to challenges, on its own, seeks to work out a substantial shift in organizational character so as to arrive at a more promising posture for the future. In other words, is a natural incubator that provides support structures for teachers and students to initiate new ventures: intellectual, commercial and conjoint.

At the same time, were identified four theoretical approaches or models of *Entrepreneurial Universities* development by Clark (1998), Sporn (2001), Etzkowitz, (2004) and Kirby (2005). These models were analyzed following the institutional economic theory and implicitly each one is integrated by both formal and informal factors. Nevertheless, the majority is concentrated on the first one. Similarly, in the empirical studies, the evidence reveals the use of case studies methodology where are described and concentrated issues related with entrepreneurial activities, entrepreneurial vision, transformation process, strategies, structural changes and others.

Afterwards, was proposed the theoretical framework that analyzes the factors that affect the creation and development of *Entrepreneurial Universities*. In this perception, as formal factors were considered the organizational and governance structure, the support measures to create new business and the entrepreneurship education. By the other side, the informal factors were the attitudes of university community, entrepreneurship teaching methodologies, and role models and academic reward systems. It helps to construct each proposition that support the *Entrepreneurial Universities Model* suggested.

In addition, following the works of Etzkowitz (1998, 2003, 2004 and others) were considered as outcome of an *Entrepreneurial Universities* the different outcomes produced in each mission. In addition, have been identified some macro and micro economic factors that can be influence, positively and negatively, during the process of creation and development of this kind of university.

Finally, the academic implications of this paper could be help design policies that will stimulate the entrepreneurial activity of universities and stimulate, therefore, their contribution to the development of the modern knowledge economy. In other words,

to analyze one reality that still remains under-studied, such as the environmental factors that affect the development of entrepreneurial universities, could and should be very useful to design and formulate public policy to improve this specific environment.

Future Research Lines

The *Entrepreneurial University Model* and its propositions suggested in this paper are a theoretical approximation related with the determinant factors during the creation and development of an *Entrepreneurial University*. The first future research line is oriented to corroborate this framework with some experts in the field of entrepreneurship. In this point of view, an empirical analysis requires specific measures about each formal and informal factor proposed in this model. In first light, qualitative methodology designed by Eisenhardt (1989) and Yin (1989) is useful to explore all pieces of the creation and development process of this kind of universities.

In this direction, other the future research line is oriented to elaborate a protocol that guides the realization of the case study research following for one side, the previous research in this specific field (exposed previously in the table 4); and for other side, the principal indicators that facilitate measure each factor and define the specific data sources (see Appendix 1). It finally, it can be applied in some *Entrepreneurial Universities* identified in Spain and complemented with some control indicators or factors of each university as size (students, faculty, academics and personal), location, orientation (applied or not applied sciences), and others aspects as the internal and external analysis.

Another future research line could be the summarization and transformation of all information into a strategic planning using the management technique designed by Kaplan and Norton (2001). The reason is because it provides a view of a public or non-profit organization from four perspectives: users, internal process, financial and future/learning potential (see Appendix 2). Actually, some public universities from United States of America, Canada, Australia, United Kingdom and Kenya⁵ have introduced this technique to development strategic plans. In the same line, instigators as Lee, et al. (2000), Gullen, et al. (2003), and Rodrigues, et al. (2005) had used this technique in their university studies.

⁵ Users list presented by the Balance Scorecard Institute <http://www.balancedscorecard.org/adopters/index.asp>

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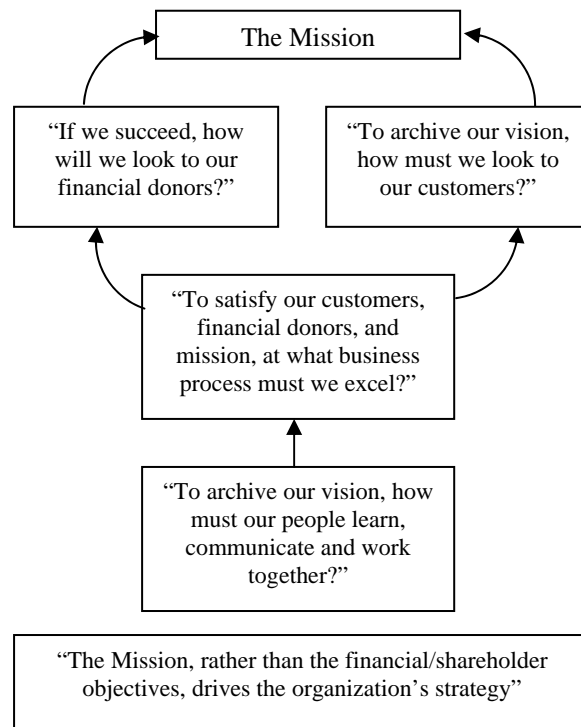
Appendix 1. Measures of formal and informal Entrepreneurial University factors

Environmental Factor	Indicator	Measures	Data Sources	References
Formal Factors	University organizational and government structure	Mission	<ul style="list-style-type: none"> Website, Staff Personal Interviews, Administrated questionnaire Secondary Data (Organisms Records and Reports, Etc 	<p>Aiken and Hage, 1968; Gibbons, et al. 1994; Dill, 1995; NcNay, 1995; Henkel, 1997; Clark, 1998; Van Vught, 1999; Etzkowitz and Leydesdoff, 1999 and 2000; Etzkowitz, et al. 2000; Klofsten and Jones-Evans, 2000; Lee, et al. 2000; Shattock, 2000; Poole, 2001; Sporn, 2001; Ranga, et al. 2003; Jacob, et al. 2003; Gullen, et al. 2003; Etzkowitz, 2004; Sotirakou, 2004; Schulte, 2004; Middlehurst, 2004; Zhao, 2004; Bernasconni, 2005; Brenna, et al. 2005; Rodrigues, et al. 2005; Hefferman and Poole, 2005; Lazzaretti and Tavoreletti, 2005;</p> <p>Universities: Catholic de Chile, Makerene, Monash, Chalmers, Joensuu</p>
		Organizational structure		
		Governance structure		
		Manager		
	Support measures	Existence	<ul style="list-style-type: none"> Website, Secondary Data Responsible For Supporting Personal Interviews, 	<p>Chrisman, et al. 1995; Dill, 1995; Keast, 1995; Mian, 1996; Van Vught, 1999; Zaharia, 2002; Etzkowitz, 2004; Grandi and Grimaldi, 2005; Koh, et al. 2005; O'Shea, et al. 2005; De Zilwa, 2005, and others</p>
		Diffusion		
Informal Factors	University attitudes towards entrepreneurship	Students	<ul style="list-style-type: none"> Administrated Questionnaire 	<p>Louis, et al, 1989; Koh, 1995; Kolvereid, 1996; Tan et al., 1996; Crant, 1996; Ryu, 1998; Tkachev and Kolvereid, 1999; Audet, 2002 and 2004; Kruger et al., 2000; Lee and Wong, 2004; Veciana et al., 2005</p>
		Faculty		
		Academics		
	How-Teaching Methodology	Methodology	<ul style="list-style-type: none"> Website, Secondary Data Responsible for Entrepreneurship Programmes and Teachers-Researchers Personal Interviews, 	<p>Jack and Anderson, 1999, Fiet, 2000, 2001; Nijhuis and Collis, 2005</p>
	Role models and academic reward systems	Role models	<ul style="list-style-type: none"> Website, Secondary Data Teachers-Researchers Personal Interviews 	<p>Casrud, et al. 1987; Kruger, 1993; Venkataraman, 2004; Miclea, 2004; Sotirakou, 2004; Bernasconi, 2005; Kirby, 2005; Veciana, et al. 2005</p>
		Reward systems		

Source: Own elaboration based

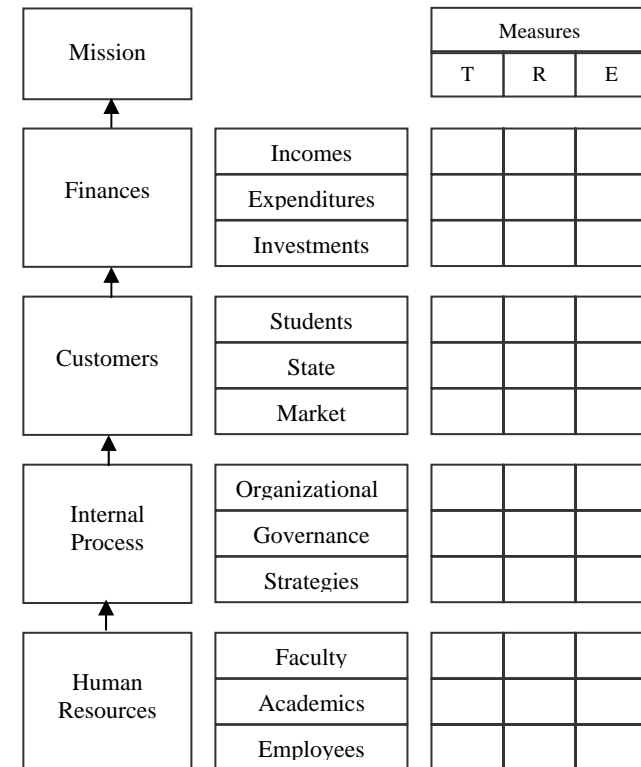
Appendix 2. Proposed of Balance Scorecard for Entrepreneurial Universities

Balance Scorecard Framework to Nonprofit Organizations



Source: Kaplan and Norton (2001)

Balance Scorecard Framework to Entrepreneurial Universities



Source: Own elaboration based

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