

# **The effect of university culture and stakeholders' perceptions on university-business linking activities**

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## **Abstract**

The present work discusses the effects of university culture and structure on university-business relations, focusing on knowledge transfer activities. It puts forward the thesis that when links between university and business are introduced into the university system as a turn-key proposition rather than as developmental process, the prevailing university culture and structure will exert resistance against change and will oppose the creation of appropriate structures to promote them, with deleterious effects for the university.

**JFL Classification:** O31, O32, O33, O57

## **1. Introduction**

The interaction between university and business has been a subject of economic, political and social interest for several decades, and forms part of the debate that revolves around the relevance of universities in today's world and the revolution occurring in higher education.

Universities are considered an important ingredient of the innovation formula in the new knowledge society, and as such they are experiencing important changes. From being the producers and guardians of knowledge for its own sake<sup>1</sup>, they are increasingly being asked to generate “useful” knowledge and to “transfer” it to the economic system. The concept of knowledge diffusion, therefore, has become as relevant to the university's mission as knowledge creation.

As return on investment becomes the focal point of the global consumer-capitalistic society, where accountability often turns to simple accounting and money becomes the measure of all things, universities are put under the ringer to account for the funds they receive (particularly public ones) and forced into designing profit-making strategies and increasing their interaction with the businesses that are at the end of the rope, exerting the major squeeze.

A serious debate has been taking place on whether implementing profit-making business related strategies will represent a positive or negative change for universities or even if they truly belong within the scope of university function. One extreme of this debate is represented by those who view the link with businesses as threatening the “real” role of university as unbiased generators of knowledge for the pursuit of profitable endeavours, while at the other extreme are those who consider the university another economic agent and, as such, believe that the financing of academic activities should be justified in terms of economic productivity.

This paper will discuss these different views and their effect on university organizational structure and function. It concludes that since the links with businesses arise as *ad hoc* solutions to intermittent situations, a culture that supports them has not yet been rooted within the university system and that instead, the prevailing culture and structure opposes the development of appropriate mechanisms to promote them. First, a reference framework for the analysis of university-business links is developed, followed by a description of the activities involved in these links and their accompanying organizational structures. Subsequently, a description of the USB is provided. The next section centres on the analysis of university's decision and policy-making capabilities in the development of diffusion and transfer activities, focusing on the stakeholders' perspective and sphere of influence. The remaining part of the paper proposes strategies and policy recommendations that can promote university-business relations, particularly those involved with the licensing of inventions and the generation of technology-based enterprises arising from research results.

This work draws its data and information from a comprehensive study done on the Universidad Simon Bolivar (USB), which took place between the years 1997 and 2003. During this period the USB was subjected to a complicated reengineering-like process as part of its efforts to attain full-level university status from being an experimental university and only enjoying a limited level of autonomic decision making. The persistent and acute lack of resources caused by political, social and economic instability in Venezuela augments the pressure towards implementing profit-making strategies in universities and thus, university-business relations became an important aspect of the reengineering process of the USB. This particular situation allowed for a more direct and systemic route of observation of the effect of culture on university change, and particularly on knowledge transfer activities. Data was collected

in various ways throughout this period; such as interviews, brainstorming sessions, reports, and strategic plans. The analysis and conclusions of this study can be extrapolated to encompass other university systems across the globe where the issues covered by the present work are in full discussion.

## **2. Background information**

Technological innovation has acquired great relevance in economic development. According to data from the World Bank, technology (high, medium and low) represented more than 70% of the total commercial activities in the world market in 2002<sup>2</sup>. The promotion of technological innovation is today a focal point in the development of innovation systems in government policy, and its conceptual basis is established by the institutional interaction between government, academia and industry (Nelson, 1988, Lundvall, 1992, Ertzkowitz and Leydesdorff, 1995). The picture presented by national and regional innovation systems usually includes the presence of technological interdependencies and puts forward the notions of co-evolution, where the various actors influence one another along the chain of innovation (Rosenberg, 1982; Porter, 1995; Karnoe et al., 1999).

As innovation is closely linked to entrepreneurship, the latter has also become important for economic development. The economic relevance of entrepreneurship was firstly studied by Joseph A. Schumpeter (1936, 1954). Schumpeter describes the introduction of innovation as a critical process in the stream of economic change, where the entrepreneur represents the cultural innovator. From Schumpeter's point of view innovation is something more than an invention, since the latter needs to be applied within a productive process before it can become an innovation. In the same train of

thought, not all managers or business owners are entrepreneurs, the difference residing in whether they conduct their business implementing “new ideas”.

Closely linked to entrepreneurship are the small and medium sized enterprises (SME), which play a relevant role in economic development. Approximately 99% of the business enterprises in the European Economic Area (EEA) are considered micro and small businesses, of which 93% have less than 10 employees and 6% between 10 and 49. Less than 1% of all businesses have between 49 and 249 employees (referred to as medium sized) and only 0.2% are considered large businesses (possessing 250+ employees)<sup>3</sup>. In the EEA two thirds of the existent employment is generated by the SME sector while in the USA SMEs generate 46% of employment. Within the universe of SMEs, technological SMEs are considered to have the greatest economic potential but also the highest risk of failure.

Since universities play an important role as knowledge generators in the development of the technological SMEs, innovation systems try to design and implement mechanisms that help promote the transfer of knowledge from universities to businesses. Even though university research continues to be mostly financed by public money via government grants, businesses are beginning to invest in it, especially if it contributes more directly towards increasing their competitive abilities. Links between university and business are developed in various ways; consulting by faculty to businesses, investment in pre-competitive R&D, financial support from businesses to students, technology licensing, and the creation and incubation of businesses from research results, among others.

When viewing universities as knowledge centres it is possible to define three major roles. The first two involve the traditional activities of high-level education and research, where universities maintain a greater autonomy of action, and can be seen as

indirect ways of transferring knowledge. The third role, while also including research and educational activities, addresses these as a direct demand from business and industry.

The technological orientation of the USA has often been cited as an example of the result of active university participation in technology transfer activities to business enterprises, accompanied by a dynamic network of promotional activities at the Federal, State, Regional and Local level. In 1980, the US Congress approved the Bayh-Dole Act, which gave universities the right to generate income from the results of research financed by Federal grants<sup>4</sup>. This law produced an enormous amount of university participation in the innovation process<sup>5</sup> (Mowery et al., 1999). A report presented by the Association of University Technology Managers (AUTM) estimated that in 1999, the products commercialized as a result of academic research generated fiscal revenues of around \$5000 million in the USA, and more than 300 enterprises were constituted<sup>6</sup>.

Countries in the European Union (EU) are seen as lagging behind the USA in university-business relations, particularly with regards to patenting and licensing of research results, and the creation of university-based enterprises<sup>7</sup>. Although the EU contributes more than one fourth of the world's innovation (26.6%), slightly below the USA (27.8%)<sup>8</sup>, it is viewed as having a less entrepreneurial spirit than the USA, which in turn has had a negative effect on the development of venture capital in Europe, necessary for the financing of high risk enterprises (Henrekson and Rosenberg, 2001).

Latin America, on the other hand, generates less than 2% of the world's innovation, and the entrepreneurship that springs from there is considered to be more out of necessity than opportunity (Reynolds et al., 2001, Kantis et al., 2002). The percentage of engineers and scientists that engage in R&D activities is on average 20% lower than in Spain and 5% lower than in Finland<sup>9</sup>. In this region, the collaboration

existing between universities and businesses is 50% lower than in OECD countries<sup>10</sup>. The endemic economic crisis of Latin American countries has had a deleterious effect in public universities, which are constantly under budgetary uncertainty. This situation promotes the denominated “brain drain” that many of these countries experience, resulting in a discontinuity in research efforts and poor development of a “critical mass” necessary to increase the research potential (Carrington and Detragiache, 1999). Not surprisingly, therefore, it is believed that the technology gap existing between Europe/USA and Latin America is becoming wider rather than diminishing, which in turn produces a serious impediment towards development.

### **3. Description of University’s Knowledge Diffusion and Transfer Activities**

Universities are recognized as centres of higher education, accompanied in many cases by research efforts for the purposes of advancing knowledge, and their research capabilities vary between different university systems and cultures. However, universities are under constant competition with each other, being evaluated by the level and quality of their research almost as much as by their teaching capabilities. The way the results of the research activities are most commonly disseminated is through publishing in specialized journals, which themselves are evaluated by the quality of the knowledge presented. This mechanism of diffusion is considered a closed academic system, since the evaluators usually belong to the academic community. Universities are believed to not cater to any particular need but rather perform a service to society as a whole. As technology in particular and knowledge in general have become an increasingly relevant factor for business competitiveness and economic development,



many businesses look towards the university as a potential supplier of solutions, and are willing to develop professional bonds with faculty members, especially alumni turned business managers.

The activities that take place between university and businesses can be grouped into four categories. In the first category we find activities that are related to teaching, in the form of improvement and professional courses outside of the normal academia curricula. Teaching is probably the most natural and most easily implemented business service, a lesser source of debate and potentially a high-income generator.

The second category is related to laboratory services. As research centres, universities have the appropriate infrastructure while many businesses that need to perform research do not and cannot afford to develop one. Universities can provide laboratory services to businesses through the use of their infrastructure; equipment, installations and in many cases, human resources. The rendering of these services will usually depend on the level of unused capacity of the university's infrastructure and on the need to generate extraordinary income.

Consulting services offered by university faculty constitute the third category and perhaps the most commonly encountered (worldwide) university-business link, one that can become quite a profitable activity for members of faculty and supposes very little risk to them as their job security is maintained by the university's tenure system. In most cases, consulting jobs do not implicate the use of university property and are under the sole responsibility of the particular faculty member performing it. Many universities tolerate a certain amount of these activities, and some even view them as a way to increase faculty members' fringe benefits and complement the salary difference existing between public academia and the private sector, allowing the university to

maintain many professionals who would otherwise choose the higher earning possibility of the private sector.

The fourth category refers to the transfer of university research results to businesses through various instruments, such as research contracting, licensing and the creation of technology-based enterprises. This category is acquiring relevance among university culture systems as it is novel and perceived to be aligned with the primary concepts of innovative research.

#### **4. Description of the University Simon Bolivar**

##### *General Information*

The University Simon Bolivar (USB) was created through a Presidential decree in 1967 and initiated its activities in 1970 using a novel concept of a public technological university with a “social conscience”. Today, it offers undergraduate programs in the areas of engineering and basic and applied sciences, and short technical degree-oriented programs in administrative and technological areas<sup>11</sup>. At the postgraduate level its strength lies in offering specializations, masters and doctorate degrees in technological and engineering areas, but it also offers postgraduate programs in social sciences. In a particular academic year its undergraduate student population is around 7500, 1150 graduate students, 1000 active faculty professors and 1200 administrative and maintenance personnel<sup>12</sup>. Within the USB’s stated mission one finds that in addition to teaching, the USB gives great importance to research activities and to establishing direct links with the community and the business sector in the form of knowledge transfer services, a role denoted under the title “extension activities”. These can be revenue-making and non-revenue-making. The written mission, however, has no

counterpart in the form of formal rules, methodology, incentives or rewards relating to extension activities.

### *University-business links*

Faculty members are the ones most directly involved in extension activities. They search for opportunities and organize themselves under diverse informal organizational units, such as institutes, groups, centres, management units, to name a few. Of these, only the Institutes have been formally inserted into the organizational structure of the university and are situated under the control of academic Divisions and Departments. The remaining organizational units operate with almost no control by the university, there are no laws or policies to regulate their activities, and these are given very little or no weight in the academic evaluation of faculty. Not surprisingly, the strongest motivation that faculty members have for performing extension activities with the business sector was to obtain monetary rewards and complement the ever falling university salaries<sup>13</sup>.

Because of the profitable potential of extension activities and in an effort to regulate them and their executioners, the university began to develop organizational control mechanisms in the form of liaison units (Horowitz, 1998, Horowitz, 2001, Horowitz et al., 1999). Initially the USB created the Technical and Administrative Secretariat in 1982 (STAI), which later gave rise to the Foundation for Continuing Education (1985) and the Foundation for Research and Development (1986). In 1994, the activities of the Foundation for Continuing Education were taken over by the Foundation for Research and Development (FUNINDES-USB). In 1987, the USB founded the Foundation for the Development of Audiovisual Art (Artevision-USB) and in 1993 the Corporation Parque Tecnológico Sartenejas (PTS).

Table 1 shows a description of the purposes for which the different university-business liaison organizations were created.

**Table I: Description of Liaison Units**

<i>Organization</i>	<i>Purpose</i>
<i>FUNINDES-USB</i>	Given a separate legal personality it supports faculty in the process of formulation, negotiation and execution of profit-making extension activities. Does not have control over faculty and over the university facilities used in these activities.
<i>PARQUE TECNOLÓGICO SARTENEJAS</i>	Created with the objective of exploiting the real estate potential of the USB and promoting technological developments, which include the establishing of businesses on university's grounds and the development of a technology-based business incubator.
<i>ARTEVISION-USB</i>	Given a separate legal personality it helps formulate, negotiate and execute programs and projects that deal with the use of the established capacity of the USB in the field of audiovisual media.

Source: "La Corporacion USB". Papel de Trabajo. Comision de la Corporacion USB. 1998

Most for-profit activities have been channelled through FUNINDES-USB. Since its foundation to 2003, less than 10% of the total faculty of USB had been involved with a profit-making extension activity<sup>14</sup>. Of these, less than 3% establishes a stable link, the majority perform intermittent activities. 99.3% of these activities are in the consulting area, professional courses and laboratory services, while only 0.7% represents research and development per se.

During the same period covered by this study, some faculty members (5-7) began to explore creating technology-based enterprises. Start-up support activities were

channelled through the Parque Tecnológico Sartenejas (PTS) <sup>15</sup>, which was in an incipient stage of development.

Artevision was designed exclusively as a provider of audiovisual services to businesses using the equipment and resources of the USB and it is maintained as a unit of production with a small number of its own staff and has developed almost no links with the faculty. It will therefore, not be further alluded to in this study.

### **FUNINDES-USB**

FUNINDES-USB was created as a not-for-profit foundation of the USB with its own legal form and private character. The owner is the university. The mission assigned to this institution and described on its founding articles was that of promoting links between the scientific and technological capabilities of the USB and the needs for technological development of the industrial sector, generating at the same time the means necessary for its self-financing and providing the University with considerable funds<sup>16</sup>. In reality, FUNINDES-USB manages a reduced university supply that includes laboratory services, training and professional development courses, and consulting projects, the majority of which relate to specific technical problems. It does not receive subsidies from the university and its operations are covered by a percentage of what clients are charged for the services they receive.

Starting on June, 1997, as an initiative of the USB Chancellor, a revision of the mechanisms of university-business interaction was initiated<sup>17</sup>. This included a process of reengineering of the institutions in charge of these activities, particularly FUNINDES, starting with an analysis of the situation encountered (Table II).

According to the initial evaluation performed at the start of the reengineering process, FUNINDES-USB had been functioning merely as an intermediating legal

contracting office between industry and university faculty and was performing accounting follow-ups of the projects being executed.

**Table II: Situation encountered in 1997**

<b>Country in General</b>	<b>FUNINDES-USB</b>
Economic recession	Lack of historical information and analysis
Political instability	Lack of operational processes
Fall in income value	Lack of information systems
Budgetary deficit	Lack of consensual criteria
Bad managerial practices	Lack of policy
Non functioning systems	Lack of control mechanisms
Poor confidence in public institutions	Conflicting environment

The organization did not have a formal cost structure of the services and projects that were performed by faculty members; instead of a cost structure the organization used an accounting structure based on the repartition of revenues. Clients were charged a fee and most of the revenue obtained went towards paying the faculty involved plus some expenses such as travelling and purchasing of equipment and supplies, but not the use of university equipment or facilities. FUNINDES-USB did not perform marketing or promotion activities, and its information system was an administrative database. Its personnel were in general non-professional, with labour contracts made under the umbrella of FUNINDES' own legal entity as a private institution that was different from the labour regulations ruling university's employees<sup>18</sup>. According to university rules<sup>19</sup>, the majority of faculty members were in principle obligated to channel their for-profit activities through FUNINDES and had to pay the established fee regardless of the degree of support provided. Not surprisingly, FUNINDES was viewed by most as a

“toll taxing” structure that added little value, since the contacting and promotion was mainly done by the faculty, who also acted as executors of projects.

With regards to its decision making bodies, FUNINDES-USB had a board of directors that consisted exclusively of academic members including the four highest ranking university officials (Chancellor, Academic Vice-Chancellor, Administrative Vice-Chancellor and Secretary). This body appointed and evaluated the performance of the President of the institution, which also had to be by tradition a faculty member of the university.

### **Parque Tecnológico Sartenejas**

Although the PTS was formally created in 1993, it did not really begin operations until 1998, when a strategic alliance was formed between the university and a private provider of mobile cellular services, which allowed the firm to establish itself in university-owned grounds<sup>20</sup>. The PTS functioned under a similar legal form as FUNINDES-USB and under the same concepts of self-sustainability, but was under less pressure to provide additional funds for the university, since it was viewed as an infant project. Its major objective was to support faculty and researchers in the promotion of entrepreneurship endeavours involving the creation of university start-ups through the operation of a business incubator. In 2001, the business incubator contained less than 10 start-up businesses - most of them not related to academic activities - which took advantage of the real estate services provided. The PTS was in the process of developing commercialization strategies for five university projects<sup>21</sup>. PTS financing came mostly from the real estate deal made with the large mobile cellular company. The board of directors of the PTS, in contrast to that of FUNINDES, also included representatives of external institutions in addition to faculty members, such as the Ministry of Science and Technology, Ministry of Production, and some large

corporations. The President of PTS was appointed by the Chancellor of the USB and did not have to be a faculty member.

## **5. Stakeholders' influence in decision making**

Many of the university's stakeholders assume different roles within the university system depending on the organizational position they occupy, which in turn affects their decision making ability.

### *Business sector: Clients, competitors and strategic partners*

The view that the majority of clients have of the university is that it is a bureaucratic institution, excessively academic and therefore not in touch with the real needs of businesses. They also hold the impression that the university cannot be trusted to deliver or to comply to previously defined business agreements, as a public institution is not subject to the same rules governing businesses. The presence of FUNINDES with its private legal nature allowed the establishment of binding contracts, better adapted to business dynamics, and created the perception of stricter control of faculty members, thus generating a higher degree of confidence.

Many small businesses involved in technological activities viewed establishing strategic alliances with the university through FUNINDES as a helpful boost in developing technological markets, because of the excellent reputation which the USB had in science and engineering in the country. Other businesses, however, considered FUNINDES an unfair competitor. In their view, the university had better technological infrastructure and resources than them, mostly financed by public money, and was, therefore, in a better position to win bidding processes for technology-oriented contracts. In addition, the majority of the university's overhead costs of the extension



activities and contracts were being subsidized by public money, since the fee charged did not include the use of university's infrastructure and equipment. In addition, the majority of the faculty involved in for-profit activities had tenure and had labour stability as government employees and therefore both the faculty and the university were free from the financial risks normally assumed by businesses.

#### *FUNINDES and PTS employees*

As has been alluded to before, the human resources employed by the liaison units are under a labour law regime different from the one covering university employees and similar to that which applies to businesses. The use of the different labour regime allows, in principle, a greater flexibility for managing human resources and permits better achievement of effectiveness. FUNINDES was free to use a different set of evaluation and reward systems, similar to that used by businesses, but instead chose to use ones similar to the university system. It did not have a clear evaluation or reward system based on performance for its personnel. In addition, although the liaison units are required to be financially self-sustainable, their ability to maintain an adequate cash flow rested on the capability of developing profitable extension services, which was mainly under the control of faculty members, who were not directly employees of the liaison units and who enjoyed tenured positions and therefore labour stability. The employees very often felt that they were at the whim of faculty members, who in general were inexperienced in dealing with the business sector. The manner in which the liaison units operated reflected the university's inability to define a general policy of rules and regulations and a coherent and universally accepted strategic plan. The liaison units often operated in a disorganized manner, did not develop useful information systems, were unable to analyze performance properly, and found themselves constantly

in a situation of crisis management. The situation, as some employees expressed, is the following –“Ours is a no-win situation. When things go well the credit goes to the professors, when things go wrong the responsibility is always ours” –.

### *University Faculty*

The university faculty plays three roles in the process.

### Administrative and Authority positions

The university system of the USB has a very flat structure with regards to faculty. All administrative positions are held by faculty members and, apart from very few that are appointed directly by the Chancellor, the remaining ones (including Chancellor and Vice-Chancellors) are chosen through democratic elections within the community. The appointments last between two to four years with re-election for 1 or 2 terms<sup>22</sup>. These include Chancellor, Administrative Vice-Chancellor, Academic Vice-Chancellor, Secretary, Deans of Schools, Heads of Departments, Chiefs of Service Units, Faculty Representatives, etc. The university’s legislative body members include most of the people holding these administrative positions, and the decisions are determined through voice vote, using the simple majority rule. When it comes to specific decision making of different university issues, particularly delicate ones such as changes in rules and regulations, structural changes, evaluations of tenure-track candidates, university’s grant adjudication, etc, different types of commissions are created, which are composed by faculty members appointed by the legislative body. These commissions study the issues at hand and give their conclusions to the legislative body, who is the ultimate decision maker but who rarely overturns the decisions made by the commissions. This manner of governance is used to avoid the generation of

authoritarian behaviour and to promote consensus among the community in the decision making process.

However, reaching consensus within a large community is a difficult process and requires the prior generation of a shared vision particularly with regards to issues that pertain to cultural and structural changes (Levitt and March., 1988; Senge, 1990; Schein, 1992; Dogson, 1993). In this case, there was no consensus available on how transfer activities should be conducted, and no shared vision of what these activities implied, how they should be promoted, or even if they should be encouraged at all. The number of faculty actively involved in them was very small compared to the total population, and most of those not involved were either indifferent or expressed concern about the effect that these activities could have on the traditional system they adhered to. As it was, no official position had been taken by the legislative body and, therefore, no set of norms or regulations had been defined. Because of the financial problems suffered by the university, obtaining outside revenue could be tolerated and even encouraged, if it would provide needed funds for the university, or a venue by which the faculty could complement decaying salaries without undermining the main academic activities of teaching and publishing in prestigious academic journals. The belief held by many faculty members concerning financing was that the government had the obligation to provide the necessary funds for the university, each of them viewing their respective activities as being meritorious of public financing.

When it came to the repartition of revenue generated by for-profit activities, the inclusion of a university overhead became a subject of conflict between those directly involved in these activities and those who were not. The former felt that they should reap the highest benefits since they were doing most of the work, while the latter group believed that since these activities were only possible because of the security,

infrastructure and resources that the university provided, the university should receive the highest proportion. Pressure was exerted by both of these groups upon the university's authorities, which were themselves participants of these groups. On the other hand, since their operations were financed through these activities, the percentage allocated to the liaison units would have to be sufficient to cover their costs, which would diminish the returns to the individuals that performed the activities directly and to the university as a whole. Since the authorities were unable to establish a definite position concerning this issue and since the liaison units were in charge of collecting the overhead and had been given discretion over their use, the liaison units often found themselves the target of criticism and rebuke. Without having an *a priori* plan of operations or well-defined objectives, the units were being evaluated *a posteriori* and the basis for the evaluation was determined following the existing mood at the time it was performed. If the authorities felt that the university needed extra external funding, the evaluation emphasis would be based on a strictly accounting viewpoint, but if the mood prevailing was an academic one, the weight would be placed on areas relating to type of projects, areas of research, participation of faculty, etc.

This behaviour did not promote organizational development towards generating stable liaison units but, rather, ad hoc structures expected to accommodate themselves to the changing whims of decision makers.

#### Managers of the transfer units

In the case of FUNINDES the managing team was composed of two or three members of the university faculty, who were selected by the Chancellor. The managers were chosen from among those, who already had been involved in university-business related activities and had technological expertise but otherwise little managing

experience. No formal process for selection was used, nor was a job description or a professional profile defined. Because of the *a posteriori* nature of the performance evaluation of the liaison units without the *a priori* establishment of objectives and plans, the management team usually found itself in dire conditions with regards to unfulfilled expectations. New appointed managers brought with them the ideas and views of what they themselves would like the institution to do, and were convinced of their ability to succeed in implementing them where previous managers have failed, without prior analysis of the preceding situation. This revealed a lack of organizational learning capabilities necessary to provide continuity and efficiency of efforts. However, as had been the case with their predecessors, their ideas and views very quickly began to clash with the views and desires of the rest, due to the lack of a unified vision. The absence of formal operative processes and systems (in particular information systems) made reporting a very difficult endeavour, particularly since it was not known what kind of information the authorities would be interested in. The desire to succeed where others had failed fuelled the need to convey a sense of efficiency, without the realisation that in doing so, the real needs and situation of the organization were being masked. This behaviour was fuelled by destructive criticisms on the part of board members, who often demonstrated disregard of organizational history and organizational learning. A difficulty or necessity exposed by managers was taken as a managerial flaw, even though in most cases it responded to a pre-existing situation, or to a problem encountered that was beyond the control and responsibility of the management team.

In the case of the PTS, the president is assigned directly by the Chancellor and may or may not be a member of the faculty. As in the case of FUNINDES there is no established plan for management to follow, and business is carried out in an *ad hoc*

manner with little written information being generated and even less analysis being done.

For FUNINDES, the precarious and stressful situation of managers was a more complex and problematic one than for the PTS. Firstly, FUNINDES not only managed a larger number of faculty, but the activities performed by the faculty were less compatible with the view, shared by the majority of the mission, of the university. Secondly, FUNINDES governing body was composed only of university faculty, while PTS had outsiders in its board, whose presence tended to tone down outspoken internal criticisms. Thirdly, FUNINDES managed a much higher cash flow than PTS, without the university really knowing what the real profit was in either case, as it had not established the appropriate accounting systems. However, a higher cash flow was mistakenly understood to mean higher profits and therefore higher surplus, which was, most prevalently, not the case.

#### Executors of extension and transfer activities

All members of faculty can participate in extension activities and can at the same time function as university administrators and managers of transfer units. Executors of extension activities usually view these as part of their academic autonomy rights and do not want any kind of controlling intervention. Because most of these activities are not considered as part of their “normal” academic load, the greatest motivation to perform them is monetary. Many executors, however, would like to see these activities considered in their academic evaluation. They also feel that in subjects such as engineering, for example, the involvement of students and faculty in university-business projects augments the value of traditional teaching and academic research. On the other hand, they were also very protective of their business contacts and tended not

to encourage either student involvement or collaborative work with other members of faculty. In the seven year span of the study, no new faculty members were added to existing working groups, and resistance was strong when liaison units suggested collaborative associations with other members of faculty. Even worse, a “relay generation” was not developed. In one particular case, for example, the area of water engineering and management consisted of three faculty members from the college of engineering who were involved for over fifteen years as a group force working through FUNINDES. When one of these faculty members emigrated to the USA and the other two retired from academic life, the discipline was completely lost in the university as their group never expanded.

In general, the managerial knowledge of the executors is low and they are not aware of the overhead costs of performing university-business activities. This is not surprising, as the university itself is not aware of what these costs are. While the executors consider themselves the true owners of FUNINDES, each individual has a particular vision of the institution and expects it to accommodate each and every one of their particular needs, regardless of costs. University authorities have little time to become acquainted with the issues concerning for-profit extension services and are not willing to make decisions that affect formal policy and may create internal controversy. Liaison unit managers, on the other hand, have to deal with day to day operational problems, in addition to their normal academic obligations (also in some cases the execution of their own extension activities), and are under the pressure of unreasonable expectations and, furthermore, are not in the position to perform the type of analysis and planning needed. Therefore, a constant positive force that can propel an effective organizational development is absent.

As the financial situation of the university worsens with a falling national economy, the subject of generating funds outside of the normal governmental budget through for-profit university-business activities becomes more relevant, and greater demands are placed upon liaison units, which in turn try to exert more control over executors of these activities, without these increased demands being accompanied by the policy and organizational changes necessary to comply with them.

## **6. Conclusion and strategies which support knowledge-transfer activities within the context of university-business relations**

As stated previously, the topic of university-business links is travelling through different zones of influence that relate directly with the issues of economic utilization of publicly funded research and of the mission and usefulness of universities in today's economic world. When we turn to the practical issue of how these activities are being promoted and managed (if at all) by the university, we are confronted with a clashing of cultures and interests between the university's stakeholders and with the absence of proper instruments of development, evaluation and control. The end result is that formal policies and structures are not generated, but rather ad hoc solutions to punctuated problems are designed and imposed in a top-down fashion without a clear vision of where the institution is headed. Individual extension activities are left to wander through a path of self-promotion, which causes more clashes and conflicts.

Increased university-business links demand of universities new and novel organizational strategies that promote generation of shared vision among the stakeholders. It is clear that it is not enough to state an organizational mission and then expect it to be complied with, when the predominant culture is not in tune with it. The



university system is subject to internal and external pressures that demand change that, if not properly managed, will lead to a destructive process rather than a constructive one. In university systems, where academic freedom to search for truth and knowledge is considered the basis of its existence, relations with business can be perceived as a potential threat to this freedom and can strengthen the accountable and accounting market-oriented view of universities and hence, create an environment of strong opposition to it. In addition, if linking activities are not introduced properly within the academic structure, executors of these activities will begin to form a new academic elite, divorced from the traditional academic society, creating cracks and conflicts in the system, and even meta-systems and informal structures that can negatively affect the development of the university.

While the general issue of university's place in society continues to be debated, how should we then proceed to handle the more particular issue of university-business activities? Clearly, one immediate answer should be not to ignore them nor try to exert excessive control over them without first understanding them.

The complex picture presented in national and regional innovation systems requires a fine tuning at the level of specific organizations. With regard to universities, for example, the interrelations governing university culture are very diverse, each particular university acting as a discrete organizational unit and as such, having a specific culture and *modus operandis*, which are partly a function of the time context and the immediate environment where it is imbedded into. Some aspects of culture are shared among different universities and others are not, and therefore, there is no single model that can be constructed and expected to work for all. The university culture system in the USA, for example, encourages more active participation by faculty in the commercial exploitation of research, while that in European universities does so in a

much lesser degree. Instead of a model, what may be of increased value would be to develop processes that will aid the university in defining the best way to proceed towards breaking the dichotomy existing between the knowledge-creation and knowledge-transfer cultures.

### *The concept of ODUs*

It has been generally agreed upon that changing organizational culture is a very complex and difficult problem, which is accentuated by the size of the organization. Because of the reported importance of liaison offices on university-business linking activities (Centro Interuniversitario de Desarrollo and Agencia Española de Cooperación Internacional, 1997; Centro Interuniversitario de Desarrollo, 1996, 1998, Thurby and Kemp, 1999, Siegel et al., 1999; Bercovitz et al., 2001), it appears that the starting point of the process development involves creating operational organizational structures within the university system in charge of organizing and coordinating the new business interacting role with the more traditional one that involves education and knowledge creation. However, in order to avoid the traps that have plagued previous efforts, instead of acting as an isolated, top-level imposing structure, these should be viewed as the locomotive units of the university, working in a bottom-up and across fashion, towards developing the processes needed to insert university-business activities within the university system in a systemic manner. Rather than functioning as an intermediary between the university and businesses and therefore establishing a pre-set linear model, these structures should function as connecting tissues of the body formed by the interactions between university's internal structures and businesses.

In order to increase their success, three important issues must be considered. Firstly, the nature of these connecting-like structures must be understood from the very beginning by all the stakeholders. Secondly, they should operate under clear objectives and goals defined *a priori* as well as under a pre-established plan of action that should be continuously revised. And thirdly, it must be stressed that the results obtained always remain part of the university's overall responsibility and not that of the new structures.

I will subsequently refer to this proposed connective tissue as observatory-developmental units (ODU).

#### *Designing and fitting ODUs within the university structure*

One of the most relevant forces exerted upon universities originates from financial uncertainty. Universities are in constant need of resources and are continuously being put through the 'budget ringer', which forces the university to look for new ways of financing. As short term and quick revenue generators, the activities involving consulting, laboratory services and professional courses should be managed under a careful policy of cost accounting and avoidance of unfair competition practices with the private business sector. These activities can help develop longer term ones such as contract research, licensing and spin-off/start-ups. The university must be aware that a particular faculty member may be competent in performing the technical aspects of these services as executor of these activities, but is not necessarily knowledgeable in the management of business processes. ODUs must have human resources capable of navigating comfortably between the world of academia and that of business, and serve as a bridge between both. ODUs should become efficient communication and coordination channels between the different stakeholders but should

also be allowed to have the degree of independence necessary to insure impartiality. ODU's must promote interdisciplinary collaboration, systemic vision and critical mass generation.

Developing the proper management mechanisms for handling revenue-making opportunities for the university minimizes conflicts. In particular, the information concerning these and other aspects of university-business management must be available and constantly generated, analysed and evaluated. Having pertinent information can help pull the design and implementation of adequate policies. Involvement in university-business activities should become a formal aspect of the university system, thus generating incentives and decreasing the sensation of those who engage in them of being 'academic pariahs'.

Transfer activities in the form of industry research contracts, licensing of inventions and business start-ups are perhaps of greater importance to the university than performing specific and intermittent services, not only because of their high income-generation potential, but because of their high innovation-generation potential. One thing to keep in mind is that maintaining a harmonious and productive balance between knowledge-creation and knowledge-transfer is of great economic importance to society and that this balance is closely related to the balance that should exist in universities between academic freedom and market-oriented dynamics.

While contracting research may seem like the easiest route of the three, those who have transited through it know that this is not always the case. To begin with, it might be difficult for the university to find contractors. For instance, a greater gap between high scientific performance and industrial competitiveness has been observed in Europe compared to the USA. This phenomenon has been termed the "European Paradox" (EC-DGECFIN, 2000). This gap has been mainly attributed to low levels of

Industry Science Links (ISL) and this, in turn, to a lack of demand on the enterprise side (Polt, 2000). While performing the present study, it has also been found that many of the businesses and industries that could become university's contractors still consider R&D activities a cost rather than an investment.

Contracting usually depends on the type of industrial and business network that is present at a given time period, and on the economic situation of the region where they operate. Being closely in touch with these networks and developing a proactive attitude for capturing businesses' present and future needs is extremely critical for the university, as well as aligning these needs with its internal R&D supply. ODU's must therefore move in the direction of developing the marketing skills that researchers lack, based on information systems of supply and demand, and in acquiring capabilities for performing prospective analysis studies in which researchers should participate. The information obtained should be shared with researchers, in order to increase their awareness of the market, of future demands and technological tendencies. In addition, contract research should be given a weight in the faculty's academic evaluation, taking into consideration that this type of research carries, in many cases, delays in publication or prevents publication totally, because of confidentiality arrangements that might be requested by industry. Regional barriers can be broken by expanding the industrial networks and by establishing productive links and collaboration with other centres of knowledge. Collaborative, team-based research appears to have become the most significant mode of activity in today's global scientific community, although the concrete motivation and particular factors that drive this interaction are not yet entirely understood (Carayannis and Laget, 2004).

Universities may also follow strategies of promoting the licensing of technologies developed or/and generation of start-up businesses. These strategies are

complex and require resources and structures, which universities usually do not possess. It has been proposed that the use of a patent system is the most appropriate mechanism for licensing and commercializing technology developed by the university, as it reduces the transaction costs related to technology transfer (Shane, 2002). However, the value of a patent will depend on the type of technology it protects and the existing capacity that the organization has for defending the patent in question (Mansfield, 1981). More important than patenting per se, is the ability of the university to actively search among its research activities for developments with the potential for commercialization, and to provide researchers with the resources necessary to accomplish them. Researchers are not necessarily aware of the economic potential of their results, nor do they have the inclination to transfer them to the market. The commercialization of technology involves a series of capabilities that include the identification of requirements of the market, the development of the product, the design of manufacturing and/or marketing processes, among others, that the university inventor rarely possess. ODU's must, therefore, have the capacity to determine the economic potential of universities' activities and design strategies to develop them.

Licensing technology to economic agents has, in some cases, been considered preferable to giving licensing rights to the inventors themselves, since it may augment the possibility of obtaining royalties for the inventor and allow them to concentrate further in productive research (Teece, 1980; Pisano and Mang, 1993). On the other hand, it has been argued that conditions which impede the successful commercialization of an invention by previously established businesses may exist (Arora, 1996). Some of these conditions are caused by inefficiencies in the knowledge markets and are related to the difference in quality perception of an invention existing between inventors and buyers. For example, how much to reveal about an invention becomes a complex issue,

since a buyer may not be disposed to purchasing a particular technology before he understands what it is that he is buying, but after acquiring the information he may forfeit on payment and proceed to use the technology anyway. The basis of a successful association becomes then having the capability for negotiation between the interested parties and leaving the door open for renegotiation once the process of commercialization has begun (Pisano, 1989). In order to help the university decide what path to follow, ODUs must have the capacity to define the pertinence of patenting an invention through the analysis of its present and future potential, and the ability then to design and implement a strategy for commercialization based on the resources available and the environment present. By creating permanent channels of communication and negotiation with businesses, the negative effects of inefficiencies in the knowledge markets can be minimized.

To transit through this knowledge commercialization path successfully, the university must also establish clear directives and policies concerning the sharing of revenues resulting from the licensing of inventions and the granting of the proper academic credit. These must not conflict with other policies present. The university should also supply evidence that supports the need for national policies that can help pave the road towards achieving productive and effective university-business interactions.

With regards to the creation of university spin-offs and start-ups, the results of the forth mentioned studies have interesting implications over the area of entrepreneurship, since they present evidence that suggests that university entrepreneurs only turn so because of existing deficiencies in the knowledge markets. Following the path of promoting university spin-ups and start-ups, however, can help avoid the problem of inefficiencies in knowledge markets and also expand the available mass of

industry, business and commercial development maintaining ties with universities, which in turn will promote innovation. Here again, however, we should take into consideration that the faculty-inventors may not be the best choice for managing the start-up business, since they may not have the attitudes and attributes that are said to describe the entrepreneur (McClelland, 1961; Khilstrom and Laffont, 1979). The university, however, has a definite competitive advantage in the search and acquisition of entrepreneurs, after all it possess one of the greatest human resources pool in existence among its student population. Students are already connected to inventions through academic activities, and university spin-outs and start-ups can be seen as perfect opportunities for their insertion into the professional world more as entrepreneurs than as employees, supporting the view that information and opportunity are just as important as attitude and attribute in the road to entrepreneurship development. The university, through its teaching activities, can help in the formation of future entrepreneurs by developing these attitudes and attributes, as it can also promote collaborative alliances between students and between students and faculty that can help generate an entrepreneurial culture within the university (Horowitz, 2004). ODU's must be able to develop, through their information systems, the capacity to select, among the portfolio of university research inventions, those more apt to spin-off and start-up creation, and have the capability to help those new businesses through the most trying parts of their development. A good strategy for ODU's to follow in the process of culture transformation is to use "showcases" to create a "domino" effect, which necessitates the development of a good communication system inside the university.

Last but not least, a critical role for ODU's to have is that of administrators, accountants and financial managers of the revenues, which result from university-business activities. Cash flow control and financial planning become pivotal areas for



the future development of transfer activities, and are usually areas of weaknesses and controversy in universities. Having accounting information available is a necessary step for the development of an internal negotiation processes geared towards investment decision making, and as such, it is as important for promoting the generation of a shared vision on university-business activities as is the development of information and analysis capabilities on non-financial operations and opportunities.

## Notes

<sup>1</sup> Following the notions expressed by Cardinal Newman in the 1850s.

<sup>2</sup> Source: Presentation given by representatives of the World Bank in the Venezuelan Ministry of Science and Technology, September, 2003.

<sup>3</sup> Source: EIM Business & Policy Research, estimation based on Eurostats data base. Also European Economy, Supplement A, June 2001 and OECD: Economic Outlook, No. 69, June 2001.

<sup>4</sup> Source: Council on Governmental Relations, U.S.A., Copyright 1999.

<sup>5</sup> Using the term innovation as defined as “The process by which firms master and get into practice product designs and manufacturing systems that are new to them”, by Nelson, R. ed. 1993, *National Innovation System: A comparative Analysis*, Oxford University Press:

<sup>6</sup> Source: Association of University Technology Managers Inc., AUTM Licensing Survey, FY 1999, c2000.

<sup>7</sup> Source: EC, 2002, Economic Policy Committee DG ECFIN, Working Group on R&D, Report on Research and Development.

<sup>8</sup> Measured as the amount of publications present in the scientific index. Source: Observatoire des sciences et des techniques. Published in December 1994. Data obtained from the Science Citation Index of ISI Society.

<sup>9</sup> Source: World Development Indicators, 2002.

<sup>10</sup> Source: IMD World Competitiveness Yearbook 2002

<sup>11</sup> For more information view <http://www.usb.ve>

<sup>12</sup> Source: Boletín Estadístico 1996-2000, Universidad Simón Bolívar.

<sup>13</sup> In 2004, the salary of the faculty was 25% of the value of 1984's salaries, measured in terms of US dollars.

<sup>14</sup> Source: FUNINDES-USB, Informe de Gestión, 2000

<sup>15</sup> Source: Corporación Parque Tecnológico Sartenejas, Informe de Gestión 2000.

<sup>16</sup> As described in the by-laws of FUNINDES-USB.

<sup>17</sup> This process of reengineering was surrounded by a great amount of controversy and did not advance beyond defining a new mission for the university and partly restructuring its accounting system.

<sup>18</sup> These regulations are based on Venezuela's public servant's law and include additional benefits that have been included through union-employer negotiations. A major difference with the university labour regime relates to employee security. According to the law pertaining university labour policy, it is very difficult to remove university employees, and they practically enjoy a tenured-like position. The faculty perceives this as being detrimental and making the university administrative system inefficient.

<sup>19</sup> The majority of faculty members were under a university contract known as exclusive dedication, which prohibits obtaining additional revenues outside the university's salary.

<sup>20</sup>The USB became a minority shareholder (5%) of the consortium that owned the telecommunications firm

<sup>21</sup> Source: Corporacion Parque Tecnologico Sartenejas, Informe de Gestion 2000

<sup>22</sup> The election system is under constant revision following political and social trends

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