

THE IMPORTANCE OF STRATEGICALLY MANAGING INTELLECTUAL CAPITAL TO DEVELOP INNOVATIVE CAPACITY IN BRAZILIAN COMPANIES

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Abstract

This paper presents a study conducted among 35 Brazilian companies of varying sizes and sectors into their innovative capacity based on an analysis of their intellectual capital management practices, systems, and models. Using the *Intellectual Capital Innovation Assessment Model*[®], this analysis was conducted on 19 intellectual-capital-related indicators considered important to the development of an organization's innovative capacity. The results point to a significant correlation between the companies' capability to innovate and the intellectual capital management models they adopted.

Introduction

The concept of innovation has attracted the interest of researchers, academics, and business people since 1970. In the last decade, innovation has become recognized as essential to the competitiveness of organizations and has been included into their corporate strategic agendas. Several researches [1-3], show a strong correlation between innovation, economic development, productivity, and organizational performance. It is, therefore, paramount that 21st-century organizations be able to continually upgrade their products, services, processes, competencies, and organizational designs in order to guarantee sustainable growth and, consequently, their survival in the market. Regardless of the economic sector in which they operate, knowledge-based companies are becoming more abundant, thus making innovation management a strategically important area in organizations.

Stewart [4] asserts that three important ideas have transformed the way organizations have operated over the last few decades: Total Quality Management, reengineering, and the concept of Intellectual Capital. In linking intellectual capital with innovation, he makes two interesting statements: "Intellectual capital and knowledge management are two of the most important topics in business today" and "innovation is treated as a mysterious, external factor". His observations suggest the need to conduct further research on innovation in order to better understand the dynamics of the

processes which leverage innovative capacity in organizations.

Research on Innovation and Innovative Capacity

According to the Oslo Manual [5], innovation activities take place in small, medium, and large companies across all sectors of the economy, such as manufacturing, services, public administration, health, and even in the homes of people. As the concept of innovation is still somewhat vague, especially in some economic sectors, the Manual recommends that research on this subject should primarily focus on innovation activities in market-oriented industries, including service industries.

Moreira & Queiroz [6] warn us about the difficulty of systemizing studies in applied social sciences, particularly in the field of business administration under which innovation research falls. They emphasize that innovation studies form a complex area of research about various branches and specializations, but have witnessed a surge in popularity in the last two decades. These authors affirm that the understanding of innovative behavior in companies is still rather limited, and that most research on innovation have largely generated inconclusive results. They go on to state that research on innovation may be categorized into two main groups: research conducted in the higher levels of an aggregate, such as a nation, an industry as a whole, a manufacturing sector or a particular industrial group; and research carried out at the company level, investigating innovation in a certain company or a small set of companies from the same industry, as in multiple case studies.

Moreira & Queiroz break down innovation studies at a company level into three classes: research on the Diffusion of Innovation (DI), on an organization's Innovative Capacity (IC), and on the Theory of Processes (TP). Research on innovative capacity seeks to discover which factors stimulate innovation in a company. This involves identifying the determining factors contributing to an organization's capability to innovate.

Strategic Management of Intellectual Capital and Innovative Capacity

Intellectual capital refers to a company's intangible assets, with people as its mainspring. These intangible assets are related to the market, suppliers, partners, internal processes, technological infrastructure, and education, which may be defined as an organization's value chain [7].

Sveiby [8] proposed a taxonomy of intellectual capital in his book, "The New Organizational Wealth: Managing and Measuring Knowledge-Based Assets". He claims that knowledge assets are concentrated in three main areas: the competencies of a company's staff, its internal structure (patents, models, and internal systems), and its external structure (brands, reputation, customer and supplier relations).

Edvinsson & Malone [9] also divide a company's intellectual capital into three main areas: structural capital, customer capital, and human capital, as shown in Figure 1. They divide structural capital into organizational, innovation, and process capital. The first refers to the company's investment in organizational systems, instruments, and corporate culture, which facilitate the flux of knowledge through the organization, its external departments, and the supply and distribution channels. It is a systemized, organized, and codified competency, as are the systems that harness this competency. Innovation capital refers to the capacity for renovation and the results of innovation in terms of legal commercial rights, intellectual property, and other intangible assets used to create new products and services, and release them onto the market. Process capital refers to processes, techniques, and programs, used by the organization's collaborators with the aim of improving product or service efficiency. It is the practical knowledge employed in the ongoing value creation.

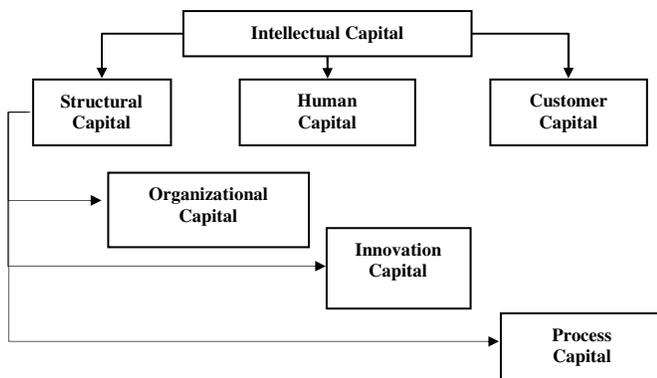


Figure 1. Model of Intellectual Capital [9]

Stewart [4] defines intellectual capital as "knowledge assets including talent, skills, know-how, know-what, and relationships, as well as the relevant machines and networks – used to create wealth." This means that intellectual assets may be found both in routine and unexpected places: in people, in the organizational structures and infrastructure, in the company's relationships, its customers' staff, and its external collaborators, and should consequently be cultivated and aligned by an organizational strategy. According to Stewart, the most common taxonomy used by theorists and researchers operating in the field of Intellectual Capital Management to represent these elements has been: Human Capital, Structural (or Organizational) Capital, and Customer (or Relationship) Capital.

Cavalcanti et al. [10] add a fourth element to be contemplated in the analysis of intangible assets: Environmental Capital, which incorporates the other three dimensions. For these authors, the four capitals defined as Human, Structural, Relationship, and Environmental, are important sources for the creation of value and innovation in an organization. According to several other authors [4], [9], [11-15], a sustainable competitive edge emerges when a company is able to channel its knowledge and technological competencies into innovation in services, products, processes, administrative and management models, and commercialization strategies, in order to leverage organizational performance in the execution of its strategic objectives.

Jonnash & Sommerlate [14] highlight the need to stimulate innovation through the synergy and complementarities in the organization's technological, financial, and human resources—knowledge and talents—found in the company's business ecosystem. According to these authors, identifying intellectual capital resources in the company's value network [16] within the extended enterprise [14], which comprises intangible assets of clients, suppliers, direct and indirect collaborators, partners and even competitors, and strategically managing them to innovate must become a core competency for organizations to sustain and leverage their business in current and future competitive scenarios.

Chesbrough [17], [18] states that a company may seek innovation resources from outside the extended company and its value network. He proposes an open innovation management model for the development of both products and services, which presumes that resources which stimulate innovation are found both internally and externally, and can be obtained from organizations and professionals located anywhere in the world. According to Chesbrough, companies wishing to leverage their innovative capacity should open their doors to external human, financial, and technological resources found in research centers, universities and

even competing companies. Therefore, they should establish collaborative strategies and agreements with these companies for the transfer of innovation-oriented knowledge and technologies.

Almeida [19] emphasizes that intellectual capital is a starting point for innovativeness and that it is a company's intangible assets that add value and credibility to the business, thereby determining its innovative and learning capacity, rendering it necessary for companies to employ strategic management of their intellectual resources. All in all, according to the above-mentioned authors, innovation management through the strategic management of intellectual capital in the extended enterprise has become an important management tool to increase a firm's capability to innovate.

Study on Innovative Capacity in Brazilian Companies

The research method adopted in this study was the case-study method. According to Yin [20], this method is used to explain contemporary events of how some social phenomenon works, and for in-depth descriptions of this phenomenon, thereby enhancing knowledge of individual, group, social, political, and organizational determining factors that contribute to the phenomenon. The case-study method, then, allows for retention of meaningful characteristics of organizational and managerial behavior, such as the innovative capacity in firms. Yin also states that the case-study method can be the basis for significant explanations and generalizations, allowing one to draw a set of "cross-case" conclusions.

Innovative capacity, as defined here, deals with the ability of an organization to develop strategic processes to gain a competitive edge, resulting from at least one of five types of initiatives: a new product or service, a new process, a new management model, a new marketing/commercial approach, a new business model, or the improvement of these, which should add a significant, tangible and/or intangible value to an individual, group, organization, market, or society as a whole.

In this paper, the authors present the results of a multiple case study which set out to analyze innovative capacity across 35 Brazilian companies using the Intellectual Capital Innovation Assessment Model® and its diagnostic tool, the Innovation Assessment Questionnaire (I.A.Q.®) [15]. This model is a quantitative-qualitative diagnostic tool that aims to help managers assess how and to what extent the systems, models, and practices adopted by the organization to manage its intellectual capital may contribute to the development of the company's innovative capacity. It was devel-

oped based on the innovation management models proposed by Higgins [12], Jonnash & Sommerlate [14], and Tidd et al. [11], which identified organizational models, practices, systems, and routines considered important for innovation processes, necessary to leverage innovation capacity in firms.

This study sought to assess how these organizations promoted the development of their innovative capacity through the management of the financial, technological, and human resources available in the human, structural, relationship, and environmental Capitals, within the extended enterprise and business ecosystems, so as to identify the main barriers to innovation within these organizations, considering their industry and marketplace. An additional objective of this study was to assess the level of understanding of the managers, who responded to the I.A.Q.®, about the importance of the systems, models, and practices adopted by their companies to help develop the organization's innovative capacity.

The Innovation Assessment Questionnaire (I.A.Q.®)

The I.A.Q.® took the form of 64 questions about management practices related to 19 intellectual capital-related indicators that leverage innovation capacity within an organization [11], [12], [14], [15], [17]. Each indicator was assessed on a scale of 0 (zero) to 1.0 (one) points. The key indicators and their descriptions are outlined in the Table 1:

The I.A.Q.® was applied to analyze how the following factors might stimulate or restrict organizational innovation: strategies, goals, targets, organizational culture and values, structural and infrastructural resources, people and business management models, and administrative systems. This study was conducted over a period of 24 months, from 2007 to 2009, and carried out at the company level [6], involving 35 Brazilian organizations, eight of which belonged to the public sector, and 27 to the private sector, with a geographical distribution as displayed in Figure 2, and of various sizes, as per Figure 3.

The companies that participated in this study were selected based on their interest in assessing their innovative capacity, and identifying inhibiting factors to innovation in their organizations. Of the 35 companies analyzed, 31% belong to the industrial sector, 66% to the service sector, and 3% to the commercial sector. They operate in a variety of segments including: petrochemicals, food, commodity distributors, pharmaceuticals, iron and steel, IT, education, energy, clothing, sports, insurance, telecommunications, and automobiles.

Table 1. Intellectual Capital Innovation Indicators

Innovation Indicators	Description
Essential Competencies and Critical Knowledge	The degree to which the organization identifies its Core Competencies and Critical Knowledge in order to conduct its current and future activities.
Environmental monitoring	The degree to which the organization monitors the external environment in tracking innovative and technological developments, and market trends.
Culture and Organizational Values	The degree to which the organizational culture and values encourage innovation, innovative and entrepreneurial behavior.
Organizational Learning and Knowledge Creation	The degree to which the organization adopts practices to enhance its learning capacity and create new knowledge aimed at developing innovative solutions.
Organizational Communication	The degree to which internal communication systems and I.T. stimulate and sustain innovation processes in the organization.
Creativity and Idea Capture and Management	The degree to which the organization promotes creative problem-solving and develops innovation by utilizing idea capture and management systems for collaborators in the value network.
Performance assessment, recognition, remuneration and promotion	The degree to which performance assessment, recognition, remuneration and promotion systems value innovative behavior, critical knowledge, individual competencies, and collaborators' capacity to contribute to innovation in the organization.
Recruitment and Selection	The degree to which the internal and external recruitment and selection systems values innovative behavior, critical knowledge, individual competencies, and collaborators' capacity to contribute to innovation in the organization.
HR Retention	The degree to which the organization adopts practices to retain collaborators and their critical knowledge in order to leverage the organization's innovative capacity.
Innovation Indicators	Description
Collaborative Work Models	The degree to which the organization adopts collaborative work models to stimulate interaction aimed at co-creation and co-innovation processes within the organization's value network.
Leadership Roles	The extent to which managers and leaders understand and manage innovation processes and strategies, and promote and strengthen the necessary competencies for innovation at all organizational levels.
Relationship Network	The degree to which the organization identifies and utilizes intellectual capital resources available in the company's extended value network to develop innovation.
Management of Collaborative Agreements	The degree to which the organization establishes and manages collaborative agreements and partnerships in order to develop its innovative capacity.
Innovation Strategy	The degree to which the organization establishes strategic guidelines to promote and align collaborators' actions in order to strengthen innovative capacity at individual and organizational levels.
Organizational Structure and Infrastructure	The degree to which the organization is structured in order to better promote the sharing and creation of knowledge and generation of innovative solutions.
Innovation Generation	The degree to which the organization has generated innovative solutions in the last 24 months by means of its collaborators' contributions.
Barriers to Innovation	This identifies the degree to which barriers inhibit innovation and if they are individual in nature (behavioral) and/or organizational (structural/infrastructural).

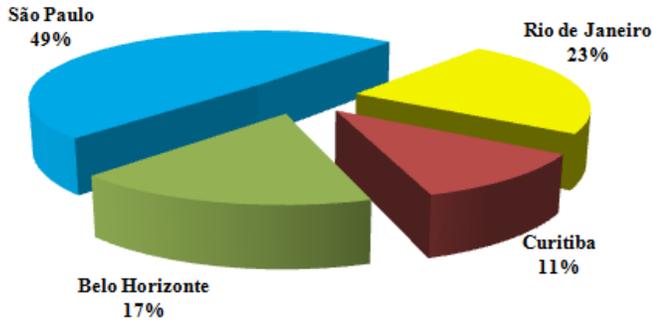


Figure 2. Geographical Location

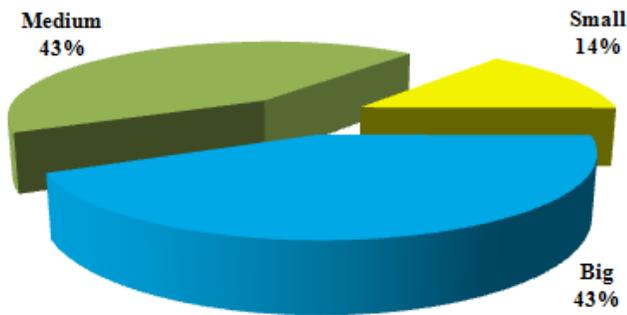


Figure 3. Company Size

Application of the Intellectual Capital Innovation Management Assessment Model

The first step to the application of the Intellectual Capital Innovation Management Assessment® was to identify the respondents to the I.A.Q. in each company, so as to ensure an appropriate selection. The respondents were mid- and high-level managers selected according to the divisions they worked in, and their knowledge of the business and marketplace. A meeting was held with the respondents to clarify any questions about the application procedure and the content of the questions in the I.A.Q. considering that the reliability of the results obtained in this study would be strongly correlated with the precision with which the respondents analyzed the routines, systems, and practices adopted in the management of intellectual capital resources aimed at developing the company's innovative capacity.

Data Analysis and Consolidated Results

Data on the following main questions were obtained upon processing and analysis of the questionnaires:

- 1) What are the main organizational models, systems, and practices used to manage intellectual capital which may restrain innovation capacity in the organizations that were studied?
- 2) What is the managers' level of perception/knowledge of factors critical to innovation processes in the management of capital intellectual resources?

Main Barriers to Innovation Capacity in Private-Sector Organizations

The results presented in the following graphs have been separated into the public sector, in which eight organizations were analyzed, and the private sector, which includes the remaining 27 companies. A third graph shows the consolidated results of the 35 organizations studied.

Figure 4 presents the eight main barriers to developing and sustaining innovative capacity in the 27 private-sector companies that participated in this study. It therefore identifies the main organizational models, systems, and practices adopted in capital intellectual management that inhibit the innovation process and innovative capacity of the companies analyzed.

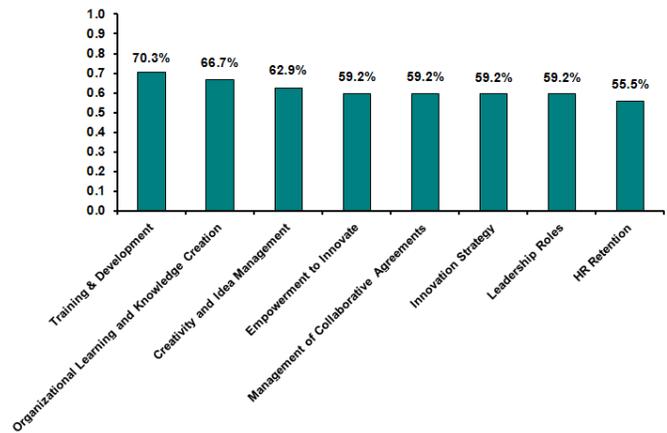


Figure 4. Main Barriers to Innovation: Private-Sector Organizations

The results obtained from the I.A.Q. showed that 70.3% of the companies identified a lack of training programs to develop the competencies necessary for innovation as the most restrictive factor to the organization's innovative capacity. The capacity for Organizational Learning and Knowledge Creation was identified as the second most significant barrier to innovation in 66.7% of the companies analyzed, signaling that these companies had not adopted adequate systems and practices to nurture the creation of new knowledge to sustain innovative development. Creativ-

ity and Idea Management by means of a well-structured and managed system was the third most restrictive element identified in approximately 63.0% of the companies analyzed. This indicates that these companies fail to adequately promote creative problem-solving processes or use structured systems for collecting and managing the ideas of collaborators in the value network, in order to develop innovation. Approximately 60% of companies indicated that they did not afford the necessary empowerment to innovate to collaborators in the organization's value network. Furthermore, there was a lack of adequate management of collaborative agreements to support the identification and strategic use of intellectual capital resources for innovation in the extended enterprise. Managers' lack of knowledge about innovation processes and the consequent inability to manage these processes was also among the eight most restrictive factors identified, coupled with the lack of clearly defined and publicized organizational strategies on innovation. Finally, managers in 55% of the companies analyzed indicated that they did not adopt practices to promote the retention of employees who have knowledge critical to innovation and the sustainability of future business, thus compromising their organizations' innovative capacity.

Main Barriers to Innovation in the Public Sector

Figure 5 presents the eight worst-performing indicators in terms of intellectual capital resource management for the capacity to innovate in the eight public-sector organizations analyzed using the I.A.Q.

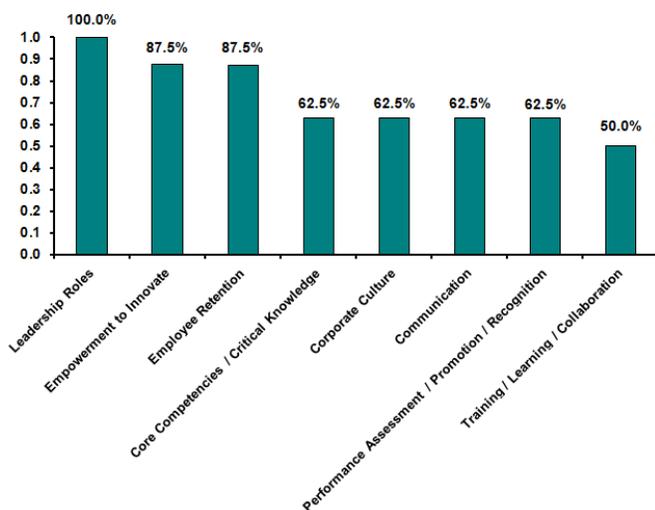


Figure 5. Main Barriers to Innovation – Public Sector

The respondents of all eight organizations indicated that leadership and their roles in organizational administration, represented the main restrictive factor to innovation. The lack of empowerment to innovate and the challenge provided by employee retention were identified by 87.5% of these organizations as the second factor to most inhibit innovative capacity. It is interesting that these three factors also feature among the eight most restrictive factors identified in the 27 private sector companies analyzed.

Of the eight public-sector organizations analyzed, 62.5% indicated that they failed to adequately identify the core competencies and critical knowledge to conduct their current activities and support innovation in the future. The same percentage of organizations indicated that their organizational culture and values did not promote innovation, innovative behavior, and an intra-entrepreneurial attitude, and, likewise, the communication systems did not promote and sustain innovation in the organization. Similarly, performance assessment, recognition, and promotion systems do not consider innovative behavior, critical knowledge, individual competencies, and staff members' capacity to contribute to innovation in the organization. The last restrictive factor is partially due to limitations imposed by the legislation in force. Finally, managers in 50% of the organizations indicated that they did not adopt collaborative work models to promote the interaction necessary to disseminate good practices and lessons learned among collaborators in the value network in order to support innovation processes and generate new solutions in the organization.

Main Barriers to Innovation: Consolidated Data for the Public and Private Sectors

The consolidated results for the 35 organizations analyzed are shown in Figure 6, which shows the eight worst-performing indicators in relation to the systems and practices adopted in the intellectual capital management aimed at developing innovative capacity.

The responses show that the most restrictive factors identified in organizations across both the public and private sectors are related to systems adopted by the organizations in the management of intangible asset resources. The results seem to suggest the necessity to better manage structural and human capital resources, and in particular Human Resource management models related to the intellectual assets of the organization's value network. Interestingly, both public- and private-sector organizations pointed to the necessity to strategically generate relationship capital resources, since one of the main restrictive factors identified in private-sector organizations was the need to better manage collaborative agreements and, in the public sector, the need to de-

velop collaborative work models to promote organizational learning which is critical for enhancing and sustaining innovative capacity in organizations.

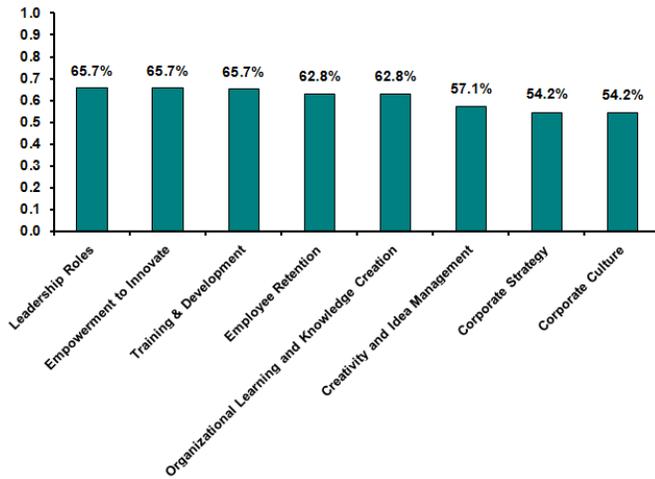


Figure 6. Main Barriers to Innovation – Consolidated Results for the Public and Private Sectors

Barriers to Innovation and Generation of Innovations by Sector

Applying the I.A.Q. across the 35 organizations analyzed allowed some complementary results to be inferred. Based on the consolidated results, an analysis was conducted to verify the possible existence of low, medium, or high barriers to innovation according to the particular organizational and market realities. These data were compared with the degree to which these organizations had developed innovation by means of contributions from collaborators in the value network within the 24-month period covered in this study.

The data obtained indicated that eight of the public-sector organizations under analysis encountered high barriers to innovation (0.78, see Figure 7), of an individual (behavioral) and/or organizational (structural/ infrastructural) nature. The data provided by the private-sector companies, on the other hand, suggest the existence of medium barriers (0.429) to innovation. Even though there is a significant difference between these two values, private-sector companies generated innovation at a slightly higher rate than in public-sector organizations: 61.7% compared to 50%, respectively.

Another significant I.A.Q. finding is related to the respondents' level of knowledge and perception of factors critical to innovation processes in terms of the organization-

al models, systems, and practices adopted in their intellectual capital management. Managers from public-sector organizations demonstrated a higher level of knowledge on factors critical to innovation processes (0.87%), even though they adopted only 44.33% of practices to generate innovation. Managers from private-sector companies demonstrated a slightly lower level of knowledge on the importance of practices, systems, and models, key to innovation (0.81%), despite adopting approximately 53% of routines analyzed to generate innovation.

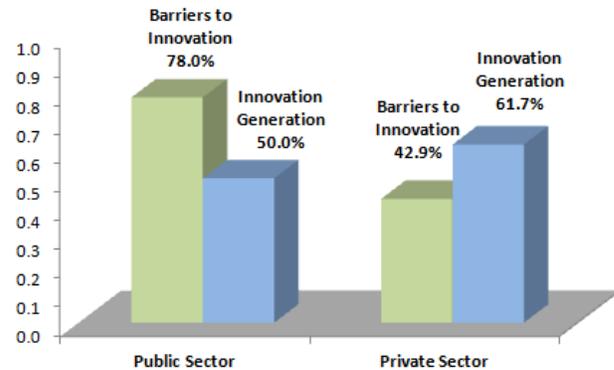


Figure 7. Barriers to Innovation versus Innovation Generation

Conclusions and Future Research

This multiple case study was limited to 35 Brazilian organizations and, therefore, provides little basis for scientific and statistical generalizations. However, the data collected by means of the application of the Intellectual Capital Innovation Assessment Model® and its diagnostic tool, the Innovation Assessment Questionnaire (I.A.Q.®) provide a basis to expand and generalize existing theories on innovation management, and provide for some preliminary “cross-case” conclusions.

The results obtained from the application of the Intellectual Capital Innovation Management Assessment Model® seem to indicate that the 35 organizations analyzed lack more specific knowledge on how to strategically manage the existing intellectual capital resources in their companies and value networks in order to stimulate innovation. The results also suggest that most of the companies analyzed share similar restrictions and challenges in terms of implementing practices, systems, and management models to stimulate their organizations' innovative capacity. There is certainly greater understanding among managers on the strategic importance of innovation as a factor for the organization's competitiveness and sustainability, but it still seems that they face several restrictions to transform this knowledge into concrete innovation actions.

It is important to highlight that the application of the I.A.Q. in the 35 organizations analyzed also contributed toward the managers developing a greater understanding of the dynamics of innovation processes within their organizations and marketplace, allowing them to debate how to improve organizational practices, systems, and models they employ to manage intellectual capital in order to foster their innovative capacity.

Innovation management through the strategic management of intellectual capital in the extended enterprise has become an important management tool to increase a firm's capability to innovate. Managers must learn how to identify and manage the existing intellectual capital resources in their companies and value networks in order to leverage their companies' level of innovativeness. However, there are still few studies which correlate Intellectual Capital management models with innovative capacity. Therefore, future research should be directed to in-depth studies on organizational models, systems, and processes that enhance or inhibit an organization's innovative capacity at higher levels of an aggregate, such as a specific industry, sector, or a particular industrial group.

Considering that innovation activities take place in small, medium, and large companies across all sectors, future research will help managers develop a more comprehensive understanding of innovation management systems and models considering their organization and marketplace realities.

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