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IN SEARCH OF INNOVATION LOOKING OUTSIDE THE COMPANY

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Resumo

No contexto atual de elevada incerteza no competitivo ambiente de negócios, este estudo investiga teórica e praticamente as proposições de que a capacidade absortiva e a visão periférica em empresas inovadoras afetam a procura externa pela inovação e seu desempenho inovador (inovação como resultado). Adicionalmente, é sugerido que a estratégia de busca da inovação pode influenciar o tipo de inovação criada. Com base em metodologia qualitativa, por meio de estudos de caso no setor de serviços de tecnologia da informação, ou conhecimento intensivos (KIBS), com foco em pequenas e médias empresas, obtêm-se como resultados do estudo, que a capacidade absortiva, visão periférica e elementos como mapeamento, estratégia de busca da inovação e a capacidade de leitura de sinais da empresa, podem ser geradores de inovações.

Palavras-chave: Capacidade Absortiva, Visão Periférica e Inovação.

Abstract

In the current context of high uncertainty in the competitive business environment, this research studies theoretical and practically the propositions of the absorptive capacity and peripheral vision in innovative companies affect the external search and the innovative performance (innovation as outcome). Additionally it is suggested that innovation search strategy may determine the innovation type generated. Based on qualitative methodology and multiple case studies in Information Technology, or Knowledge Intensive Services Sector (KIBS), focusing on Small and Medium companies, it suggests the influence of absorptive capacity and peripheral vision and elements such as scanning, innovation search strategy, and the reading capacity of weak signals can be generators of innovations.

Keywords: Absorptive Capacity, Peripheral Vision, and Innovation.

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1 Introduction

In the current era of information data is generated in huge volumes, forcing companies to translate these data into information, and interpret them in knowledge (IBM, 2014; Slater, 2013), because with frequent and intense external changes to the limit of its borders hierarchical, businesses, for their survival, should be alert to what happens in the external world and seek signs (Silver, 2013), potentially innovative, providing a source of competitive advantage and differentiation from its competitors. The company should be so "porous" their "senses" and reading skills should be encouraged to detect threats and opportunities on their radar expanding its Peripheral Vision (Day & Schoemaker, 2005; Schoemaker & Day, 2009).

How can the company identify market opportunities that generate innovation from weak signals? Will be from structured mechanisms to expand the absorptive capacity of the company? Or through expansion of the repertoire of elements of the Peripheral Vision of the company? Researchers like Nonaka & Takeuchi (2008) and Cohen and Levinthal (1990), among others, focused his studies on how the company generates knowledge and company capabilities to acquire and assimilate knowledge as elements for the company to increase its innovative capacity. Other authors, for example, Choo (1993, 2002) and Choo (2002, cited in Aguilar, 1967), have focused on how the company monitors its external business environment with the aim mainly to perceive threats and opportunities as soon as possible, even when the signs of these events have not become strong, or also called weak signals.

The detection of weak signals (Hiltunen, 2010) can be performed by various methods, tools and early warning systems, these processes are often directed to the analysis of future prospective techniques (FTA - Future Technology Oriented Analysis) and for example, technical scenarios (Ramirez, Österman, Gronquist, 2013; Wright, Cairns, Bradfield, 2013), or the Delphi technique, quantitative forecasts, among other existing (Schwarz, 2008).

After the identification of knowledge in the market, there is a need to interpret it. The interpretation is done through event analysis in relation to a standard established by the individual, or in our case, by the company, in such a way that makes sense (sense making) the individual or company or not (makes sense). Daft & Weick (1984), mention the interpretation as a way to make sense outlined by individual beliefs and the company and whose meaning becomes shared with the company's employees. However, the company should not only monitor the reactive and broadly market without a focus or strategy. Choo (2002, cited in Aguilar, 1967) presents four quadrants defined by analysability dimensions of the environment and the attitude of the company. In our study will focus on the analyses portion of the environment and the proactive attitude of the company. That is, this quadrant, called search, the primary target is set as a premise for the study of the search for weak signals for the generation innovation. As a secondary target, the company can perform analysis in relevant markets initially not analysable. What will determine whether a market is analysable or will not be is the repertoire of the company's knowledge base.

In this way, and set the search strategy for the generation of innovation (where the company looks) (Laursen, 2012), we will deep the search topic, their conditions and expected results, given the studied literature, based by researchers as Cohen & Levinthal (1989, 1990), Zahra and George (2002) or in more recent studies with researchers as Laursen & Salter (2006), Grimpe & Sofka (2009) and Salter, Wal, Criscuolo & Alexy (2012), exercising such elements as basic diversity of the company's knowledge, diversity of industry segments for the search among others, and analysing their effects in generating ideas that can used for creating innovation. The search strategy such elements for innovation, and include expanded what was conceptualized by Day & Schoemaker (2005) and Peripheral Vision.

Through a literature review we realize there is a theoretical and practical gap in relation to the variance of the constructs absorptive capacity and peripheral vision on how both affect the generation of innovation in the company.

Therefore this study aimed to investigate the behaviour of the variables absorptive capacity and Peripheral Vision as drivers and constraints of the acquisition and interpretation of external weak signals for generating innovative ideas. As a secondary objective we studied the influence of the variability of the company's knowledge base, diversity of industry segments than the company itself, and the influence of search strategy (external) (Day, 1994) innovation for the generation of a systematic creation of ideas from external weak signals the company. In all these cases, the studied theory, there would be a positive relationship with the innovation performance of the company.

Research problem

The environment in which the company operates affects in many ways, typically from threats to opportunities. The company is an interpretive system composed of managers (Daft & Weick, 1984). As these leaders classify external events threatened or opportunities results in subsequent actions and behaviours that are consistent with the previous classification of the event as a threat or opportunity (Dutton & Jackson, 1987). Companies that innovate respond faster and better and enjoy more opportunities from outside, than those who do not innovate (Jimenez-Jimenez & Valle, 2008 cited Miles et al., 1995).

General and Specific Objectives

The main analysis element of this work is the influence of the environment in the company, and how the company interprets the signals in the market aiming to generate innovative ideas. The overall objectives of the study of this work are the identification and analysis of:

- Capabilities that a company must have to acquire external knowledge on the market (customers, suppliers, etc.) conducive to innovation;
- The influence of absorptive capacity for generation innovation,
- The influence of Peripheral Vision for the generation of innovation and,
- The relationship between the search strategy and the performance of the generation of innovation;

- As secondary objectives we can mention the research and analysis of:
- The influence of company’s knowledge base diversity stimulates the ideas generation,
- The influence of the company's innovation search strategy in different segments to yours, provides more radical innovations,
- The search in the same company’s industry segment provides more incremental innovations;

These are the generals and specific objectives set out in the study and that may signal it is possible to increase the innovative performance of the company (Crossan & Apaydin, 2010). Therefore one can get a better competitive market performance and increased competitiveness of the company (Di Serio & Vasconcelos, 2009) from certain capabilities of the company and predefined strategies.

Justification

We live at a time when companies need to reinvent and create new to not get stuck in limbo based on its past success story. In this context and due to the dynamism of target companies in this study, it is essential to deepen the research on Information Technology services, which is known as KIBS (Knowledge Intensive Based Service), and know, how they monitor external business environment (Lesca, Caron-Fasan, Falcy, 2012). Services in general, and specifically in this industry that demand and generates knowledge, occur through interactions with its

customers, and its product (services) only exists when the customer consumption (Gallouj & Weinstein, 1997), in a process of value co-creation (Prahalad & Ramaswamy, 2000). In the process of interaction between the company and the outside world, knowledge is created, following the classical model of Nonaka & Takeuchi's knowledge creation (2008), known as SECI (the initial letters of Socialization, Externalization, Conversion and Internalization). For these authors, knowledge is a source of innovation. In this context for a company to acquire an external knowledge, the company can and should monitor their business environment in search of weak signals (Hiltunen, 2010), not only to avoid threats, but also to anticipate the signs while they are weak, that may stimulate them in creating innovations. More and more companies realize the value in pursuing of external knowledge to their borders, resulting in superior performance to that which would be obtained only considering the knowledge contained within its boundaries (Ireland, Hitt & Vaidyanath, 2002).

2 Literature Review

The initial concept introduced is the Innovation as per author Crossan and Apaydin (2010). As in Figure 1 Innovation may be approached as a process or as an outcome. In terms of process we can use internal elements, and as well, we can use external elements to generate innovation. We will focus in on Innovation sourced out of the company.

The innovation out of the company

The many and drastic external changes generates uncertainties to the managers (Duncan, 1972) and motivate them to have to acquire knowledge (Daft et al., 1988) in order to reduce the uncertainty, interpreting the events in threats or opportunities (Jackson & Dutton, 1988). In this case the knowledge gained is located externally to the company and such knowledge will be input to innovation (Crossan & Apaydin, 2010; Nonaka & Takeuchi, 2008). When we look at the review of Crossan & Apaydin (2010) we see that the present work focuses and fits the aspect of innovation as a process and within the concept of management levers (at the organization level), mainly focusing resources and company capabilities order to gain knowledge and learning within the perspective of RBV (acronym for Resource Based View) (Barney, 1991) and Dynamic Capabilities (Teece, Pisano & Shuen, 1997; Eisenhardt & Martin, 2000) as shown in Table 1, as an enabler for the generation of innovation.

Figure 1 – Organizational Innovation Framework

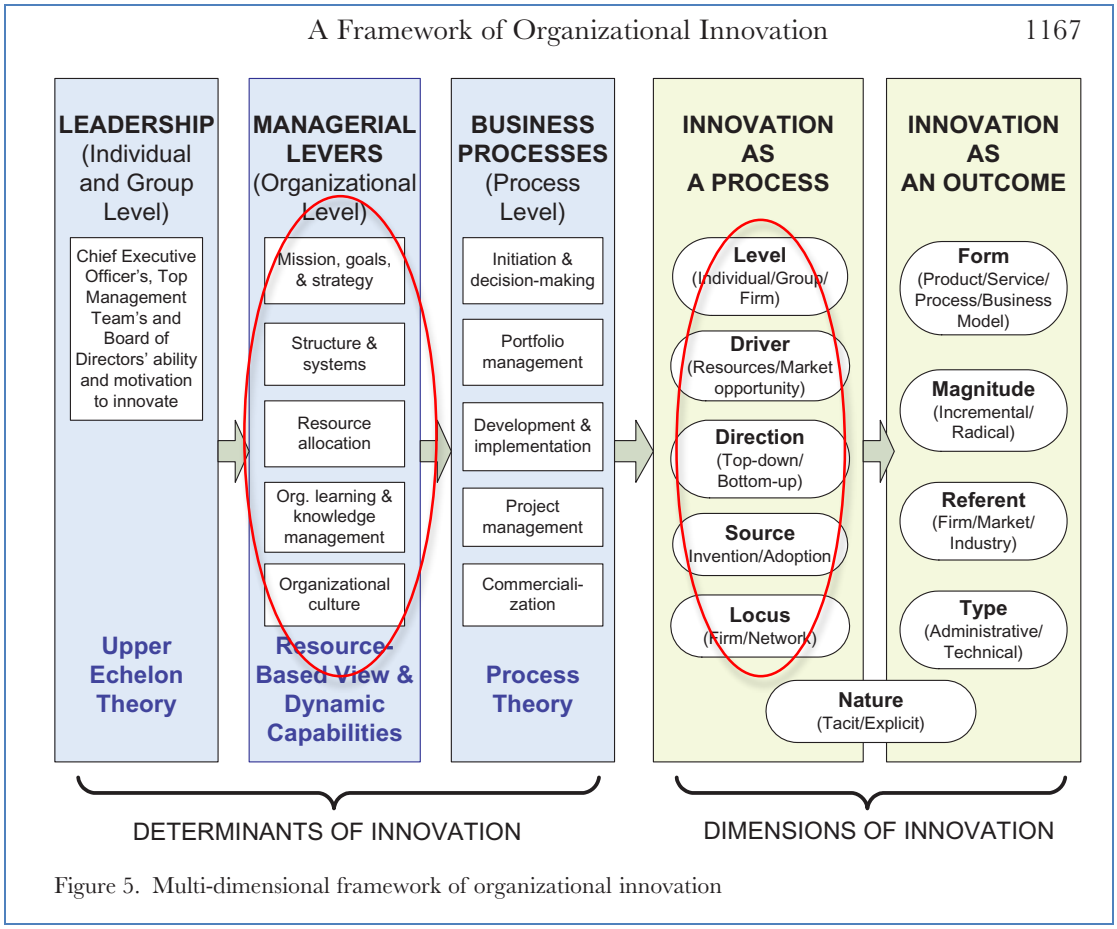

Figure 5. Multi-dimensional framework of organizational innovation

Source: Crossan and Apaydin (2010, p. 1167), with author's emphasis.

Therefore the company, besides to listen to their own employees (internal focus), should listen to your market (external focus) in order to seek more and different knowledge to generate innovations (Cassiman, & Veugelers, 2005). Many companies today use as research and development strategy not just the internal knowledge, but they seek partnerships in the market (Chesbrough, 2003). They look for external signals that can be raw material for innovation. Thus, the traditional model of stages and gates (Stage-Gate) as shown by Cooper (2001) was adapted with the advent of open innovation (Chesbrough, 2003) and now includes in its various stages the external component and was resubmitted under this new light, an external one (Cooper, 2008; DOCHERTY, 2006) as shown in Figure 2.

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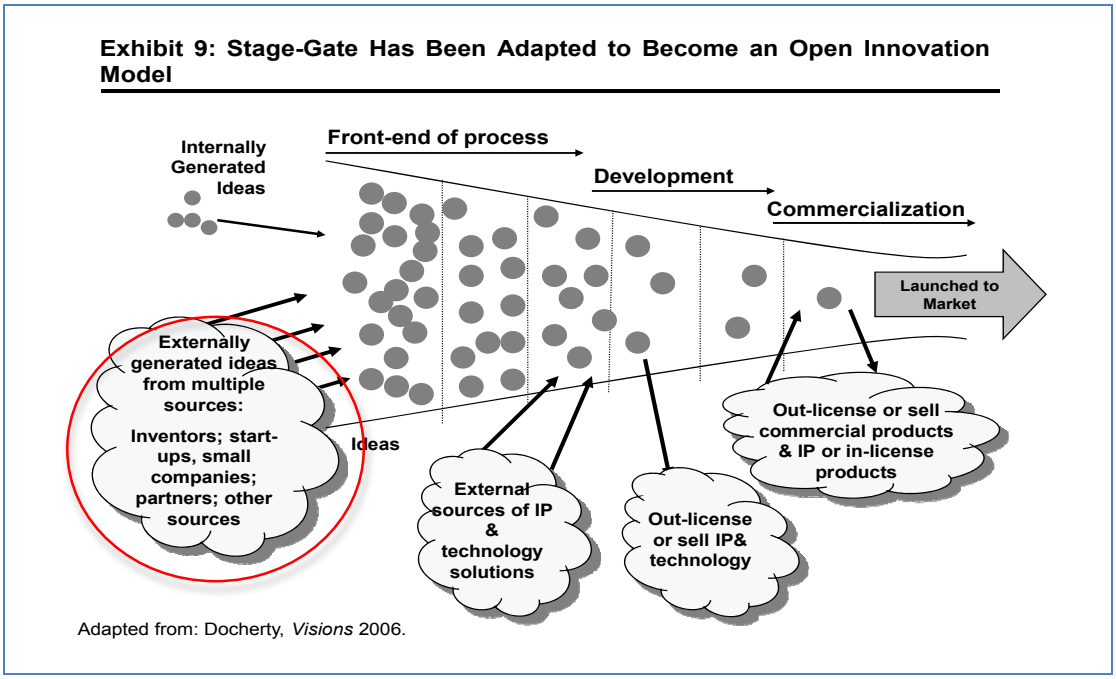
Figure 1 - *Stage-Gate* adapted to consider the open innovation.



Source: Docherty (2006), with author's emphasis.

Absorptive capacity

Cohen & Levinthal (1990) with the concept of absorptive capacity (AC), from macroeconomics Adler (1965, cited Tu et al., 2006) propose a relationship between the ability of the company to look at the market and their ability to innovative, or more specifically the relationship between the perceived value of the new on the external information, assimilation and commercial application (innovation).

The authors present the following components elements of CA:

- Receivers: they can be centralized or decentralized
- Internal Knowledge Base: diversity of knowledge as a source for increasing the AC,
- Good communication: ranging from the same language or different one; trade-off between the commonality and diversity. Cross-functional or close links between the areas of the company facilitate the launch of products.

Cohen & Levinthal (1990) show that learning influences the absorptive capacity of the company. And the more difficult it is to learn, the more R & D is crucial to increase the CA of the company.

The knowledge base can help the company to recognize, assimilate and exploit the value of new external information. And the more the company have the external source as a target, the easier the recognition. As Nelson and Winter (1982) said, as more explicit and coded were the new recognition, easier to understand and to assimilation.

Peripheral Vision

The Google Street Car carries out their local registration work through the photos are taken and constantly updated. Although Google is company from the Technology Business Information sector, the question is: a traditional car manufacturer company (in the manufacturing sector, therefore) should care about such fact (autonomous car)?

Peripheral vision (Day & Schoemaker, 2005) proposes to discuss this aspect of search that is, not in places of traditional business focus, but in other places or markets, considered peripheral to the company.

The analogy with the human vision system is illustrative, but significant because the human body has averaged around 6 million cone cells to record the focus of vision. And the same human eye has around 120 million rod cells that register the vision around the central focus, called peripheral vision (Day & Schoemaker, 2004). Thus, the interesting point here is that we have far fewer cells to look at our vision of focus than the many cells to a peripheral look where, in theory, if we are not looking is because it is not our interest (yet).

Absorptive Capacity and Peripheral Vision: Extended Peripheral Vision (EPV)

We have seen so far that a diversification in the knowledge base allows greater absorptive capacity and therefore greater capacity for innovation, as Cohen & Levinthal (1989, 1990) presented to us. Moreover, we also saw that a larger range in search for innovation and greater range of peripheral vision enables more possibilities of finding weak signals and more elements, which can lead to a threat or an opportunity as Day & Schoemaker (2004, 2005) mentioned.

Thus, we are proposing a framework that combines the absorptive capacity with Peripheral Vision of the company. Here we call this junction Extended Peripheral Vision.

3 Methodological Aspects

In terms of research, method and approach, we adopt the model of Van de Ven (2007) in his book Engaged Scholarship, which suggests:

- Formulation of the problem - where is located, underlies, diagnoses and infers the research problem determining who, what, where, when, why and how,
- Creation theory - creates, develops and justifies the theory using abductive, deductive or inductive reasons,
- Research project - developing a model that is variance or process oriented,
- Problem Resolution - communicate, interpret and apply practical results found in alternative models that best meet the research question about the problem;

About the research methods

As Medeiros (2010, p. 30) states from the point of view of research objectives, initially we established an explanatory research which conducting a study, analysis, recording and interpretation of the facts and identify the causes. Or, otherwise, we can say that we will use as a method, observation, interpretation and comparison (Medeiros, 2010, p. 31) with the theory studied.

Research Method

As research method, we chose to be deductive, as the researcher part of a particular theory or preconceptions and he/she seeks evidence on, for his theories. As research technique initially we use literature review and case study. The choice of the case study as a research method, as Yin (2010, p 28-29), is used when fit the following considerations:

- The type of proposed research question is about: how and why,
- The degree of extension the researcher has about the events,
- If the study focuses on contemporary events;

Typically thought when you use a case study, we understand that the exploratory analysis is a suitable technique to the field of study for a work with features and initial knowledge on a given subject. Although there is an initial theory, it is intended, with the case study, deepen the theme, validate or not the theory, and eventually deepens it or explore other variations that appear in the field.

Research Approach

The research approach used is qualitative. Qualitative occurs when there has been little sampling of the experiment, either to study the nature of the event and its essence, as data collection is used interview or observation and the research instrument is the researcher himself, as Prodanov and Freitas mention (2013, p. 70-71).

Propositions to the Fieldwork

Baxter (2008, p. 551) says when a case study presents propositions it increases the chance of the researcher put limits on their research and also increases the chance to complete the work. So the more the study contains propositions, more study is within the boundaries of achievement. Still, the same author discusses the sources for the theoretical propositions are created. Among the presented by the author as practical experiences, theories and generalizations based on empirical data, we consider that in our study the main source of search for the creation of the propositions will be the theoretical evidence, that is, they arise from literature review. In this context, based on the literature review, the propositions for this work are those mentioned earlier in the *General and Specific Objectives* topic in this paper.

The Industry Segment

According to the Companies and Markets website (2015) the Global Information Technology (IT) market was about US$ 3.6 trillion in 2011; the IT Service market could reach US$ 1.147 trillion by 2017. The IT services it is positioned in the sector called KIBS (Miles et al., 1995; Hertog, 2000; Hertog, & Bilderbeek, 1998), which stands for Knowledge Intensive Based Services, and more specifically focusing on business services supported by technology, called t-KIBS (Howells, 2000) or KIBS-II (Miles et al., 1995). The innovative companies in this sector of services (knowledge-intensive) are differentiated in the generation of innovation as occur in industry segments which produce tangible products, traditionally use much more intensively a department of research and development (R & D). In information technology services (KIBS), there is a greater need for interaction of professionals from different business functions with the external environment, by exchanging information on events, workshops, forums, etc. for the generation of innovation in the company (Malachias & Meirelles, 2009).

The Unit of Analysis

The unit of analysis is the company, and its relationship with the market and its customers (Cropper et al., 2010) or in other words it is the process of capturing, acquisition and innovation (VAN DE VEN, 2007).

Companies used in the Case Studies

Companies here called A, B and C, are Brazilian companies, small or medium-sized, in the initial phase or existing a few years in the market. Additionally, they have in common the fact that they belong to the named segment KIBS (Knowledge Intensive Services). Specific features are:

- The Company A, with 10 years of existence, was initially a fully focused company in (Information Technology) services and, for nearly 01 year, it turned into software

company radically changing its business model. It has a specialized focus on a particular segment of industry,

- Company B has existed for about 20 years, was also services based, migrated to software solutions, with a business model that pays for use, and has clients in some industry segments,
- Company C has approximately 07 years of existence. It operates in pure (advisory and specialist) services and studies migrate to software. The software is used for Knowledge Management of its projects and other intangible assets. Their customers are positioned in all industry segments;

Relating the questions to the constructs

In order to extract information of the firms regarding concepts previously presented, we created and used a semi-structured questionnaire with 19 questions for guidance, which served as script questions for the interviews, thus obtaining a relationship between questions versus constructs. In the Table 1, filled with the answers of the three companies, the numbers shown represent qualitatively the intensity of their responses. Where 1 represents basic features, 2 mediums and 3 intensive form of the element that makes up the construct. The constructs are presented in theory:

- Absorptive Capacity (AC): it means if there is a formal function of Research and Development (R&D) and diversification of its knowledge base,
- Peripheral Vision (PV): they are the formal and informal elements of the company to monitor and interpret external signals. For example, with technologies, processes, and professionals for this purpose or others who do spontaneously (informal),
- Willingness to innovation (WI): it is how much the company has a predisposition for innovation,
- Innovative Performance (IP): how the company's results, either in number of innovations or financial results,
- Turbulence and Weak Signals (WS): assuming a correlation between turbulence and signs in the market, these would be one representation of how competitive and how many signals are generated in the market,
- The Peripheral Vision and R&D plus the knowledge base's diversity (these two elements are part of Absorptive Capacity), we might call them as the Extended Peripheral Vision (EPV);

Respondents in the companies

Interviews with the three companies were conducted with senior executives of the companies, with the title of CEO or General Manager; it means the person responsible for the whole company. And he or she therefore knows all activities, has the strategic vision, and knows the current situation and the direction to be followed.

Results from the fieldwork

As a result of field research (Table 1) was found some facts:

- Company C, is in a more turbulent environment (75%) out of the three environments, has less susceptibility to innovate (60%), and is the most innovative (78%),
- Company A that realizes a less turbulent environment (58%), have a greater predisposition to innovation (73%) and has good innovative result (78%),
- In terms of research and development (R&D), the company that uses more this function is the company A, followed by B and then C,

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- Stronger diversity in C, followed by A and B with the same intensity,
- Peripheral Vision more pronounced in the company C (81%), followed by a (67%) and B (48%),
- PV + CA: (EPV: Extended Peripheral Vision): C company has greater capacity to Extended Peripheral Vision (78%), followed by a (70%) and B (55%),

Table 1 – Questions and Constructs

Constructs					Questions	Companies		
AC	PV	WS	Innovation Willingness	Innovation Outcome		A	B	C
		X			1	1	1	3
		X			2	3	3	2
Turbulence & Weak Signals (1,2,11,12) (Sum)						7/12	7/12	9/12
Turbulence & Weak Signals (1,2,11,12) (%)						58%	58%	75%
X			X		3	3	2	1
R&D (3)						3	2	1
			X		4	3	2	1
			X		5	3	2	3
			X		6	3	3	3
			X		7	2	2	1
Innovation Willingness (3,4,5,6,7) (Sum)						11/15	9/15	9/15
Innovation Willingness (3,4,5,6,7) (%)						73%	60%	60%
X					8	2	3	3
Diversity (8)						2	3	3
				X	9	2	3	2
				X	10	3	-	2
	X	X			11	2	1	2
	X	X			12	1	2	2
	X				13	1	1	2
	X				14	3	2	3
	X				15	2	2	2
	X				16	3	1	3
	X				17	2	1	3
Peripheral Vision (11,12,13,14,15,16,17) (Sum)						14/21	10/21	17/21
Peripheral Vision (11,12,13,14,15,16,17) (%)						67%	48%	81%
EPV = CA (3,8) + PV (11,12,13,14,15,16,17) (Sum)						19/27	15/27	21/27
EPV = CA (3,8) + PV (11,12,13,14,15,16,17) (%)						70%	55%	78%
				X	18	2	3	3
Innovation Outcome (9,10,18) (Sum)						7/9	6/9	7/9
Innovation Outcome (9,10,18) (%)						78%	67%	78%
				X	19			

Source: Authors

In the question 19 we explore the sources of innovation versus the potential results. From Table 2 we have:

- Company B is the least use external sources and that generates less innovation,

- The company A and C use 9 sources (out of 10); in common, their sources of generation of radical innovations are: international sources (other regions) and other industries (rather than its own industry);

Table 2 – Source of ideas, importance and outcomes

From question 19	Companies		
	A	B	C
Total Sources	10	10	10
Sources used	9	7	9
Incremental	6	2	5
Radical	3	1	4
Radical comes from	Research Centre International Other Industry	Consultants	International Consultants Events in the market Other Industry

Source: Authors

4 Analysis of Results

Based on the results reported in the fieldwork with the three companies, and analysed from the perspective of the theories presented here, we could interpret the above results with the following possible explanations:

- Company C is the most innovative even as it is in an environment considered to be more aggressive, competitive and more variable, so in order to survive it needs to reinvent itself all the time; that's why the company C seems to be innovative,
- Company A, despite having a greater predisposition for innovation has the same innovative performance (outcome) that C (78%); this is probably due to its low perception of turbulence, and therefore less need to innovate more,
- Company A is the most product-based (software) and has a (software) manufacturing behaviour that is therefore they act like a company in the tangible goods segment, and so it makes sense its largest R&D structure; C is more service-based, so the less (formal) R&D uses,
- The (knowledge database) diversity of C may be one of the mechanisms for creation of innovation,
- The attention paid to the market for Company C, evidenced by its (high developed) Peripheral Vision (PV) or what we called Extended Peripheral Vision (EPV) may be the major factor in generating innovation that makes the most innovative company (78%) tied with A, C has even less innovation willingness (60%) rather than a (73%) as in A,
- More sources of external innovations allow more innovation,
- The further away from your industry and geographically more distant are the search, the greater the possibility of generation of radical innovations; in the opposite situation, the closer to its original geography and industry more incremental innovations are generated;

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5 Conclusions

Based on the results and the analyses performed with the constructs and theories presented here, we see a good relationship between Absorptive Capacity and Peripheral Vision as positive conditioners elements of innovation in the company, which support the developed propositions affirmed in the study. Partially we could verify the influence of diversification of the company's knowledge database. Still, we also notice some signs that the search strategy and external orientation to innovation means more innovation. And that search strategies in different industry segments of its original or other geographies suggest the generation of more radical ideas. Moreover search only in their industry segment generates incremental innovations. With this study we got some evidences the propositions of relationships between industry segments and type of innovation generated.

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