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NOWLEDGE MANAGEMENT IN A COMPETITIVE SCENARIO OF AN INFORMATION TECHNOLOGY COMPANY

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ABSTRACT

This research aimed at proposing a knowledge management plan to increase competitiveness in an information technology company. It used qualitative methodology based on a study case, which analyzed the context of internal and external environments in which Intelitech Company operates. The data collection was divided into three steps: (1) application of a questionnaire to the manager and Intelitech employees, which was composed of knowledge management practices (KMPs), aiming at obtaining previous practices from the company and therefore internal critical variables; (2) application of Rojo's (2005) scenario simulation model in order to identify external critical variables; and (3) formulation of a proposal for KMPs improvements according to simulated scenarios and the internal and external critical variables previously identified. So, this research resulted in the development of an action plan for two scenarios: (C1) case scenario to expansion of the market, therefore the company could hire new employees and expand its physical structure o, enhance IT tools and ask for manager's flexibility towards a new culture; and (C2) also to observe an unfavorable scenario of restricted market, it would be necessary to build customers loyal order to use IT tools, as well as interact and communicate with them. Thus, it was concluded and confirmed the hypothesis that knowledge management can enhance competitiveness of an IT company.

Keywords: Competitive Scenario, Knowledge Management, Tacit Knowledge, Information Technology, IT Tools.

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Introduction

Competitiveness has been an increasingly ongoing in organizations routine, thus it keeps on driving them to look constantly for a differential whose main goal ensures survival in their operating area. A joint planning comes as an essential tool based on formulation of strategies and decisions, with an increased competition, focused on analysis and competition of the organizations to achieve a sustainable market position.

Therefore, there is a scenario projection as a management tool of the strategic process aiming to set up better futures so that the organizations can deal with this market uncertainties (Rojo, 2005; Brandalise *et al.*, 2012).

This methodology, when combined with a knowledge management produced up from its application, allows managers and other members of a company to take more assertive decisions. This may result in a more participative and competitive performance in the market (Hoss *et al.*, 2012). Considering this, the theme is important due to the market where the studied company operates and is in great expansion and development. It is also characterized an area of great need to be innovated.

Thus, knowledge management is seen as a facilitator process to get some spotlight in this segment, since the main feature of an IT organization not only corresponds to sophisticated and related equipment, but also to intellectual capital. So, based on knowledge management, the company gets full knowledge about its business and thus, it becomes more competitive. Then, the present study aims at answering the following issue:

How can knowledge management influence competitiveness in an information technology company? Thus, it was established as the objective to propose a management plan of knowledge in order to increase competitiveness in an information technology company.

LITERATURE REVIEW

Knowledge Management

Knowledge management (KM) is responsible for creating or finding knowledge, as well as managing

the existing knowledge flow in the organization, in order to ensure the effective and efficient use of this resource so that it results in long-term benefits for the company (Darroch & MCnaughton, 2002).

However, when the knowledge management is discussed based on small and medium enterprises (SMEs), it is known that this category of businesses still faces unique challenges on the adoption of knowledge management when compared to large companies. This reality is due to the fact that most SMEs do not have a clear policy for KM applied to the strategic level and tend to treat KM only at the operating level. This shows that SMEs still focus on the management of tacit knowledge when compared to larger enterprises (Beijerse, 2000; Matlay, 2000; MCadam & Reid, 2001; Corso *et al.*, 2003; Bozbura, 2007; Hutchinson & Quintas, 2008).

So, Mills and Smith (2011) point out that due to the composite nature of resources to obtain and produce knowledge, they also vary from company to company. Each one has different levels and facilitators' combinations and knowledge process that, when put together, from their knowledge capacity.

Consequently, it is essential to understand the creation process and conversion of knowledge in a company, since the obtained information will be managed by individuals, and based on discussion, transferring and sharing, the same will result in the necessary knowledge so that people can act out in a most effective way to solve problems, create new products and/or services plus get greater security regarding decision-making (Lana 2011).

Creation and conversion of knowledge in the organization

Knowledge is an asset created only by individuals, in such a way that an organization cannot create knowledge without the presence of a human element. Thus, knowledge production occurs by interaction between tacit and explicit one. Personal is the first one, specific to a particular context and is related to perceptions (mental models) of each individual, which it is difficult to express, encode and transfer.

While the second type of knowledge refers to an easier one to be transmitted in formal and

systematic language through techniques, methods, and standards (Takeuchi & Nonaka, 2008; Cong & Pandya, 2003).

Takeuchi and Nonaka (2008) have already shown four ways of knowledge conversion: (i) from tacit knowledge to tacit knowledge, which is called socialization; (ii) from tacit knowledge to explicit knowledge, whose result is outsourcing; (iii) from explicit knowledge to explicit knowledge also known as combination; and (iv) from explicit knowledge to tacit knowledge, or internalization. Based on these four conversion ways, there can be seen the knowledge spiral that seeks to explain, graphically, how an amplification of tacit and explicit knowledge occurs regarding the quality and quantity of this process, from the individual to the group knowledge, and from this last one to the organizational level.

Firstly, socialization develops an interaction field that eases the sharing of experiences and mental models of an individual. So, this person can get new tacit knowledge directly from other individuals without the use of formalized language.

This step occurs through interaction among individuals, observation, and imitation. Then, internalization is triggered by dialogue or by collective reflection, in which the application of a metaphor helps individuals to articulate hidden tacit knowledge that is difficult to be communicated.

Thirdly, there is the combination which is caused by placing a newly created explicit knowledge and the (explicit) one that already exists in a knowledge system. At this stage, individuals have exchanged and combined knowledge through meetings, documents, IT tools (Skype, ERP – Enterprise Resource Planning), online forums, and blogs. Finally, it can be implied that it is the on doing learning that causes internalization.

Takeuchi and Nonaka (2008) highlight the importance that knowledge has on a company and that it results in valuable resource from the moment that the resulting experiences from socialization, externalization and combination are internalized based on the individual's tacit knowledge, as shared mental models or know-how techniques. However, an organization that is featured as a creator of knowledge must have as its central activity such continuous process to allow

that knowledge individually generated should be available to everyone in the company.

Knowledge Management Practices

Knowledge has become of great importance for companies because of its strategic role. So, it is essential that this asset can be managed so the organizational practices can be improved, and thus they will contribute to the goals achievement of each organization regardless of its size and line of business (Boiral, 2002).

Thus, literature has brought several models focused on the process of knowledge management, each one with its peculiarities and similarities. These models aim at proposing a set of activities (practices) that, when worked together, contribute to the correct and efficient knowledge management in companies (Cavalcante, 2011; Souza & Kurtz, 2014). Among these models of knowledge management, it can be highlighted some as Chaves & Veronese (2014), Garvin (1993), Davenport and Prusak (1998), Terra (2000), Teixeira Filho (2001), Pereira (2002), Batista (2004), Batista *et al.* (2005), Dalkir (2005), Stefanovitz (2006), Leuch (2006), Helmann (2007), Takeuchi and Nonaka (2008), Purcidonio (2008).

Batista (2004) characterizes practices of knowledge management as actions aiming at sharing storage, transference, dissemination and application of knowledge. Such practices should be aligned to the mission, vision and organizational strategies so that, in this way, they can put forward the organizational development. It should be kept in mind that the institutionalization of those practices occurs more effectively when supported by IT (Souza & Kurtz, 2014).

Importantly, the organizational culture must encourage the deployment and adoption of knowledge management, so that the staff can feel motivated to contribute to the success of this process since they are participating members (Davenport & Prusak, 2003).

At last, Stewart (1998) states that up from the moment when the companies use the frequent-like practices, while standardized and formalized, the sharing occurs more rapidly and its growth becomes systematic and collective, apart from the fact that human capital becomes more productive.

**SCENARIOS
Scenario Simulation**

Nowadays, this kind of market is characterized by fierce competition, due to the constant search for a differential of organizations as a means of survival ahead of competition. It has still been great challenge for them to succeed in overcoming a very present factor in this competitive market, the uncertainties, which means that it is not possible that organizations provide for future ongoing (Bethlem, 2004).

Therefore, there is a scenario simulation, which can be defined as an investigative tool used to describe a specific situation in the present. This occurs to identify potential events that may happen to the company in the future, making them minimized by surprising elements that contribute to a greater competition. The simulation consists of a step that has been carried out before planning (Rojo, 2005).

Many businesses are best planned from the moment in which they operate in an environment with large and multiple choices, with a different set and made by choices that concern what to do and how to do it (Ghemawat, 2012). It must be recalled that scenario planning can be used both for the development of business strategies as well as to develop and strengthen processes that already exist or are innovative (Hoss *et al.*, 2012).

Consequently, procedures that involve the scenario simulation approach must be understood. So, it will be presented the model proposed by Rojo (2005).

Simulation Model according to Rojo's Scenario

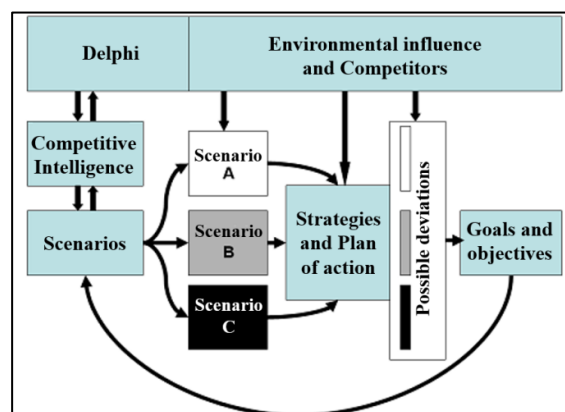
The Simulation Model according to Rojo's Scenario was developed in 2005 aiming at contributing to the decision making in companies, so that the competitiveness factor was taken into account in its preparation. Its application may happen in any kind of organization.

For Hoss *et al.* (2012), Rojo's model contributes to the achievement of organizational goals, and that they can be modified based on new prospects of identified scenarios. The model base considers the scenarios introduction up from its use, and there is a dynamic and interrelation of factors responsible for scenarios introduction - tools, *Delphi* and strategies.

The dynamic of scenarios introduction, according to the author, is made by using the Delphi technique, and is related to strategy formulation and use of strategic tools. This process plays a key role in simulating scenarios, so, the elements responsible for the set of variables formation must be monitored continuously if there is any need to readjust tools to be used.

As it can be seen, Hoss *et al.* (2012) explained that the scenarios simulation involves the analysis of external environment to the company, which indicates that the environmental influence is responsible for changes in scenarios, and it could be taken as examples the legislation, competitive behavior and economic context. Thus, environmental influence will reflect in the formulation of alternative strategies so that the objectives can be achieved, as shown in **Figure 01**.

Figure 01 – Environmental influence on scenarios simulation



Source: Rojo (2005, p.101).

Delphi's technique identifies critical variables since it presents the appropriate characteristics in order to obtain the parameters of an experts' panel, which act out as competitors (Rojo, 2005). Vergara (2008) confirms that Delphi's technique aims at getting the consensus on experts' opinion concerning what has been under investigation.

It is based on a questionnaire application to a group of experts during successive business meetings, but there is no respondents' identification. It should be told that you can change the instrument of data collection during the research process in such a way that the same items can be included or excluded (Rojo, 2005).

The author explains that the reason he chose the Delphi's technique to take part of his model is the insignificant investment on applying such technique. The studied questionnaires can be printed, according to the participants' displacement, so that there is a faster access on the research, since the required answers can be easily obtained.

It becomes even financially more viable, when those questionnaires can be sent to the respondents by e-mail, for example.

Then, the model suggests the use of tool(s) to obtain the completion of a strategic diagnosis, which is called as competitive intelligence level (level 2). The level aims at defining strategic tools that will be used for training scenarios at level 3, also considering the critical variables identified above. The managers of participating companies choose such tools in order to obtain feasibility in applying those measures, and therefore a better diagnosis.

Rojo's model (2005) allows the use of several tools such as Balanced Scorecard – BSC, SWOT and BCG matrixes, in such a way that there is no limit regarding the number of tools used. So, the more tools there are, the better will be to identify the critical variables, consequently, the study can be more robust.

After identifying the critical variables and defining the strategic tools, the next phase (level 3) is to establish possible scenarios up from the application of forward-thinking, so that the scenarios development refers to the forethought of possible contextual changes that may happen in the future or even actions related to competition.

Thus, according to the construction of scenarios, strategies are formulated (level 4) for each simulated scenario, so that each one represents identified issues and strategies are possible solutions. **Level 4** is concluded at the beginning of the next phase of the model, whose purpose is to draw up an action plan. This moment involves setting targets to formulate strategies that can be implemented as a drafted action plan. There may be some possible adjustments when necessary.

It can also be highlighted that the set targets can represent the goals with the model application, while formulated strategies and goals must be lined up in order to have an answer concerning the obtained results and the desired objectives.

Finally, it is recommended that managers can monitor and keep on doing frequent evaluation of the results, and thus provide feedback to the competitive intelligence (level 2). It is also important to update the scenarios that have been defined at level 3, as it is necessary that the formulated strategies (level 4) are reconfigured, and finally, the action plan (level 5) can be prepared for their effective application.

This evaluation phase allows changes when managers perceive that there is some need, once it is recommended to carry out an overall assessment of the model periodically, i.e, bi-monthly, annually or according to the needed opportunities to change the environment.

Strategic planning

The strategies formulation is based on what will be done to build up the desired future, although, those strategies need to be planned with respect to the general guidelines and acting forms (Costa, 2007).

Then, the strategic planning consists of a management process that occurs continuously and systematically, whose focus is on the forward thinking, targeted to the formulation of objectives to create action programs and execute them, taking into account the internal and external scenarios to the organization (Hamel & Prahalad, 2005).

Bromberger (2013) points out the management of strategic planning firstly and asks for formulating strategies that define the company aim. Such definition occurs according to the scenarios analyses, and further development of a matrix that

shows possible threats and opportunities in relation to the company performance, which also takes into account internal and external points of view to the company.

Thus, the strategic market-driven planning corresponds to an analysis regarding the internal environment. It starts defining the company mission, the basic financial planning and operation of all departments.

Then, competitors and market are analyzed to establish strategies that will improve the organization's future, so that this phase results in a prospection of future scenarios (Hoss et al., 2012).

Matrix SWOT

The SWOT matrix comes from the acronym that means: strength, weakness, opportunities and threats, and it is used in order to list the existing strengths and weaknesses of a company's internal environment, as well as identify threats and opportunities in the external environment.

Therefore, this strategic tool is widely used for prospecting the future of a company along the strategies formulation process (Rezende, 2003; Corsatto & Hoffmann, 2013). Kotler (2002) points out that, in general, a business unit should thoroughly know its internal environment and the market in which it operates (external environment). In the internal environment, there are variables that the company can influence and control. These variables are classified as strengths of company or points to be improved (weaknesses).

According to the analysis of the external environment, it is important that the company keeps on monitoring the important macro-environmental strong points (technological, economic, demographic, political-legal and socio-cultural) as well as the considered significant micro-environmental agents such as customers, competitors, suppliers and distributors that influence in its ability to make profits.

BCG Matrix

Boston Consulting Group - BCG - was created in 1963 by Bruce Henderson, since the BCG matrix consists of a methodology that supports strategic decision based on consistent scenarios and analyses of the product portfolio. Such methodology

comprises four quadrants, as it is shown below, considering the (annual) development rate of the market and the participation rate of a business unit on the market when compared to its biggest competitor in the segment (Kotler, 2000; Hoss et al., 2012). This question mark refers to businesses with high development rates usually during the input period of its life cycle. Such businesses still have low market share, there is an increase on the uncertainty level.

The company must carefully review its feasibility to keep on investing in the business it begins, since this quadrant requires high investment. Concerning the Star quadrant, there are businesses that have been successful in relation to this question mark, and they are in high development and market share. This means that they are long-lived cash generators. The quadrant dairy cow is made of fully developed and consolidated businesses, which are no longer in high development, but still have high market share.

The dairy cow generates a lot of cash, so, companies use dairy cows as business to pay their bills and support other businesses. At last, if there is any loss of relative share of a business cash regarding dairy cow market, it may become a mere pet animal, so, they will be associated to those businesses that do not offer more development prospects and which have relatively low participation of the market.

Balanced Scorecard (BSC)

Another strategic tool refers to the Balanced Scorecard or BSC. In 1996, Kaplan and Norton developed this tool in order to structure a strategic management system of a company (Hoss et al., 2012).

Kaplan and Norton (1997) have explained that the Balanced Scorecard consists of a comprehensive strategic tool that aims at translating the company's vision and strategy into a set of performance measures, as well as the organizational mission and strategy into objectives and measures, based on four perspectives - financial, customer, internal processes and learning and development.

Each company may choose its best way to build the Balanced Scorecard, so that most companies have followed the eight basic phases to build the BSC proposed by these authors: first

phase - preparation; second phase - interviews: first business meeting; third phase - executive workshop: first business meeting; fourth phase - interviews: second business meeting; fifth phase - executive workshop: second business meeting; sixth phase - executive workshop: third business meeting; seventh phase - implementation; and the eighth phase - periodic reviews (Kaplan & Norton, 2000).

Thus, Rojo (2005) points out that the BSC is a facilitating tool to simulate future scenarios that will help in the process of strategic decision-making so that goals and targets set are achieved. Since the BSC connects the strategic scenario perspective with actions (activities) to make ease the implementation process of these actions so that strategic objectives are achieved.

ORGANIZATIONAL LIFECYCLE MODEL OF GREINER

The lifecycle model developed by Larry Greiner in 1972 is relevant to several kinds of organizations. This model aims at explaining the history and evolution of a company based on experiences and psychological studies aimed at analyzing human behavior according to the changes in the environment (Grapeggia, 2006).

So, the Greiner model consists of five phases of development. Each phase has a period of evolution to achieve it, in such a way that they are concluded with a revolution period (or crisis), characterized by dominant management issues that need to be solved before the company's development continues (Grapeggia, 2006).

These phases and their respective evolution periods are: (1) creativity phase preceded by the leadership crisis period; (2) A direction phase that ends up with an autonomy crisis period; (3) delegation phase, which results in the control of crisis period; (4) coordination phase, which has as resolution period the bureaucracy crisis; and finally; (5) phase of collaboration, which finishes generating the crisis period (Greiner, 1998; Grapeggia, 2006).

According to the text, the author points out about few companies that can go through all the phases of development. As the organizational development happens, it is possible to observe traces of other phases (previous or subsequent ones). Thus, overcoming the difficulties during the

enterprises development will be possible if the entrepreneur knows how to use the tools offered by the environment and recognize the difficulties (Lezana & Grapeggia, 2002).

COMPETITIVENESS

Competitiveness, directly or indirectly, has forced organizations to go after new ways to meet better the needs of their customers, in order to reduce costs and increase productivity (Futami, Valentina & Possamai, 2012). Canongia et al. (2004) define competitiveness as a process that goes beyond the search for excellence regarding performance or technical efficiency of organizations or products.

Competitiveness also encompasses, through production and application of knowledge, the ability to develop processes that ease the search for new opportunities and to overcome possible technical and organizational obstacles.

In the strategic context, the source of competitive advantage takes part on knowledge application of an organization. Identification and adoption of the best practices have indicated that a way to a better organizational performance is controlled, maximized. This happens due to the competitive process be characterized as an interactive discovery process, in which new knowledge is generated (Vasconcelos & Cyrino, 2000; Leite & Porsse, 2003).

This fact is confirmed when it is associated to knowledge-based industries such as a provision of information services, software development, and whose knowledge is their key factor to win on competitiveness, where there is constant search for actions, innovative practices (Perez & Pablos, 2003).

Porter (2004) explains that the competitive strategy is related to the positioning of a business and aims to potentially enhance the features that make it different from the other. Hence, processing a strategy asks for a detailed analysis as a main idea concerning the competitors.

Based on this, it is developed a profile of nature and likelihood of success that the competitors can get with the possible adopted strategic changes as well as the likely response of each competitor in relation to those ones and each competitor's likely reaction concerning which kinds of changes have happened in the sector.

Accessing information and knowledge contributes to a better design of strategies aimed at gaining competitiveness by analyzing the external environment, enabling companies, especially smaller ones, as well as being prepared with some anticipation for its expansion and development. This analysis occurs up from the development of competitive intelligence (Corsatto & Hoffmann, 2013).

Competitive intelligence, according to Valentine et al. (2003), consists of a process that aims at investigating the external environment to the company and diagnosing its internal environment in order to identify and reduce the risks. Furthermore, the use of several techniques and methods has contributed to the information analysis for a decision-making, so that one of these methodologies is the scenarios analysis, already presented in Section 2.2 of this study.

Based on what has been already shown, knowledge management associated to competitive intelligence are processes that have improved information resources of an organization. So that when knowledge management is effectively and competitive intelligence is available to the situation, a combination of both provides the right information to the decision maker at the right time (Meihami & Meihami, 2014).

COMPANIES OF INFORMATION TECHNOLOGY

The software industry origin is associated to the hardware one. The software industry takes part of the information technology and is characterized by the intense speed of generated technical innovations, more specifically when it is related to the continuous development of products based on creative and intellectual capacity of the staff (Campos, Nicholas & Cário, 2000; Roselino, 2006). Rus and Lindvall (2002) have already defended that the main resource of IT companies does not correspond to the industrial plants or sophisticated equipment etc., but its intellectual capital.

According to this fact, obtaining essential benefits regarding knowledge management is clear in these companies, since through this asset they can have greater ability to share information, in order to ease the process of innovation and market competitiveness.

The data from 2013 have indicated that, in Brazil, there was a significant development related to the investment in IT, whose increase percentage was 15.4% when compared to 2012. Worldwide, Brazil was also highlighted in such a way that the world average of development was 4.8%; so, the country is ranked among the top ten sectorial development, and they keep the 7th position in the world ranking of countries that invest in IT (ABES, 2014).

The software industry increased in 13.5% in 2013, when compared to the previous year. In 2013, approximately 11,232 companies were identified by operating in the software and services' industry, and almost half of these companies are directed to the distribution and marketing (ABES, 2014).

Albertin and Albertin (2008) realized that IT organizations play an important role in the market, mainly nowadays, since they can offer benefits and business reconfigurations by IT for different kinds of companies. Such benefits include cost reduction by integrating processes and areas of a company; there is also an increase in productivity due to automation processes.

This innovation is achieved with the adoption of new practices and processes to the intense use of IT.

METHODOLOGY ORGANIZATION IN STUDY

The subject matter refers to the Intelitech Company - Assistance and Training. It was founded in March 1996, and it works with information technology in Cascavel city, Paraná, and has a 500-company customer group from different areas and featured as small and medium ones in (western and southwest) Paraná State, Santa Catarina (southwestern region) and Mato Grosso do Sul (western region).

The Intelitech's mission is "To be a center of excellence in software solutions" and as a forward thinking, it "produces software of excellence for organizational needs in order to contribute on costs decrease and increase regarding management quality."

Developed products and services provided by Intelitech refer to courses and computer training

(1996), Hoss Doctor Software - DRHS - management software (2005) and DRHS with NF- and (Electronic Invoice).

In 2014, new products took part of the market such as modularized system 2014, PHD EFT (Electronic Funds Transfer)/FAP (Fiscal Application Program), systems for facilities, bars and restaurants (sistemas para postos, bares e restaurantes).

But, in 2015, the company aimed to develop software for pharmacies, costs, human resources, and headquarters and branch. The products are developed to the company management, calculation and cost control system, development of information, financial and accounting management of the company, management of production activities, service order processing and road trucking load knowledge and issuance of tax documents.

METHODS PROCEDURE

This study applied a descriptive research with qualitative approach, since it aims not to generalize the obtained data, but by treating them in a specific way, trying to relate it to the investigated context.

With regard to the technical procedures adopted the case study, which "deeply investigates a contemporary phenomenon and in its real life context, especially when the boundaries between phenomenon and context are not clearly evident" (Yin, 2009 p. 39).

Regarding data collection, the structure of this process consists of three phases and the studied company (Intelitech) and its direct competitors took part of it.

The first phase consisted of applying a questionnaire to the manager and Intelitech employees. This instrument was characterized as structured and composed of 38 knowledge management practices (KMP) based on the models already mentioned in item 2.1.3 of this study. The instrument aimed at recording knowledge management practices in the company and consequently the internal critical variables (ICV).

Then, it consisted of a range of points to determine how often this practice happens in the company, its level of standardization and

formalization. It must be reinforced that standardization is the practice of following a standard; it is systematic; it follows a single model, while formalization refers to the practical implementation by the rules that were pre-established (Holanda, 2010). In relation to the frequency with which the practice takes place in the company, it was used the following scale: 0 - practice does not occur in the company, 1 - practice eventually occurs in the company, 2 - practice almost always occurs in the company 3 - the practice always (often) occurs in the company.

When the level of practice standardization was referred the adopted points scale were: 0 - the practice is not standardized, 1 - the practice is partially standardized and 2 - the practice is fully standardized.

Concerning the level of practice formalized in the company, the score scale was 0 - the practice occurs informally, 1 - the practice occurs partially informal, 2 - the practice is almost always formal and 3 - the practice is fully formal.

The second phase is the application of scenario simulation model proposed by Rojo (2005), where the first level consisted in using the Delphi technique. By applying this simulation, an external diagnosis was carried out involving both Intelitech manager and its direct competitors to identify the external critical variables (ECV), since they will be obtained from the consensus acquisition of the expert participants' responses.

In order to start the level 1 - Delphi, the first questionnaire identified the necessary factors, named as critical variables, so that an IT company could make scenario projections, whose emphasis was in competitiveness gain. In this regard, the following parameters to select companies and experts were established: business managers that belong to the IT field; act out in the western Paraná; and they are competing with each other.

After defining the parameters for Delphi, two managers were chosen from the IT companies in western Paraná that showed similar size and performance. They were set up as direct competitors hereinafter referred to as **Company A**.

These companies are placed in Cascavel and Toledo cities. It should be reminded that the first communication to invite such companies was by

phone, so the participating companies were kept in anonymity, according to the following examples: leader Company A, leader Company B and leader company C. At last, the third phase concerned about scenarios simulation, which will be based on identified ICV and ECV. Such simulation aimed to prepare a proposal to improve knowledge management practices based on simulated scenarios.

ANALYSIS AND DISCUSSION OF THE STUDIED RESULTS

KNOWLEDGE MANAGEMENT PRACTICES

The first phase of this research, identification of knowledge management practices, occurred in July 2014, aimed to identify, by KM practices, internal critical variables to increase competitiveness to **company A**.

Data obtained by applying a questionnaire to 12 members of Company A were tabulated using an Excel software spreadsheet. Among the three items (frequency, standardization and formalization) evaluated on KM practices, the frequency of practice has been established as a prerequisite, since the level of standardization and formalization of a practice can only be identified if it occurs.

Thus, the sum of respondents' answers was carried out according to each KMP, named here as total score. It should be pointed out that some practices had more than an issue to be evaluated, therefore, in these cases, the average of total score regarding each question was calculated according to the analyzed practice.

The correct total score for each trial should be between 24 and 36, whereas 24 indicates that 12 respondents assigned 2 as a score to each practice, i.e., they have shown that the practice occurs frequently in the company.

The same argument occurs for score 3, which represents the practice that always occurs. Practices with the highest scores were named as internal critic variables. Based on the described procedure for processing the collected data, it was found out that although the total score of the practices were lower than what was stated, the 38 evaluated practices, it was shown that all of them occur in the company, however, most of the time with low frequency.

Thus, it can be conceived that the organizational structure of company A allows the knowledge management to be incorporated into its processes and up from that new knowledge may be produced. The company will be developed by employees, extensive knowhow and competitive differential.

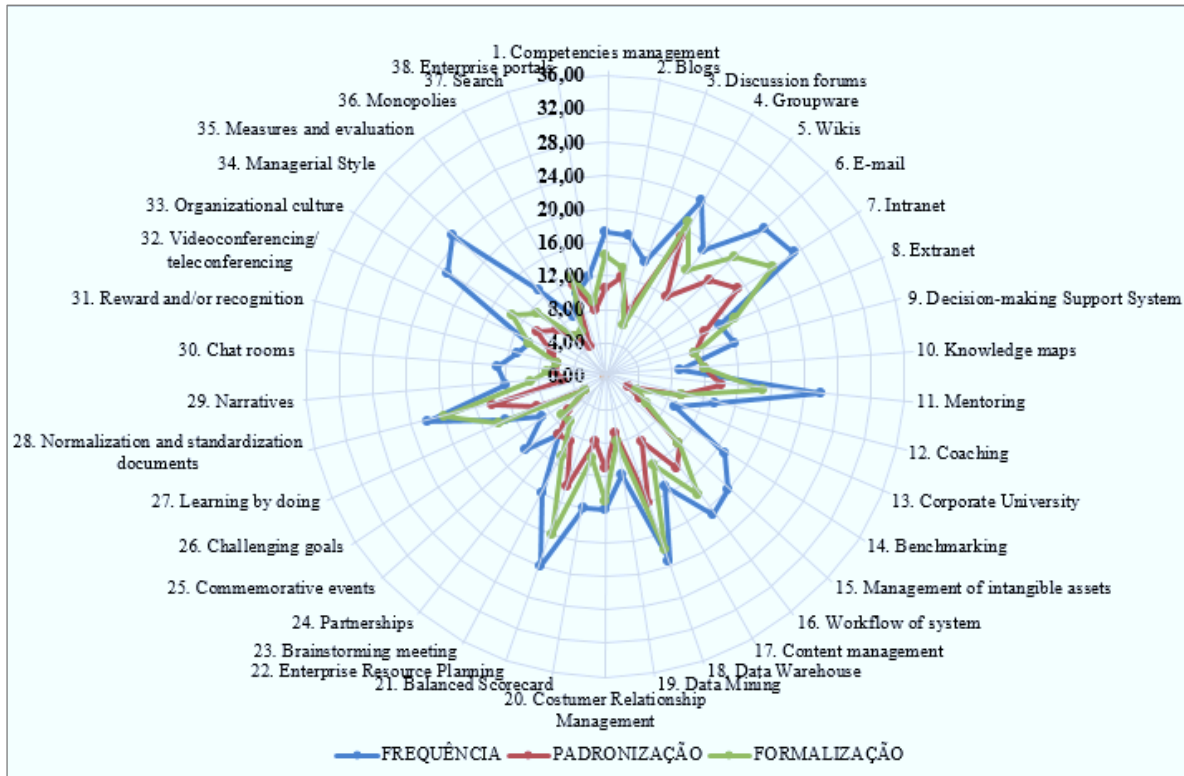
However, it was observed the great need of **Company A** to emphasize intensive and easier tasks to produce knowledge such as brainstorming meetings in order to promote discussions and look for alternatives to existing problems, new ideas, exploring the creativity of people's potential.

It is also important to establish challenging goals as a way to encourage creativity, consequently the potential of the company's members, and use means to reward and recognize them by storage knowledge that was generated.

Therefore, Takeuchi and Nonaka (2008) highlight that the generation of new knowledge comes from the individual and the transformation of tacit knowledge results in organizational knowledge in order to be spread out at the organization. However, this process of knowledge sharing must occur continuously and reach out all hierarchic levels of the company.

Cavalcante (2011) reinforces that from the moment that the practices become continuous, knowledge management occurs efficiently. Thus, according to Graph 01, it can be observed the frequency of 38 analyzed KMPs as well as their standardization and formalization levels.

Graph 01 - Frequency, standardization and formalization of KMPs at company A



Source: Research data (2014).

The studied data showed that most frequent practices do not necessarily have a high level of standardization such as practices 10, 33 and 34. This indicates that these practices occur frequently, but the right ways to systematize them were not adopted. In this context, Bem (2009) points out that, currently, there is great need to set standards and define criteria for storing and sharing both information and knowledge generated among computer systems and mainly among individuals, since the lack of interoperability between systems consists of a strong impediment to get a successful knowledge management in a company.

According to the author's point of view, the best decision-making is deploying a solution that achieves balance between the need of flexibility, since it is known that knowledge is an asset under constant change and standardization, so that this feature can be used by several people.

Regarding formalization practices, it was found out that when they were compared to their standardization, there was no great disparity between the frequency of the practice in the company and its formalization. This means that,

first, the KMPs are formalized, but they do not necessarily follow a standard, and secondly, this result indicates that they tend to be more flexible since those practices do not follow a predetermined pattern.

Thus, according to the results and taking into account that this first stage aimed to define the internal critical variables, the following information was: ICV 1 - Groupware, ICV 2 - Email, ICV 3 - Intranet, ICV 4 - Mentoring, ICV 5 - Enterprise Resource Planning (ERP) and ICV 6 - Managerial style.

From the internal critical variables that were identified, the second step of this study consisted of Rojo's model application to identify external critical variables.

ROJO'S MODEL APPLICATION

The second step of this research took place from September to October 2014, to identify the external critical variables and scenarios projection could be competitive. So, to Delphi technique (level 1) was applied at the beginning. The first question asked to

the leaders from the experts' panel referred to which variables were considered necessary to prepare projections guided by scenarios for competitiveness in IT industry.

So, the criticisms expressed by the surveyed variables were: sales channels, innovation, know-how / expertise (qualified professionals), marketing, market (care needs, for example), price, quality, social networking and technology.

From the obtained answers, the second Delphi's business meeting started, where the critical variables obtained previously were ranked in order

of importance by respondents' leaders, as shown in **Chart 02**.

Considering all CVs already pointed out by them, there are five of them that are most important in the scenarios projection to gain competitiveness.

They were ordered by importance, as it follows: 5 for the most important, 4 when it was considered important; 3 for average size of importance, 2 for those with very few importance, and one for the least important variable. Thus, according to the sum of the scores assigned to each variable by the experts, the total weight of each one was obtained.

Chart 02 - Result of the second business meeting from Delphi's technique

| Critical variables | Answers of the second business meeting | | | Total Weight |
|--|--|-----------|-----------|--------------|
| | Company A | Company B | Company C | |
| Sales channels | 5 | - | - | 5 |
| Innovation | - | 1 | 4 | 5 |
| Know-how / expertise (skilled professionals) | - | 5 | 5 | 10 |
| Marketing | 3 | - | - | 3 |
| Market (Service of your needs) | - | 2 | 2 | 4 |
| Price | 4 | 4 | - | 8 |
| Quality | 2 | 3 | 3 | 8 |
| Relationship network | 1 | - | - | 1 |
| Technology | - | - | 1 | 1 |

Source: Research data (2014).

The result from above was sent to all participants leaders. Then, the third business meeting began, in which they were asked whether they had been informed on the selected critical variables, and, from their point of view, the five critical variables most prominent would be the most appropriate to design scenarios and gain competitiveness.

Thus, Delphi's technique goal was achieved, that is, the participants were in consensus about the most appropriate variables to simulate scenarios, thus concluding the first step of Rojo's model. So, up from level 2, only reality and future prospects of company A were taken into account.

Thus, level 2 concerned about competitive intelligence, in order to define the strategic tools that will feed and feedback the scenarios of design process (level 3). In this trial, both SWOT analysis and BCG matrix were applied as strategic tools, while the critical variables were considered as the most suitable ones at level 1, as it follows: ECV 1 -

Know-how, ECV 2 - Price, ECV 3 - Quality, ECV 4 - Sale Channels, and ECV 5 - Innovation.

The preparation of BCG matrix has considered that each product of portfolio from company A was set up as a strategic business unit (SBU), respecting two criteria of classification: the market growth rate and relative share of company A in this market.

According to the parameters of market development rate (in this case, the market was limited by the total of companies that made up the expert's panel) and the relative share of the company's market, it was possible to recognize the products behavior and thereby set its precision in the produced BCG matrix. The structure of Figure 15 is composed by the vertical and horizontal axes.

On the vertical axis, the market development rate is identified, measured by the development percentage over a period of time and that can be influenced by several factors such as economic conditions, price and customers' behavior. On the other hand, on the horizontal axis, there is a

representation on how much the product participation as well as the power of each SBU at the market.

In this regard, analyzing very specifically each SBU identified by BCG matrix, the product named as DRHS (Doctor Hoss Software) was obtained in the **question mark** quadrant for pubs, restaurants and gas stations. This product fits in this category to be considered a business with high development rate. This indicates that it is under the introductory phase of its life cycle (LC), so, it is essential that the company has trained professionals who are capable and know the product that has been addressed to a new audience (**ECV1: Know-how**).

Due to the LCV phase where the product is, there is a high degree of uncertainty regarding its permanence in the market, which accounts for the low market share rate. Therefore, the company aims to work with most affordable prices in the market with regard to DRHS (**ECV2: Price**).

The APF product fits the **star** quadrant, indicating that the Fiscal Application Program for fiscal to issue coupon tax succeeded in question mark quadrant - introductory phase of life cycle -

and currently, it is in high development and shows high market share rate (**ECV 4: sale channels**). As a SBU **dairy cow**, the Company A recognized DRHS software (Doctor Hoss Software) as a strong and consolidated product, which does not show high market development, since this product was put into the market in 2005, however, it still has high market participation rate (**ECV 4: sale channels**).

This product results in the generation of strong cash flows for the company (**ECV 2: Price**) and consists of a differentiated SBU due to the scope of its duties as a software (**ECV 5: Innovation**). Finally, it has been **pet animal** quadrant. This means that the company does not have a portfolio of products that fit this category. This is a positive because when it is seen as a pet product, it is seen as high-risk asset to the company by the low development rate and market share.

Regarding the preparation of SWOT matrix (**Chart 03**), the leader pointed out the main strengths and weaknesses of his company that influence gain competitiveness, as well as the main opportunities and threats that the company observes in the IT industry.

Chart 03 – SWOT Analysis

| | | |
|-----------------------------|--------------------------|---|
| Internal Environment | Strength (S) | - The company's partners know about the business. (ECV 1); - The company offers trained professionals to develop roles and consequently products. (ECV 1). - The company has an extensive network of relationships with other companies, partners, which contribute to the exchange of knowledge and opportunities to new markets. (ECV 1 and ECV 5). |
| | Weakness (W) | Lack of knowledge on information technology market at a national level, which limits the achievement of possible sale channels for products developed by the company. (ECV 4) |
| External Environment | Opportunities (O) | The company aims to expand its operations to Rio de Janeiro state and Brazilian Northeastern region (2015) and in 2016, it will act in the national market and offer software for pharmacies, costs, staffing, headquarters and branch (ECV 4). |
| | Threats (T) | The segment in which the company operates is characterized by fierce competition, and this characteristic is influenced by the price and quality of products and services offered by companies on it (ECV 2 and ECV 3). |

Source: Company A (2014).

According to the SWOT matrix, it was possible to observe that Company A has as a threat a high competition in its working market, since the main factors that fuel this situation are referred to price and quality that companies deal in the market.

Based on the results presented in this step of Rojo's model, the third level of model application has begun, in which **company A** leader was questioned about the products portfolio that his company supply to the market, so, the portfolio analysis was suggested, consequently, they would

be used for simulating scenarios. It should be recalled that such simulation was guided to the analysis based on critical variables by experts at level 1 (Delphi Technique). So, favorable scenario (S1) is that variables have positive behavior for the development of the sector and/or company.

While in the worst case scenario (S2), the critical variables have negative behavior, which hinder the development of the sector and/or company. From

the simulated scenarios, the next step (level 4) was the formulation of strategies for each scenario, so that they are guided to gain competitiveness.

Then, considering the scenarios and their strategies, level 5 is reached, which means that it was elaborated an action plan (**Chart 04**) to line up the formulated strategies with their respective goals for each simulated scenario.

Chart 04 – Development of scenarios and their goals

| SIMULATED SCENARIOS | FORMULATED STRATEGIES | DEFINED GOALS |
|-----------------------------|--|--|
| (S1) Favorable | S1 - If demand grows, the strategy may expand the customer base because of the portfolio expansion. | M1 - Expand market segment over the next two years (2015 and 2016) at national level. |
| (S2) Unfavorable | S2- If demand decreases, the strategy can be keeping the client’s portfolio to intensify the relationship, customer’s contact, proposed solutions and after-sales. | M2 - Create a standardized after-sales program of contact with customer to increase by 20% their satisfaction level regarding the company. |

Source: Authors (2014).

KNOWLEDGE MANAGEMENT PLAN

Regarding the presented and analyzed results, it was found out that most of the KMPs are not used very frequently.

Therefore, there is a suggestion to prepare a proposal for KMPs improvement, depending on

simulated scenarios, in order to assist the **company A** in a competitive development process. Thus, it can be analyzed on **Table 05** a proposal concerning the improvement plan, which aims to eliminate or minimize the gaps that prevent the achievement of the best levels of competitiveness in a company.

Chart 05 – Improvement plan

| | ACTION (Improvement) | Complexity Level of action |
|----------------------|--|---------------------------------------|
| Favorable Scenario | The opening of markets can occur by hiring new employees. In this case, there is a movement in the organizational culture, which requires the use of knowledge management tools such as mentoring that will assist in training new employees and management style in order to be flexible with interpersonal relationships. | From average to high |
| Unfavorable Scenario | Use IT tools to enhance the customer’s relationship: - E-mails will help on information gathering and on the information loyalty process with the customer. - Groupware may assist as measurement tool of information already collected - ERP will assist on sharing information in order to ease the contact with customer and evaluate the information received. In the unfavorable scenario, internal and external conflicts can happen, so, flexibility of management actions will be required. In addition, control of IT tools should be well structured, so that its use will be beneficial to the company, taking care with possible problems at the communication level. | High |

Source: Authors (2014).

The development of information that make up the chart above takes into account the simulated scenarios and practices that had greater emphasis, the improvement action and their level of complexity to be implemented or even implemented.

Consequently, based on the simulated scenarios, a plan of KMPs can contribute to the organization in its performance in achieving goals. It also enables the company's reflection on the possible scenarios viewing.

FINAL CONSIDERATIONS

Competitiveness is increasingly present on companies' reality, driving them to seek constantly for a differential in order to ensure their survival in the market. Because of the increased competition, there is a great need for a joint planning decisions focused on the analysis of the sector and competition.

Thus, this study aimed to propose a knowledge management plan to increase competitiveness in an information technology company. Therefore, after listing the models, knowledge management practices and raise the practices adopted by company A and then apply the scenario simulation model proposed by Rojo (2005), it was possible to identify the critical variables (internal and external

ones to the company) in order to increase competitiveness considering the favorable and unfavorable scenarios, and then propose a plan for the company. So, the plan consists of two actions, one for each scenario, favorable and unfavorable, both related to the most scored knowledge management practices.

In the first case, it was observed that the expansion of new markets would require an expansion of the staff or the physical structure of the company. This would result in a cultural change requiring a managerial flexibility and intelligent IT examination. On the other hand, in case of a market restriction, it would be important to use the IT tools to reach the customer's satisfaction. Since it is an IT company, whose contact with the customer is very close due to technology, it becomes an indispensable practice to keep customers.

By the end, for future studies, in order to go deeper in this theme, it is suggested to develop a model that emphasizes the study of knowledge creation process and its management associated to the simulation scenarios. It also is recommended to carry out a research that has a larger universe of companies or even a study on franchises opening as a possibility by the surveyed company. This requires standardized management and controlled systematically practices.

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