

Exploitation or Exploration? The Intelligent Approach

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Abstract

This paper discusses knowledge management strategies based on exploitation or exploration and the competitive intelligence perspective in the creation and sharing of knowledge. It establishes differences and similarities between knowledge management and competitive intelligence regarding the definition, creation, and use of knowledge and intelligence, and proposes a theoretical framework for organizations to choose their own knowledge management strategies.

Keywords: knowledge management, competitive intelligence, exploitation and exploration

1. Introduction

Since James March (1991) first referred to exploitation and exploration a debate started about their true meaning. His definitions were the cause of much discussion. Exploitation “includes things captured by terms such as search, variation, risk taking, experimentation, play, flexibility, discovery, innovation”. Exploration “includes such things as refinement, choice, production, efficiency, selection, implementation, execution” (March, 1991). At first glance, we can state that “things captured” are things which are there to be captured; which exists somewhere in some form and which can be captured. As for “things as refinement”, we can only suggest that they are things which require some further processing or analysis in order to fully understand them.

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Two years later, Levinthal and March (1993) would define “exploitation as the use and development of things already known and exploration as the pursuit for new knowledge” and a line began to be drawn. When we look to the common meaning of both words that line becomes clear.

Exploitation can be divided into the good and the unfair use, however as the corresponding verb suggests, both parts report to the use of something for advantage. As for the verb explore, is intimately connected to the verb discover, and discover is all about the new and the unknown (Cambridge University Press, 2008). According to Gupta et al. (2006), exploitation lacks a consensual definition and varies from the use of past or existing knowledge to the pursuit and acquisition of new knowledge. Although exploitation generates incremental knowledge, it is done with certain and moderate returns (Schulz, 2001). A knowledge management strategy based on exploitation, would promote the transfer and diffusion of knowledge within the organization (Curado, 2008). In contrast, Gupta et al. (2006) state that exploration is just the pursuit and acquisition of new knowledge, and this definition does have a consensual acceptance in the literature. According to Schulz (2001), exploration generates new knowledge with high potential, but uncertain returns.

Therefore, a knowledge management strategy based on exploration, once engaged, will promote innovation and the creation of new knowledge (Curado, 2008). On the other hand, both definitions of exploitation and exploration may depend on the level of analysis, which can be individual, team and organizational, and on the focus of the type or amount of the learnt knowledge (Gupta et al., 2006). Many authors focus those definitions on their differences at the level of analysis: (1) differences in radical or incremental innovation at an individual and team level (Taylor & Greve, 2006); (2) differences in alliance function, structure and attribute across time and between domains (Lavie & Rosenkopf, 2006); (3) differences in level of learning at a team and organizational level (Beckman, 2006); and (4) differences in rate of learning at an individual and organizational level (Miller et al., 2006).

Gupta et al. (2006) identify four central questions which the academic researcher must clarify before engaging the research. The first was the issue previously discussed regarding the definitions of exploitation and exploration, and the level of analysis. The other three are the dualities of orthogonality versus continuity, ambidexterity versus punctuated equilibrium and duality versus specialization. The duality orthogonality versus continuity aims to understand if the knowledge management strategy based on exploitation is competing or is complementary to the knowledge management strategy based on exploration. March (1991, 1996, 2006) defends an incompatibility between the two strategies arguing that they compete for the same scarce resources, they are iteratively self-reinforcing and the simultaneous pursuit of both is impossible. Exploitation and exploration are to be viewed as two ends of a continuum.

However, the access to external resources, such as public goods, could solve the first issue of this incompatibility, conceptualizing exploitation and exploration as orthogonal variables (Katila & Ahuja, 2002). Gupta et al. (2006) argues that depending on the focus of the analysis – individual, single or multiple domains – both strategies can be considered as two ends of a continuum or as orthogonal to each other. According to Gupta et al. (2006), the two mechanisms of using knowledge management strategy based on exploitation or exploration – ambidexterity and punctuated equilibrium – are related to the resources involved in a time perspective. Ambidexterity accepts the use of both strategies simultaneously, which can origin the waste of specialized skills and competences of the organizational resources. Punctuated equilibrium is the use of one of the strategies for periods of time in a non simultaneous way. When using exploitation and exploration as two ends of a continuum in an individual or team level of analysis, punctuated equilibrium is the appropriate mechanism. When using both as orthogonal variables in several levels or domains barely connected, the ambidexterity is the appropriate mechanism.

However, both ambidexterity and punctuated equilibrium may be easier to use at organizational levels (Gupta et al., 2006). In another view, exploitation and exploration are in tension and the balance between them can only be achieved by organizational, temporal, domain separation or no separation at all, through contextual ambidexterity (Lavie, Stettner & Tushman, 2010). The final central question – duality versus specialization – discusses the necessity of organizations to specialize on one or both strategies (Gupta et al., 2006). Notwithstanding their differences, organizations should learn to use both exploitation and exploration activities (March, 1991).

2. Knowledge Management

The notions of exploitation and exploration have been used in several areas of organizational behavior research, such as knowledge management and organizational learning (Beckman, 2006; Miller, Zhao & Calatone, 2006; Schulz, 2001). Still, the option for a knowledge management strategy based on exploitation or exploration is far from being clear and easy. With these two competing strategies fighting for scarce resources (Gupta, Smith & Shalley, 2006; March, 1991), it is important to understand which strategy managers should select. Knowledge management is not one more research area of management, but the most important when considering the role of knowledge in supporting decision-makers in organizations.

No management decision is made without the support of knowledge and information regarding the type of decision. Knowledge is the know-how, as well as the understanding and explanation embedded in organizations (Wikström & Normann, 1994). Knowledge can be found in organizational know-how, recipes, practices, accumulated expertise and skills (Kogut & Zander, 1992). Information is not knowledge because it lacks interpretations; beliefs are not knowledge because it lacks validity; wisdom is not knowledge because it lacks veridicality (Schulz, 2001).

In fact, information is considered a lower form of knowledge (Wilstrom & Norman, 1994), and is presented in facts, data, codified and declarative knowledge (Kogut & Zander, 1992). Another distinction between knowledge and information is their state of existence, whilst knowledge is stocked, information is flowing (Nonaka & Takeuchi, 1995; Starbuck, 1992). Nevertheless, the clarity can be achieved by stating that knowledge is no more than analyzed information (Schultze, 2000). New knowledge is the discovery of phenomena that were not known before (McFadyen & Cannella, 2004). Knowledge work is cerebral by manipulating abstractions and symbols existing in the world which also represents that same world. Knowledge work requires creativity and a formal education. Knowledge work produces and reproduces information and knowledge (Schultze, 2000).

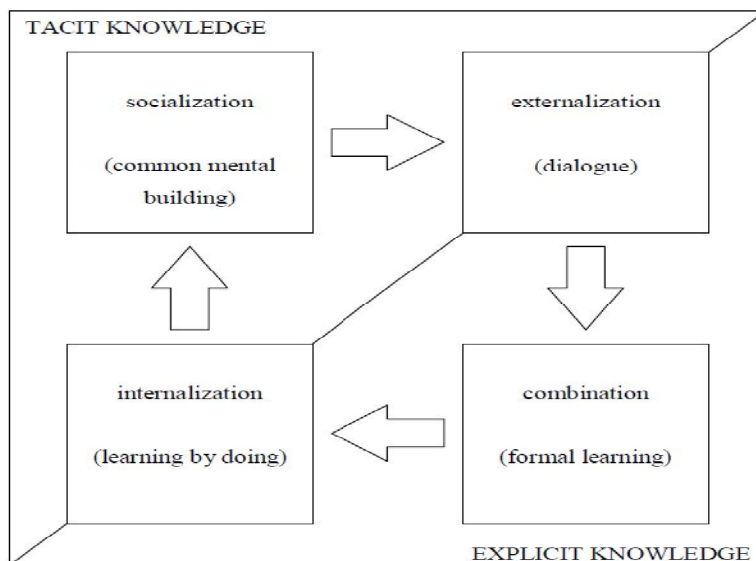


Figure 1: Knowledge Creating Company Model, adapted from Nonaka and Takeuchi (1995)

There are two types of knowledge – tacit and explicit. Tacit knowledge is knowledge that is not codified (Berman, Down, & Hill, 2002) whilst explicit is the knowledge that can be found in rules, manuals and reports. To better understand the differences between tacit and explicit knowledge in the knowledge creation process, this paper uses the model of the Knowledge Creating Company of Nonaka and Takeuchi (1995). The model is based on a cycle process between tacit and explicit knowledge considering four processes – externalization, combination, internalization, and socialization – as shown in Figure 1. Externalization is the process that transforms tacit knowledge in explicit knowledge throughout dialogue and the codification of the tacit knowledge in ways that can be accessed by the rest of the organization. Combination is the process where the recently codified explicit knowledge is captured by the organization through formal learning. In order for organizational resources to learn, techniques of sorting, selecting and combining are used.

Internalization is the process where explicit knowledge generates tacit knowledge by mentally sharing models and technical know-how. After learning in the previous stage, the individuals are implementing new knowledge in their daily work and learning from it, thus creating new tacit knowledge. Finally, socialization is the process where tacit knowledge is sharing through experience. The recently learnt knowledge is shared by a common mental building, an almost unaware process. This model allows a better understanding of the creation and sharing of both tacit and explicit knowledge in an organizational environment (Albescu, Pugna & Paraschiv, 2009).

3. Competitive Intelligence

Competitive intelligence can be related to knowledge management by stating that its purpose is to acquire knowledge about the organizational competitive environment (Neugarten, 2003).

Competitive intelligence should be understood as a management tool in supporting the decision-making process (Taborda & Ferreira, 2002), providing with the necessary knowledge to the decision-makers. Competitive intelligence is the tool which allows the decision-makers to know their own organization, their competition and their battlefield (Bensoussan & Densham, 2004). Competitive intelligence researchers and practitioners also consider it to be an ethical and legal process that may lead the organization to a dominant position in its environment (Heppes & du Toit, 2009).

According to Zangouinezhad and Moshabaki (2009), competitive intelligence is a process that allows the organization to know their competitors, their moves and decisions, staying this way one step ahead of them. The knowledge gathered throughout the competitive intelligence process may be applied to the short- and long-term strategic planning (Dishman & Pearson, 2003; Jourdan, Rainer & Marshal, 2008; Wright, Pickton & Callow, 2002). The collection, processing, evaluation and communication of military intelligence have been refined to an art form (Schultz, Collins & McCulloch, 1994). The goal of the professionals of competitive intelligence is to identify and manage risks; they are in the business of the industry risk management (Gilad, 2001). According to Kahaner (1996), intelligence, not information, is what managers need to make decisions. He also clearly states that knowledge is another term for intelligence. In 1998, Jonathan Calof presented a competitive intelligence process which comprehended five stages: (1) obtaining competitive intelligence requests; (2) collecting information; (3) analyzing and synthesizing information; (4) communicating intelligence; (5) and managing the competitive intelligence process. This derivation from the classic intelligence cycle has been justified by the misunderstood concepts surrounding competitive intelligence. Nevertheless, and for the purpose of this paper, the classic model (Figure 2) will be used as presented by Larry Kahaner (1996) and Taborda and Ferreira (2002).

When well understood and correctly applied, the four stage classic model of the intelligence cycle is more than enough to produce intelligence, as required by the issues in discussion.

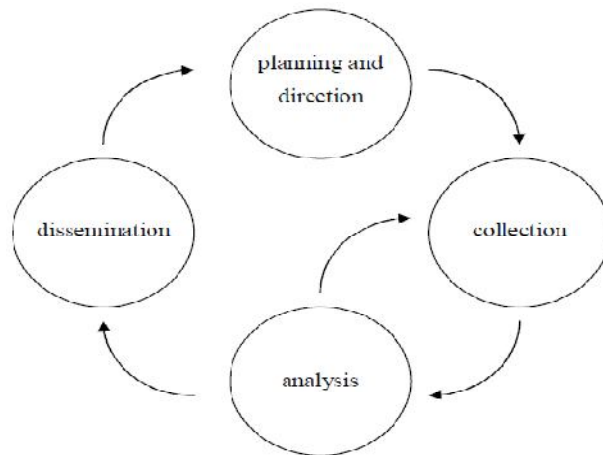


Figure 2 – The Intelligence Cycle, Adapted from Kahaner (1996)

3.1. Planning and Direction

Planning and direction is consensually the first step in the intelligence cycle and the main objective is to understand which intelligence is required for the decision-making process. Frequently, this is the step where the management becomes involved by transmitting their needs of intelligence (Kahaner, 1996). The required intelligence is identified and translated into the key intelligence topics (KITs), which according to Charles Whitehead (2002) are based on key intelligence needs (KINs). The needs of the management for information should encompass three factors: focus, decision timing, and type (Taborda & Ferreira, 2002). A wide key intelligence topic is a waste of resources. The need for information must be specified and focused on what really matters and is needed for the decision-making process. A deadline should be added to the key intelligence topic in order to establish a level of intelligence.

A key intelligence topic should also be classified on familiarity (known or unknown) and frequency (ad-hoc or continuous). These last two classifications of information produce a two-by-two matrix (Figure 3) with four types: Generic; Opportunities; Trends; and Surveillance. Generic information, which is the organizational knowledge repository, includes everyday knowledge about clients, finances and productive processes. Opportunities include the information on laws, markets and their status. Trend analysis includes information about emerging technologies and new products. In the end of the intelligence cycle this kind of information turns into generic knowledge. Surveillance is the competitive intelligence radar. This information classified as ad-hoc and unknown will allow the organization to stay one step ahead of the competition. Classifying needs for information on familiarity is what will allow the organization to follow a knowledge management strategy based on either exploitation or exploration.

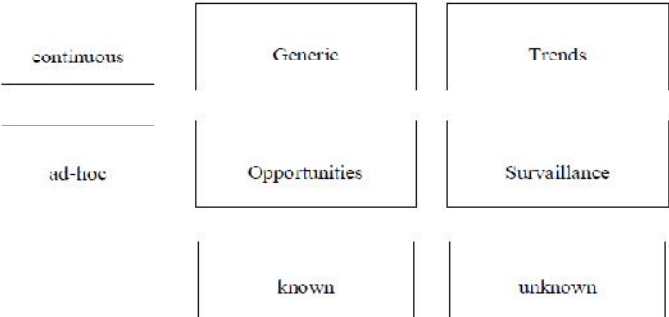


Figure 3: Classification of the Information, adapted from Taborda and Ferreira (2002)

3.2. Collection

The second step of the intelligence cycle is the gathering and collection of information which is believed to be necessary to satisfy a certain key intelligence topic. Competitive intelligence comprehends two types of sources information – primary and secondary.

Primary information is the type of information which is not usually accessible to the public or in a published form and can be collect by personal contact, by studying the development plans of a competitor or by observation (Kahaner, 1996; Taborda & Ferreira, 2002). This represents about 90% of the information necessary to produce intelligence (Taborda & Ferreira, 2002). Secondary information is the type of information which can be found in several published and public forms (Kahaner, 1996; Taborda & Ferreira, 2002). The collection of secondary information also allows identifying potential sources of primary information. When crossing this classification of information with the knowledge management concepts and notions, we can state that sources of primary information are mainly tacit knowledge inside and outside the organization, while sources of secondary information are explicit knowledge. Another issue concerning the collection of information is its reliability. Facts should be accepted and rumors must be confirmed.

3.3. Analysis

Analysis is the third step of the intelligence cycle and is where specialized skills and competences are required. Every analysis tool known can be used in this step. However, there are tools more adequate for certain purposes. For instance, the SWOT analysis can be the ideal tool to identify the strengths and weaknesses of the organization, but is not the right tool to identify future actions when not all of the information can be gathered. Nevertheless, the object of analysis is the key intelligence topic in three possible domains – the organization, the competitors, and the environment. Analysis should focus not only on the marketplace but also on everything that could change the conditions where the organization operates (Taborda & Ferreira, 2002). Competitive intelligence pragmatism indicates that organizations should look for effective performance rather than absolute truth, what works rather than what is right; and satisfying rather than optimizing when addressing the process design.

“One continues to collect and analyze intelligence until either the time or the money runs out!” (Neugarten, 2003) While analyzing the information gathered, the competitive intelligence analyst may feel the urge to go back one step and collect more information (Taborda & Ferreira, 2002).

The collection and analysis steps can be considered an iterative process. The product of this step is intelligence, which can be understood as knowledge.

3.4. Dissemination

The last step of the intelligence cycle is dissemination, where the intelligence produced in the previous step is presented to the management or the client of the competitive intelligence function. Intelligence should be delivered in time and should comprehend enough knowledge to answer the key intelligence topics. The intelligence report delivered should contain actionable intelligence based on the analysis developed, helping the managers make a good decision (Taborda & Ferreira, 2002). Dissemination often leads management to ask more questions, thus starting the next intelligence cycle (Kahaner, 1996).

4. Competitive Capital

Knowledge and intelligence are essential keys to gain competitive advantage in the next economy (Erickson & Rothberg, 2005). Competitive intelligence focuses on the identification of informational needs in the organization, the gathering and analysis of information, and produces recommendations, scenarios and knowledge for the decision-making process (Kahaner, 1996; Taborda & Ferreira, 2002). Whereas, knowledge management is concerned with identifying, collecting, codifying and sharing the knowledge assets of the organization (Erickson & Rothberg, 2005).

Therefore, one difference between knowledge management and competitive intelligence is their object, knowledge in the former and information in the later. However, competitive intelligence goes further than knowledge management in its domain of action when searching for and collecting information outside the organization. Intelligence is nothing more than knowledge, as discussed previously. To be exact, intelligence is explicit knowledge at the end of the intelligence cycle, since it appears in the form of a report. Knowledge management and the concept of intellectual capital are closely related (Erickson & Rothberg 2005). In fact, Erickson and Rothberg (2005) state that according to the theory there are three types of knowledge management: the human capital, the structural capital and the relational capital. Earlier, Rothberg and Erickson (2002) introduced the concept of competitive

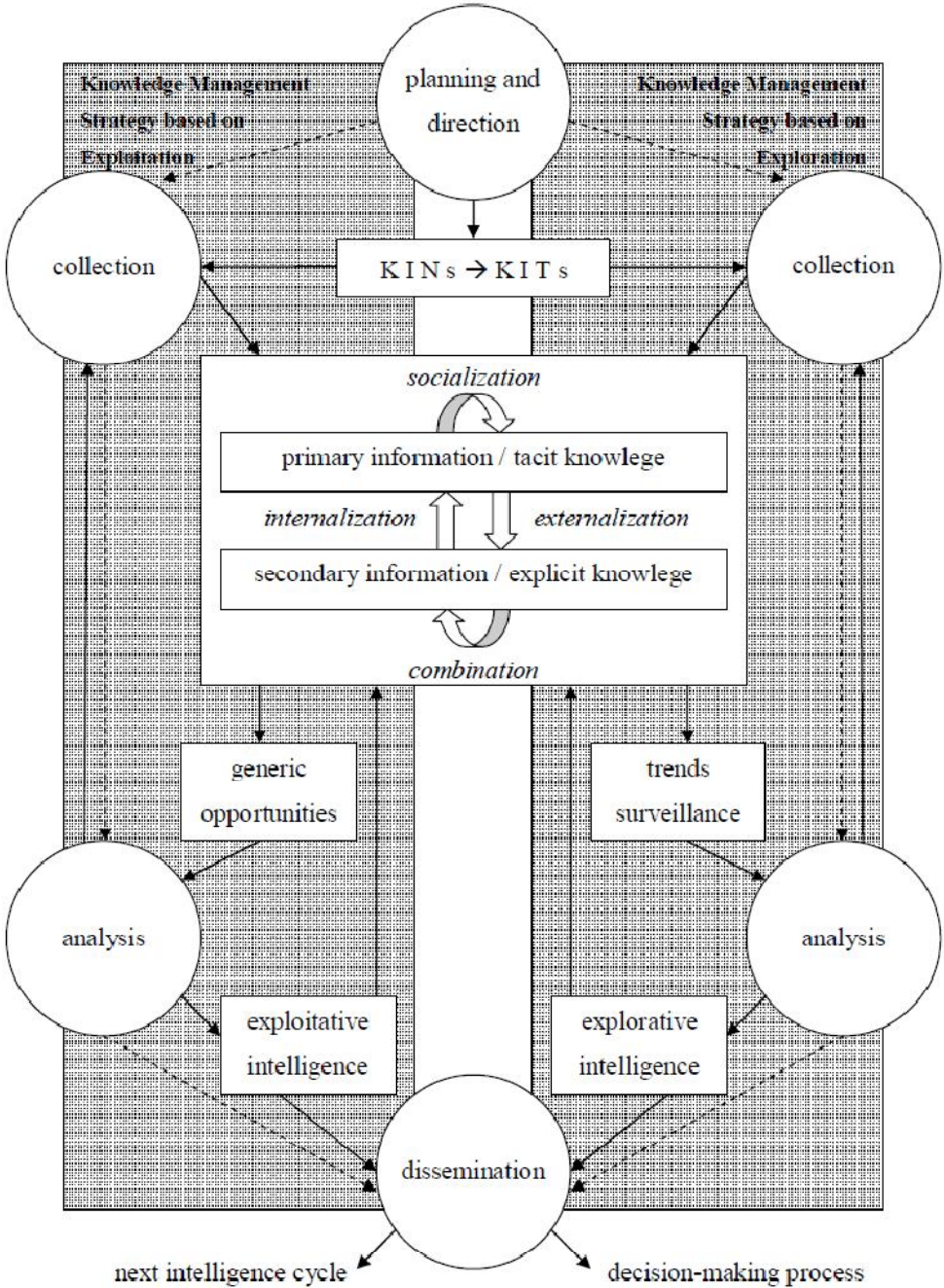


Figure 4 – The Intelligent Exploitation and Exploration Framework

Knowledge as the fourth pillar of intellectual capital – the competitive capital. In short, intellectual capital can be defined by human, structural, relational and competitive capital, being this last one the product of the intelligence cycle. This, along with what has been previously discussed, allows the choice between a knowledge management based on exploitation or exploration to be determined by the intelligence cycle.

5. Theoretical Framework

As discussed previously, the intelligence cycle can provide a mechanism to determine the use of a knowledge management strategy based on exploitation or exploration. Organizations which possess a competitive intelligence function may use the first step of the intelligence cycle to do so. When identifying a key intelligence topic and planning the collection of the necessary information, organizations are instinctively choosing between a knowledge management based on exploitation or exploration. For instance, suppose that the competitive intelligence function has just identified a new key intelligence topic after a strategic meeting with the top management. There is a rumor of a new competitor in the market where the organization operates. The new competitor has been identified, but there is not much information about the competitor. The competitive intelligence team starts its work by collecting secondary information about the new competitor, identifying sources of primary information and analyzing the collected information looking for trends and patterns in order to know their strategies.

By collecting unknown information and producing new intelligence about the new competitor, the organization has chosen a knowledge management strategy based on exploration. The organization has searched and acquired new knowledge. In the same way, suppose that the key intelligence topic was related to the improvement of the performance of the production process of the organization.

By collecting information about the production process and from R&D, the organization has chosen a knowledge management strategy based on exploitation. The organization has used existing knowledge to create a new insight about their production process. These two examples suggest the orthogonality, the punctuated equilibrium and the specialization of both strategies. However, if we assumed that the key intelligence topic was related to the performance of the new competitor production process, the dualities of Gupta et al. (2006) would change.

The competitive intelligence team would perform a comparative study between the organization production process based on existing knowledge and the new competitor production process based on the pursuit of new knowledge. This last example suggests that both strategies would be used, that they were complementary and ambidextrous and that the organization was specialized in both strategies. As for the impossibility of choosing both strategies due to the scarcity of resources (Gupta, Smith & Shalley, 2006; March, 1991), when allowing the intelligence cycle to determine which or both strategies to use, there is no impossibility. The level of intelligence, the resources and time involved in the competitive intelligence process are established when defining the key intelligence topic and planning the collection and analysis (Taborda & Ferreira, 2002). The competitive intelligence team applied the same tools when using existing knowledge or pursuing new knowledge. It is not exploitation or exploration that determines the necessary resources but the focus, decision timing, and type of information identified in the key intelligence topic (Taborda & Ferreira, 2002). Therefore, it is possible to apply one or both knowledge management strategies when using the intelligence cycle as the deciding factor. In light on what has been discussed, this paper proposes the Intelligent Exploitation and Exploration Framework (Figure 4). To understand this framework, the intelligence cycle – planning and direction; collection; analysis; and dissemination – must always be kept in mind.

In the first step, the competitive intelligence team identifies the key intelligence topics and classifies them by focus, timing and type (Taborda & Ferreira, 2002). In order to do this, the team must recognize the organizational knowledge creating model by relying on, for example, the Knowledge Creating Company Model by Nonaka and Takeuchi (1995). Knowing the mechanisms of knowledge creation used by the organization is what allows the competitive intelligence team to identify the sources of primary and secondary information needed in the second step of the cycle.

The team must know and understand the processes of socialization, externalization, combination and internalization inside and outside the organization; to easily identify information classified as generic or opportunities in the exploitation perspective and identify information classified as trends and surveillance in the exploration perspective. After the information is gathered, the analysis is done by looking for patterns. In the event of missing information, the team frequently goes one step back to collect more information. However, when this is impossible, due to time limitations or inexistent information, the team should proceed with the scenario analysis (Fuld, 2004).

The intelligence produced during the analysis step is then included in a report and delivered to the top management or other competitive intelligence function users. The intelligence produced by the use of the knowledge management strategy based on exploitation or the use of intelligent exploitation is called exploitative intelligence in the framework. Whereas, the intelligence produced by the use of the knowledge management strategy based on exploration or the use of intelligent exploration is called exploitative intelligence. At last, the intelligence produced by the use of both strategies is simply called intelligence. Going back to three fictional examples presented earlier, when applying the Intelligent Exploitation and Exploration Framework, we can see the differences and similarities in Table 1.

Table 1: The Intelligent Exploitation and Exploration Framework on examples.

	Example 1	Example 2	Example 3
Key intelligence topic	Know the new competitor	Improve the production process	Compare the new competitor production process
Strategy-based Secondary information	Based on exploitation Internet Media Market reports Patents	Based on exploration Organizational repository R&D reports	Based on both Organizational repository R&D reports Internet Media Market reports Patents
Primary information	Conferences Suppliers Observation	Production and R&D director Production and R&D personnel Observation	Production and R&D director Production and R&D personnel Conferences Suppliers Observation
Information classification	Surveillance	Generic Opportunities	Generic Surveillance
Analysis tool	Competitor profile analysis SWOT analysis Scenario analysis	Finance analysis	Competitor profile analysis SWOT analysis Scenario analysis Finance analysis
Intelligence produced	Explorative intelligence	Exploitative intelligence	Intelligence
Actionable intelligence	Change market strategy	Change production process	Change production process Change market strategy

6. Conclusion and Discussion

The problematic choice and implementation of a knowledge management strategy based on either exploitation or exploration can be understood by introducing the competitive intelligence perspective on information and knowledge.

The first step of the intelligence cycle can be interpreted as the critical factor for that choice. When identifying the key intelligence topics and the type of information needed, the competitive intelligence teams implement implicitly a knowledge management strategy either based on exploitation or exploration. Classifying the information according to its familiarity is what distinguishes that choice. For instance, classifying the needed information to satisfy a certain key intelligence topic as generic or opportunities will determine the implementation of a knowledge management strategy based on exploitation, because the information to be collected already exists. Conversely, classifying the needed information as a trend or surveillance will determine the implementation of a strategy based on exploration, meaning the pursuit of unknown information and the creation of new knowledge. In these two cases, the issue of scarce resources is not addressed. However, when classifying the needed information as generic and trend or as opportunities and surveillance, the issue will be raised. The resources involved in the collection and analysis of both known and unknown information use the same techniques and tools. Competitive intelligence teams collect secondary information in the organizational repository or outside the organization in the same way. They also collect known or unknown primary information inside and outside the organization using the same techniques – personal contact and observation. Therefore, no matter the familiarity of the information needed, the resources are the same. Regarding the analysis, a similar interpretation can be established.

After the information collected, applying the SWOT analysis or the finance analysis to known information or previously unknown is indifferent to the scarcity of the resources. In fact, time specified to a key intelligence topic is the only limit which can stop allocating resources to the analysis task. Another conclusion which can be drawn in this paper is that competitive intelligence can be used as a tool for creating knowledge. The main input of the competitive intelligence process is information and the output is intelligence or knowledge (Kahaner, 1996). As a producer of knowledge, competitive intelligence is also part of the knowledge creating process of the organization. Competitive intelligence can be interpreted as being part of the externalization process of the Knowledge Creating Company Model by Nonaka and Takeuchi (1995). Competitive intelligence transforms tacit knowledge or primary information in intelligence or explicit knowledge in the form of a report at the end of the intelligence cycle. Intelligence is incorporated in the organizational repository (Taborda & Ferreira, 2002).

When the Intelligent Exploitation and Exploration Framework produces exploitative or explorative intelligence, it feeds the organizational repository with information. Seeing competitive intelligence as a producer of knowledge may seem strange for the knowledge management researcher, but more importantly, it can bring a new approach to the whole issue. When competitive intelligence identifies potential sources of information inside the organization, it is clearly helping the organization manage its knowledge. Competitive intelligence identifies not only the potential sources but also the processes of knowledge creation, helping the knowledge management of the organization to identify and to improve the processes themselves. However, competitive intelligence goes further than the organization itself. When competitive intelligence identifies potential sources of information outside the organization, it is acquiring knowledge on how to protect information inside the organization. We will assume for a moment that the rumor of the new competitor in the previous example was originated in a social dinner.

One of the organizations employees heard something about a new competitor and reports back to the management or someone in the competitive intelligence team. The same way that the organization employee heard that rumor, a competitor employee could hear something about the organization new marketing campaign. Competitive intelligence can bring a new way of thinking and on how to protect organizational knowledge. For organizations which possess competitive intelligence functions the Intelligent Exploitation and Exploration Framework can be useful when deciding the implementation of a knowledge management strategy based on exploitation or based on exploration. The type of the information needed to produce knowledge is the deciding factor between these two strategies. The framework also resolves the problem of the scarcity of resources. For organizations that do not possess a competitive intelligence function, understanding their knowledge creating process can improve their exploitation or exploration of knowledge. Even without the intelligence cycle, organizations should be able to identify the type of information required, and elect a knowledge management strategy based on exploitation or exploration.

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