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A methodology for assessing the coherence of companies' knowledge strategy

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Structured Abstract

Purpose – The objective of the research is to propose a methodology to quantitatively assess the coherence of a company's knowledge strategy to its business strategy and to its competitive and organizational context.

Design/methodology/approach – We identified three main strategies in the literature of knowledge management: (1) the knowledge development (internal or external), (2) the knowledge sharing (codification or personalization strategy) and (3) the knowledge exploitation (internal or external). We propose a model and a three step methodology for assessing the coherence of companies' knowledge strategy which links the strategies identified with some dimensions characterizing competitive environment, business strategy e organizational context with defines the characteristics of businesses. Finally we test the methodology in a company, the illycaffè of Trieste.

Originality/value –This original methodology can be used to assess the alignment of existing knowledge strategy (as-is state) with the characteristics of the company; identify, on the basis of the current competitive environment, organizational context and business strategy, the ideal knowledge strategy as a balance of the three fundamental strategies

(ideal as-is state); identify, on the basis of the future competitive environment, organizational context and business strategy, the ideal knowledge strategy as a balance of the three fundamental strategies (ideal to-be state).

The final output of the assessment methodology is a new strategic tool, we called the *knowledge strategy coherence diagnostic matrix* which visually analyzes the as-is state, the ideal as-is state and the ideal to-be state of a company's knowledge strategy.

Practical implications – The application of the methodology for assessing the coherence of companies' knowledge strategy highlights how a company operates, and, in relationship with that, how manages the knowledge. Furthermore the proposed assessment model has a general applicability and can be a valuable tool for an in-depth organizational analysis of knowledge management.

Keywords – Knowledge Management, Business Strategy, Knowledge Strategy, Case Study.

Paper type – Academic Research Paper

1 Introduction

In last decades, managers, consultants and researchers are turning increasing attention to issues related to knowledge management, showing a particular interest in strategies and corporate policies that could be more effective in preserving and developing intangible assets that determine and increase the companies' competitive advantages.

The stream of studies on knowledge management is inextricably linked to the theory of the Resource Based View. According to this theory, growth and performance of a company are influenced by its resources and capabilities (Penrose 1959, Wernerfelt, 1984). The resources of an organization are made up of tangible and intangible assets that are owned or controlled by the organization itself and allow the implementation of the company's strategy. The topic of knowledge management is founded on these theoretical assumptions: in fact the knowledge covers a leading position among the company's resources. The organizational knowledge, represented by the know-how, the culture, the routines, the experiences, .., has the property of inimitability, generates added value for customers and scarcity for the competitors (Barney, 1991) creating a competitive advantage. This is one of the fundamental assumption of the so-called Knowledge Based Theory (Spender, 1996a; 1996b; Nonaka and Takeuchi, 1995; Cole, 1998;).

Alavi and Leidner (2001) argue that the competitive advantage resulting from knowledge is not only linked to the presence of know-how within the company, but also to how this knowledge is actually used in the process of creating new knowledge useful to constantly develop the competitive advantage. For this reason, in recent years, knowledge management, defined as management of all processes involving knowledge (Nonaka, 1991; Quintas *et al.*, 1997; Waltz, 2003; Watson, 2003;), has attracted increasing interest.

Companies' knowledge management can be viewed at least through four perspectives.

The first one focuses on defining the processes which characterize knowledge management, for example how knowledge is created, developed, stored and reused within a business environment (e.g. Alavi and Leidner, 2001; Dewett and Jones, 2001; Zhara and George, 2002, Argote *et al.*, 2003; Wijnhoven, 2003; Alavi *et al.*, 2006; Rodriguez-Elias *et al.*, 2008).

A second perspective concerns the analysis and the application of tools that support Knowledge Management. The basic assumption is that knowledge management processes can be managed more effectively through the right use of ICT (Lindvall *et al.*, 2003). Even if the technology is not the only factor to consider when implementing a project of Knowledge Management (Tsui, 2002) there is no doubt that it plays an important role as catalyst for the success of the project (Rodriguez-Elias *et al.*, 2008). Many authors, however, stress that it is not sufficient to implement useful tools to see achieved a successful KM project (Rodriguez-Elias, 2008; Tsui, 2002; Alavi *et al.*, 2005; Edmonds, 2009; Halawi *et al.*, 2006).

A third perspective concerns the evaluation of knowledge management and, in general, of intangible assets. In this view, intangible assets are divided mainly into three types of capital: human capital, structural capital and relational capital (Edvinsson and Malone, 1997, Roos and Roos, 1997; Sveiby, 1997, D'Egidio, 2001).

The last perspective concerns the analysis of companies' knowledge strategy (Hansen *et al.*, 1999, Zack, 1999, Beckett *et al.*, 2000; Bierly and Daly, 2002, Choi *et al.*, 2008). Here the fundamental assumption is that the real competitive advantage resulting from

knowledge management remains only potential if it is not linked to the *strategy* that drives business (Hansen *et al.*, 1999; Zack, 1999; Halawi *et al.*, 2006) and even to the *organizational context and competitive environment* (Wang, 2001; Droge *et al.*, 2003; Thornill, 2006; Merono-Cerdan *et al.*, 2007).

Starting from this statement the present work aims to propose a methodology to quantitatively assess the coherence of a company's knowledge strategy to its business strategy and to its competitive and organizational context. Consequently we analyze the literature finding three fundamental knowledge strategies (par. 2) and we propose a model and a methodology for assessing the coherence of companies' knowledge strategy which links the strategies identified with some dimensions characterizing competitive environment, business strategy e organizational context with defines the characteristics of businesses (par. 3). The final output of the assessment methodology is a strategic tool, we called the *knowledge strategy coherence diagnostic matrix* which visually analyzes the as-is state, the ideal as-is state and the ideal to-be state of a company's knowledge strategy. Subsequently the methodology is tested in a real company, the illycaffè of Trieste and the results of the analysis are presented (par. 4). Finally we discuss the results and the limits of our research and propose future directions (par. 5).

2   Knowledge strategy and policies

The relevance of knowledge assets as fundamental strategic factors of business success has been widely recognised in today's competitive scenario (Barney, 1991; Grant, 1991; Drucker, 1993). In fact, more and more organisations accredit their competitiveness essentially to their knowledge assets and consider knowledge as the differentiating competitive lever in knowledge economy (Nonaka and Takeuchi, 1995). In such a prospect, a suitable development and deployment of company's knowledge assets has become a strategic decision for company's success.

In literature the issue of the knowledge management strategies, or Knowledge Strategy has been treated with lesser extent and in a fragmented way if compared to the other three perspectives (processes, tools and evaluation). Furthermore scholars focused mainly on a particular aspect (policy) of the companies' knowledge strategy rather than propose a comprehensive framework of all possible strategies.

After a literature analysis on this subject, we identified three main knowledge strategies:

- *Knowledge Development*, characterized by the two policies of *internal* and *external development* of organizational knowledge, as stated by the seminal contribution offered by Zack (1999), and subsequently developed by Beckett *et al.* (2000), Maier and Remus (2001), Bierly and Daly (2002), Pai (2005), *Choi et al.* (2008).

- *Knowledge Sharing*, characterized by the two policies of *personalization* and *codification* of organizational knowledge, as stated by the seminal contribution offered by Hansen *et al.* (1999) and subsequently developed by Beckett *et al.* (2000), Schultz-Jobe (2001), Maier-Remus (2001), Choi-Lee (2003), Scheepers *et al.* (2004), Jasimuddin *et al.* (2005), Choi *et al.* (2008).

- *Knowledge Exploitation*, characterized by the two policies of *internal* and *external exploitation* of organizational knowledge, as stated by the contribution

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of Beckett *et al.* (2000) and subsequently taken up by Chesbrough (2003) and Lichtenthaler (2005, 2007).

The first strategy of knowledge management that we consider is the development of new knowledge, or Exploration. The seminal research regarding this strategy has been conducted by Zack (1999) who divides companies that adopt the policy of knowledge development in two categories:

- provincial firms which exploit internal knowledge resources (people's minds, inherent behaviors, procedures, software and equipment, recorded in documents or databases);

- cosmopolitan firms which exploit external sources of knowledge (publications, universities, government agencies, professional associations, personal relations, consultants, inter-organizational alliances).

Companies that develop knowledge internally own a unique knowledge, difficult to imitate. On the other side the knowledge developed from outside sources is available to everybody and in some situations can be more expensive (e.g. the use of consultants) and more difficult to implement. On the other hand, developing external knowledge allows the firm to have different points of view and approaches to the solution of a problem.

Also Bierly and Daly (2002) identify the strategy of knowledge development distinguishing two policies depending on the source: internal or external. In particular, the internal development of knowledge is inextricably linked to the stages of creation, integration and sharing of knowledge within organizational boundaries. The acquisition of external knowledge, however, is a process consisting of two steps: the exposure of organizational members to external sources of knowledge and the transfer within the company. The authors argue that the ideal situation is achieved by balancing the internal and external sources of knowledge.

The knowledge sharing strategy is based on the most important classification of knowledge: tacit and explicit (Polanyi, 1967; Nonaka, 1994). Therefore, starting from this distinction, it's possible to associate two distinct, but balanceable, policies: codification and personalization (Hansen *et al.*, 1999).

The codification strategy is centered on the use of ICT tools. Knowledge is carefully codified and stored in databases, where it can be easily accessed by the right employees. Knowledge is encoded using a "people-to-document approach": it is absorbed by people who developed it, made independent of them and then reused. This approach allows many employees to find the source of knowledge they need, without contacting the person who originally developed it. This creates the opportunity for economies of scale in the reuse of codified knowledge.

The personalization strategy, on the other hand, refers to a situation where knowledge is closely tied to those who have developed it, and it is transmitted through direct contact among employees ("people-to-people" approach). In this case, the objective of ICT tools is to support the communication of knowledge not the storage. Knowledge is not codified - and in many cases it can't be codified - and is directly exchanged between the members of the company, through meetings and brainstorming, and indirectly with phone calls, e-mail and videoconferencing.

Hansen *et al.* (1999) note that most companies use both strategies, but not equally. It is said that the best way forward is to focus on a strategy, using the other as a support, in a 80-20 balance.

The last strategy considered, the knowledge exploitation, has been less treated in literature if compared to the other two policies analyzed. Despite this shortage, it has been possible to identify some important contributions.

The main distinction is between the internal exploitation of knowledge and the external one (Beckett *et al.*, 2000). There are two possible paths to achieve this result: to exploit the knowledge, developed and codified in the organization, in developing products / services to-be offered to the customer (internal exploitation), or sell the knowledge outside the organizational boundaries (external exploitation), e.g. technical advice or transfer of patents. The exploitation of knowledge is the strategy that has the important objective of finalizing the potential competitive advantage built through the realization of the other two strategies (knowledge development/exploration and sharing).

3   A model for assessing the coherence of companies' knowledge strategy

3.1 A model for linking knowledge strategies to business context and strategies

Our research objective has been to propose a methodology to quantitatively assess the coherence of a company's knowledge strategy. Consequently we have identified through a further literature analysis several dimensions linked that characterize the competitive environment, the organizational context and business strategy and which should be aligned to the three essential knowledge management strategies and related policies.

These dimensions have been linked in a model shown in Figure 1 and based on some theoretical assumption.
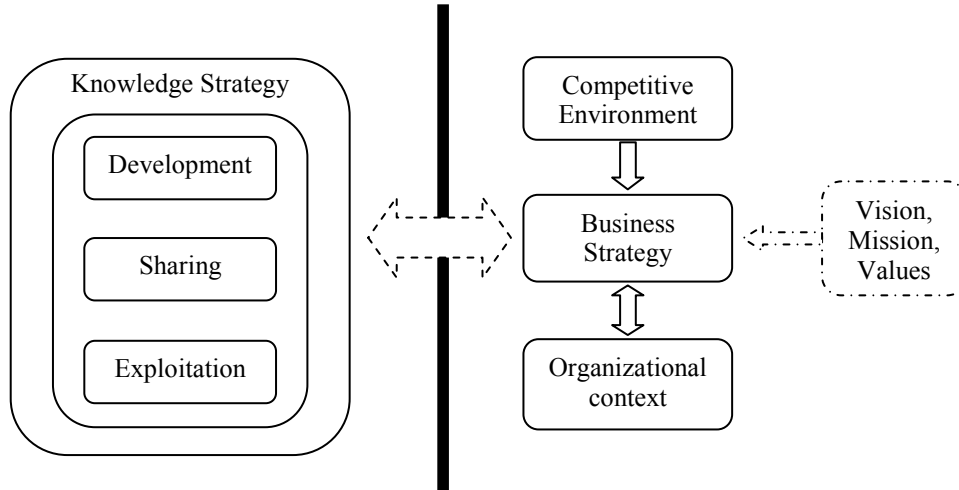

Figure 1 - A model for assessing the coherence of companies' knowledge strategy

The business strategy adopted by an organization can be formulated starting from the analysis of competitive environment and organizational context but is strongly influenced by vision, mission and values of the company. The classical theories of enterprise, such as Industrial Organization, argue that the enterprise strategy is highly dependent from the market structure (Bain, 1948; 1954, Mason, 1939; 1966, Stigler, 1961; McGee, 1975). On the other hand, the Resource Based View theory argues that the company business strategy is shaped by its unique and inimitable resources, capabilities and expertise (De

Toni and Tonchia, 2002). The relationship between business strategy and organizational context, however, cannot be considered unidirectional, since, as demonstrated by a research conducted by Ward and Duray (2000) on a set of very large U.S. companies, the business strategy, in turn, influences the internal organizational context. Finally, vision, mission and values represent the original business idea and influence the determination of business strategy as they determine the organization's lines of thought and the culture for the organization, the future objectives and the resources to get there.

Our research, for reasons of investigation, focused on the competitive environment, business strategy and organizational context, as it would be very difficult to create a framework for analysis of vision, mission and values capable of describing the many facets of these statements.

The link between the knowledge strategy (left area) and the three dimensions described above (the competitive environment, business strategy and organizational context - right area) represent the core of our model for assessing the coherence of companies' knowledge strategy. After defining the dimensions that constitute the three macro-areas we searched the linkages between these dimensions.

3.2 Dimensions characterizing competitive environment, business strategy e organizational context

The analysis of literature allowed us to identify some variables which can describe a company's competitive environment (2 variables), its business strategy (6 variables) and its organizational context (13 variables).

We defined the *competitive environment* using two dimensions:

1. *Market dynamism*, i.e. the level of innovation in production/logistics processes, obsolescence of products, unpredictability of the market, ability to monitor the macro trends of the market (Droge *et al.*, 2003);

2. *Competitive pressure*, i.e. the bargaining power of customers, the aggressiveness of competitors and the presence of substitute products (Porter, 1985; Wang, 2001).

The *business strategy* has been defined through the following dimensions:

1. *Aggressiveness of competitive strategy* defined as in the model proposed by Miles and Snow (1978), which provides the definition of corporate strategy using four strategic typologies: prospector, analyzer, defender, reactor (Hult, 2006);

2. *Product standardization*, i.e. the level of standardization/customization of company's products (Hansen *et al.*, 1999) and the manufacturing process that characterizes the firm: custom production, small batch (or job shop) production, large batch production, mass assembly production and continuous process production (Droge *et al.*, 2003);

3. *Propensity to external relationship*, defined by willingness to carry out acquisitions, agreements or strategic inter-organizational relationships (Zahra and George, 2002);

4. *Rate of new products introduction in the market* compared to competitors (Smith *et al.*, 2005);

5. *Strategic orientation* defined as cost leadership vs. differentiation (Porter, 1980) and people vs. technology (Greiner *et al.*, 2007);

6. *Centrality of top management* evaluated on the basis of the authority to make decisions concerning the introduction of new products on the market, entry into new markets, pricing decisions (Wang, 2001).

Finally, the organizational context can be investigated through the following dimensions:

1. *Internal climate* defined as the inclination towards the risk (Smith *et al.*, 2005), the presence of an ethical code shared across the organization, the presence of a climate of trust among employees and between the employees and the organization (Lucas and Ogilvie, 2006);

2. *Level of training/experience*, assessed on the average school education (Lucas and Ogilvie, 2006) and the average number of years working within the same industry (Smith *et al.*, 2005);

3. *Team working inclination* evaluated on the basis of the existence of working groups to address the critical situation (Smith *et al.*, 2005) and the existence of inter-functional relationships (Lucas and Ogilvie, 2006);

4. *Centrality of functional units in the budgeting process* (Wang, 2001);

5. *Codification level* , i.e. the existence of codification of procedures and the application of disciplinary procedures when rules are violated (Wang, 2001);

6. *Personal autonomy*;

7. *Communication intensity in the internal network*, defined through the frequency of contacts with various hierarchical levels and with other functional areas and the average length of the relationship (Smith *et al.*, 2005);

8. *Problems complexity*, defined by the technological and social complexity of the problems that arise in business (Bou-Llusar *et al.*, 2006) and the nature of the problems (repetitive, similar or new) (Greiner *et al.*, 2007);

9. *Firm specific knowledge* (Merono-Cerdan, 2007);

10. *Diversity and breadth of the knowledge*, evaluated on the basis of academic experiences, work and personal interests of top management and the heterogeneity of the working groups within the organization (Goll *et al.*, 2007);

11. *Incentives policy* in terms of rewards for formal codification and reuse of knowledge (Lucas and Ogilvie, 2006);

12. *Firm dimension*, assessed on the basis of turnover and staff (Real *et al.*, 2006).

13. *Firm age*, estimated on the basis of years of activity in the industry or sector (Thornill, 2006).

3.3 The linkage between knowledge strategy and competitive environment, business strategy and organizational context

The objective of the assessment is to offer indications on how the company should manage the knowledge given the competitive environment in which it operates, the business strategy adopted and its organizational context. So we designed a matrix, a strategic coherence assessment model, which correlates the specific dimensions described above with the three knowledge strategies and, in particular, with the six policies previously identified thank to a number of research discovered.

This matrix (Figure 2) is the heart of our methodology for assessing the coherence of knowledge strategy. The correlations has been obtained by analyzing the literature, so any link identified is associated with a particular contribution to literature as shown in Appendix 1. In the strategic coherence assessment model the dots indicate direct proportionality between the variables/dimensions that are at the crossroads of the cell, while the diamonds show inverse proportionality.

The model is divided into two main parts: the part on the right correlates the competitive environment, business strategy, organizational context with the knowledge strategies previously identified. The left side correlates the dimensions of competitive and organizational context with the business strategy.

The analysis of the correlation matrix can tell, for example, that if the dynamism of the market increases then the development of knowledge, whether internal or external, should also increase. This is due to the fact that in dynamic industries knowledge obsolescence is greater and therefore it is necessary to keep pace with technological innovations (Droge *et al.*, 2003; Thornill, 2006).

The presence of the left side of the matrix (which, as mentioned above investigates the relationship between the competitive environment, business strategy and organizational context) allows to check the existence of a real misalignment between the business and a knowledge strategy. In fact the misalignment is not always due to incorrect implementation of the knowledge strategy but it could be caused by the misalignment among the dimension which characterize the competitive environment and the organizational context and the business strategy. In this case, therefore, the problem moves from knowledge management to the business strategy.
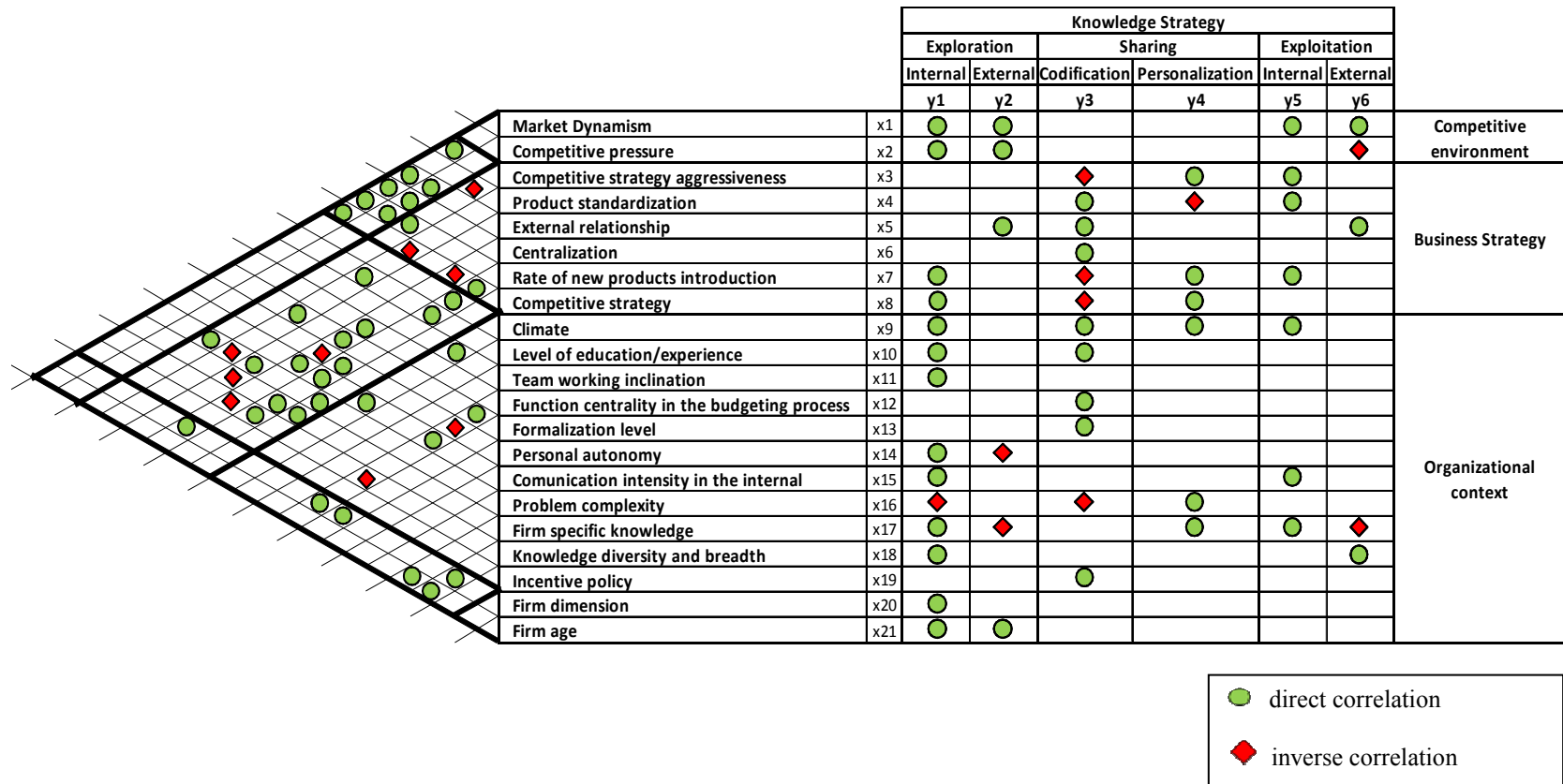
		Knowledge Strategy						
		Exploration		Sharing		Exploitation		
		Internal	External	Codification	Personalization	Internal	External	
		y1	y2	y3	y4	y5	y6	
Market Dynamism	x1	●	●			●	●	Competitive environment
Competitive pressure	x2	●	●				◆	
Competitive strategy aggressiveness	x3			◆	●	●		Business Strategy
Product standardization	x4			●	◆	●		
External relationship	x5		●	●			●	
Centralization	x6			●				
Rate of new products introduction	x7	●		◆	●	●		
Competitive strategy	x8	●		◆	●			
Climate	x9	●		●	●	●		Organizational context
Level of education/experience	x10	●		●				
Team working inclination	x11	●						
Function centrality in the budgeting process	x12			●				
Formalization level	x13			●				
Personal autonomy	x14	●	◆					
Comunication intensity in the internal	x15	●				●		
Problem complexity	x16	◆		◆	●			
Firm specific knowledge	x17	●	◆		●	●	◆	
Knowledge diversity and breadth	x18	●					●	
Incentive policy	x19			●				
Firm dimension	x20	●						
Firm age	x21	●	●					

● direct correlation

◆ inverse correlation

Figure 2 - Correlation matrix for coherence assessment of companies' knowledge strategy

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3.4 The knowledge strategy diagnostic matrix

The theoretical model described above can be used inside a methodology which can be divided into three distinct phases: data gathering through structured interviews, data processing and the analysis of results through a tool we named *knowledge strategy diagnostic matrix*.

The data gathering phase collects all the information concerning the dimensions characterizing the knowledge strategy, the business strategy, the organizational context and the competitive environment and can be performed through structured interviews to every the manager representatives of all company functions.

The data obtained through the phase of interviews can be processed and analyzed using the model previously described (Figure 2) to obtain three sets of values, called:

- *As-is state*: representation of the current state of knowledge strategies (and policies);

- *Ideal as-is state*: representation of the ideal current situation that should describe the company in terms of knowledge strategy due to the competitive environment, business strategy and organizational context that currently characterize the firm;

- *Ideal to-be state*: representation of the ideal future state in which the company should be in terms of knowledge strategy due to the competitive environment, business strategy and organizational context that, according to the responses of managers, will characterize the firm.

The direct proportionality relationships in the coherence assessment matrix suggest to align the value of the knowledge strategy to the value of the dimension considered. On the other side, inverse proportionality relationships suggest to align the value the knowledge strategy associated with the complementary value to 6 of the dimension considered. For example, if problem complexity is high (4), literature analysis suggests that it is more difficult to develop knowledge internally, so the value we use in the mathematic algorithm to describe this situation for the internal development of knowledge in relation with the problem complexity will be 2 (= 6-4), which is the symmetric of 4 referred to the medium value of the scale (3).

For every knowledge strategy will therefore be possible to obtain an indicative value of the coherence on the basis of the alignments identified by the literature, both as regards the current state (starting from the values of the responses on the current characteristics of enterprise) and as regards the future state (starting from the value of the responses on the forecast characteristics of enterprise).

In order to calculate the three set of value we have defined:

- $Ia = \{Ia_i\}$ = answers of the respondents regard the present state

- $If = \{If_i\}$ = answers of the respondents regard the future state

    where $i = \{1,2,…N\}$, with N representing the number of respondents

- $Y = \{y_j\}$ = knowledge strategies

    where $j=\{1,2…, 6\}$, representing each policy of the knowledge strategies

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So $Ia_i(y_j)$ represents the answer of the i-th respondent regarding the j-th knowledge strategy (for the present state).

Furthermore we have defined:

- $Xcc = \{x_{kcc}\}$ = dimensions of competitive environment

where kcc = $\{1, 2\}$

- $Xbs = \{x_{kbs}\}$ dimensions of business strategy

where kbs = $\{3,..8\}$

- $Xco = \{X_{kco}\}$ dimensions of organizational context

where kco = $\{9, 10, .. 21\}$

So $Ia_i(x_k)$ respresent the answer of the i-th respondant regarding the k-th enterprise characteristic dimension (for the present state).

So the as-is state is calculated as:

$$\textbf{As-is } \textit{state } (y_j) = [\Sigma \ Pks_i * Ia_i(y_j)] / \ \Sigma \ Pks_i;$$

where Pks_i respresent the weight associated to the i-th respondant regarding the k-th enterprise characteristic dimension

In order to calculate the ideal as-is state we have defined:

$Xa_k = [\Sigma \ Pcc_i * Ia_i(x_k)] / \ \Sigma \ Pcc_i$ if k belong to kcc

$Xa_k = [\Sigma \ Pbs_i * Ia_i(x_k)] / \ \Sigma \ Pbs_i$ if k belong to kbs

$Xa_k = [\Sigma \ Pco_i * Ia_i(x_k)] / \ \Sigma \ Pco_i$ if k belong to kco

To determine the ideal as-is state of knowledge strategies it is necessary to apply an algorithm to the framework of the strategic assessment of knowledge management represented in Figure 2. In particular we assign the value 1 for the dots, the value 0 to the black cells and the value (6 - xak) / xak for the diamond, where xak represents the value previously calculated for the current situation for the k-th dimension. Denote by f (xak, yj) the relation between the k-th dimension and the j-th knowledge strategy.

So the ideal as-is state is calculated as:

$$\textit{Ideal } \textbf{as-is } \textit{state}(y_j) = [\Sigma \ xa_k * f(xa_k, \ y_j)] / N,$$

where N raptesents the number of relationships $f(xa_k, \ y_j)$ different from zero.

In order to calculate the ideal to-be state we have defined:

$$Xf_k = [\Sigma\ Pcc_i * If_i(x_k)] / \Sigma\ Pcc_i \text{ if k belong to kcc}$$

$$Xf_k = [\Sigma\ Pbs_i * If_i(x_k)] / \Sigma\ Pbs_i \text{ if k belong to kbs}$$

$$Xf_k = [\Sigma\ Pco_i * If_i(x_k)] / \Sigma\ Pco_i \text{ if k belong to kco}$$

To determine knowledge strategies ideal to-be state it is necessary to apply an algorithm to the framework of the strategic assessment of knowledge management represented in Figure 2. In particular will be assigned the value 1 for the green dots, the value 0 to the black cells and the value $(6 - xf_k)/xf_k$ for the red diamond, where xf_k represents the value previously calculated for the current situation for the k-th dimension. Denote by $f(xf_k, y_j)$ the relation between the k-th dimension and the j-th knowledge strategy.

So the ideal to-be state is calculated as:

$$\textit{Ideal to-be state}(y_j) = [\Sigma\ xf_k * f(xf_k, y_j)]/N,$$

where N represents the number of relationship $f(xf_k, y_j)$ different from zero.

The final output of the assessment methodology is a strategic tool, we called the *knowledge strategy coherence diagnostic matrix* which visually analyzes the as-is state, the ideal as-is state and the ideal to-be state of a company.
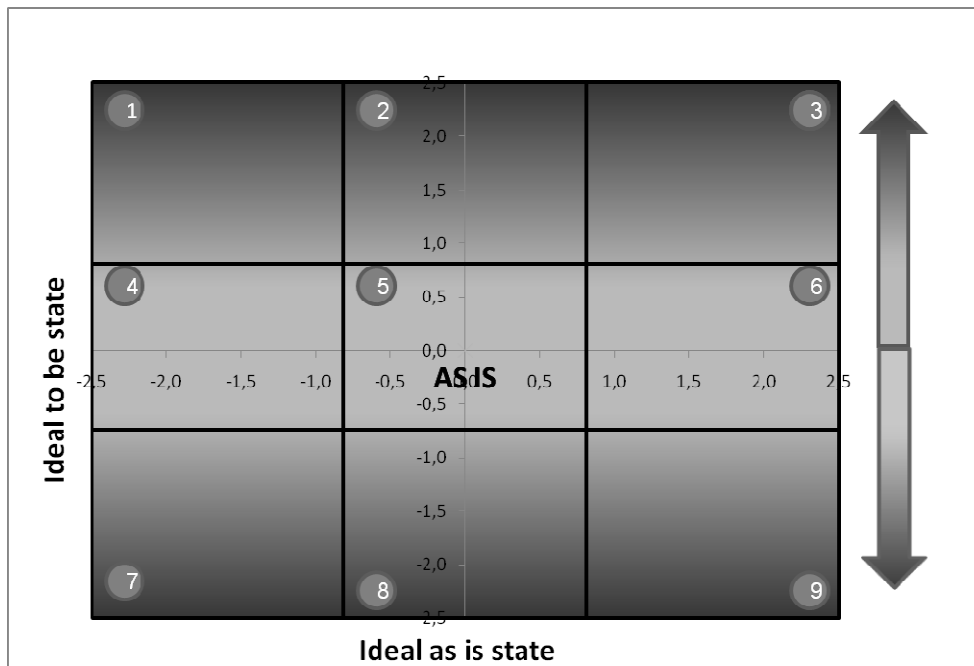

Figure 3 - Graphic representation of the knowledge strategy coherence diagnostic matrix

The origin of the axes of the matrix corresponds to the as-is state, i.e. the current state of one of the knowledge strategies. Positioning along the axes is in reference to the as-is state.

After having calculated the as-is state, ideal as-is state and ideal to-be state for any knowledge strategy (using the model set out above based on the answers of respondents in relation to current and future context and strategy), it's possible to place the company's knowledge strategies on the matrix, calculating the x-axis as the difference between the ideal as-is state and the as-is state and y-axis as the difference between the ideal to-be state and the as-is state. In this way the position of the point on the matrix showed us how a certain company's knowledge strategy has to be improved or decreased to be aligned with the context and strategy current (x -axis) and future (y-axis).

For example, if the policy of internal development is placed in the quadrant 3 it means that this strategy would require greater commitment of resources by the company to be aligned with both the present context and strategy (x-axis distance) and both future context and strategy (y-axis distance).

On the contrary the central quadrant (number 5) is an area of coherence: when a policy is positioned in this area, it means that the company is managing correctly the knowledge strategy for both the current and future situation.

This area of coherence has been set taking as distance from the center on the abscissa and the ordinate the value 0.8. This value was obtained by dividing the range of values within which each item may fall (5-1=4) for the number of choices available to respondents (5). This range of goodness, then, is inextricably linked to the nature of the Likert scale used for the interviews

4   Test of the methodology

After the theoretical construction of the model and the design of the methodology for assessing the coherence of a company's knowledge strategy, we tested it on the case of illycaffè, an historic Italian company operating in the coffee industry known for the quality of his products.

4.1 Research site

Illycaffè is an Italian company established in 1933 by Francesco Illy. It has always been operating in the espresso coffee market as a producer and retailer and now has more than 700 employees, 480 working in the headquarters in Trieste (Italy) and the others in the subsidiaries abroad.The company is internationally recognized for the high quality of coffee and it is considered a point of reference in the coffee industry positioning itself in the premium range.

The keystones on which the corporate strategy is based are The high quality of the product and of the service offered to the consumer have always been the company keystones in the strategic orientation, guiding the core values and critical choices over the years.

Illycaffè, moreover, is also synonymous of research and innovation. Over the years the company has registered numerous patents used also by competitors; moreover, the research conducted by the AromaLab and SensoryLab laboratories, together with the projects developed by the University of Coffee recently established, allows the companies to gradually increase the quality of their blend.

Obtaining an high quality of coffee blend is definitely the core capability of the company which, however, in recent years has expanded its range through the production of coffee machines, the opening of coffee bar in franchising (Espressamenteilly), the sales of branded objects (coffee cups, espresso, gadgets ..), the collaboration in the production of other beverages (such as the joint venture with Coca Cola aimed at the distribution of the "ready to drink" products). These initiatives, combined with the illy's supply chain coordination (Biotto *et al*, 2008), allow illycaffè to have a comprehensive 360-degree point of view on the world of coffee.

Thanks to these complementary initiatives, in the last ten years illycaffè has doubled both its turnover (280 million in 2008) and the number of employees (over 700 in 2008). The Headquarters of the company and the entire production of the coffee blend are located in Trieste, but the presence of the brand has spread throughout the world thanks to the ubiquity of the commercial offices and the network of coffee bar Espressamenteilly.

Illycaffè has been chosen for the test of our methodology because the whole business has always been very focused to the issue of knowledge. As a matter of fact, currently there are numerous initiatives for developing the knowledge management that make this company a point of reference in the international context. In particular, the following knowledge initiatives are:

- The University of coffee, which provides comprehensive training to professionals, connoisseurs and coffee producers and sellers;

- The project Espressamenteilly, which aimed at the dissemination of the culture of coffee worldwide;

- Knowledge management across the entire supply network: upstream through the establishment of several awards for quality (e.g. "Premio Brasil de Qualidade do Café Para Express") and downstream with customers and consumers (University of coffee and Espressamenteilly);

- The embedded knowledge products, such as pre-portioned systems, coffee machines and ready-to-drink products, which store in their characteristics decades of research and knowledge on the product.

4.1 Data gathering and elaboration

The data gathering has been conducted through structured interviews with 12 illycaffè managers representatives of all corporate functions. The questionnaire contained items found in the literature and based on a Likert scale with scores ranging from 1 (completely disagree with the statement) to 5 (completely agree with the statement). In particular we have focused our investigation on the four dimensions of our model:

1. competitive environment;
2. business strategy;
3. organizational context;
4. strategies for knowledge management.

In table 2 for each interview we report if the focus has been on the whole organization (global standpoint - G) or on the specific area of responsibility (functional unit standpoint - F). Competitive environment and business strategy, as can be seen, have been analyzed

from a global point of view, while other dimensions have been analyzed from both the point of views. The average length of an interview has been about 75 minutes. Moreover the first three dimensions of analysis (competitive environment, business strategy and organizational context) has been studied both for the as-is state and to-be state. The main reason driving this choice has been the intention to use this methodology for assessing knowledge' strategies for both the present context and the future one.

As shown in Table 1, interviews cover the main areas of the organization. This coverage allows us to think that the whole set of answer of the managers (about competitive environment and business strategy) describe truly the organizational situation.

Table 1 – Manager interviewed in illycaffè

	Manager interviewed											
	President	Global Marketing Dir.	EMEA Division Dir.	Human Resources Dir.	Innovation and Development Dir.	Green coffee manager	General Sourcing manager	IT Manager	Logistics and Production Dir.	External relationship manager	Coffee University Dir.	Espressamente Illy Dir.
Macro dimension of the model	*I1*	*I2*	*I3*	*I4*	*I5*	*I6*	*I7*	*I8*	*I9*	*I10*	*I11*	*I12*
Competitive environment (as-is & to-be state)	G	G	G	G	G	G	G	G	G	G	G	G
Business strategy (as-is & to-be state)	G	G	G	G	G	G	G	G	G	G	G	G
Organizational context (as-is & to-be state)	G	G	F	F	F	F	F	F	F	F	F	F
Knowledge strategies (as-is state)	G	G	F	F	F	F	F	F	F	F	F	F

G: interview with a global firm standpoint

F: interview with a specific function standpoint

In Table 2 we report the weight associated to managers' answers defined on the basis of their role in establishing the business strategy and the organizational context and their knowledge about the competitive environment.

Table 2 - Distribution of the weights of managers' answers

		Manager interviewed											
		President	Global Marketing Dir.	EMEA Division Dir.	Human Resources Dir.	Innovation and Development Dir.	Green coffee manager	General Sourcing manager	IT Manager	Logistics and Production Dir.	External relationship manager	Coffee University Dir.	Espressamente Illy Dir.
		I1	*I2*	*I3*	*I4*	*I5*	*I6*	*I7*	*I8*	*I9*	*I10*	*I11*	*I12*
Competitive environment (as-is e to-be state)	P_{cc}	1	1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1
Business Strategy (as-is e to-be state)	P_{bs}	1	1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1
Organizational context (as-is & to-be state)	P_{co}	1	1	1	1	1	1	1	1	1	1	1	1
Knowledge strategies (as-is state)	P_{ks}	1	1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1

Through the methodology for assessing the coherence of assessing companies knowledge strategies we have obtained the results presented in Table 4.

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Table 3 - Results of the data processing and determination of the position of the knowledge strategy on the diagnostic matrix: as-is state (from interview), ideal as-is state e ideal to-be state (from methodology elaboration)

Knowledge Strategy		ID	As-is state	Result from coherence assessment model		Position in the diagnostic matrix	
				Ideal as-is state	Ideal to-be state	x	y
Development	Internal	ID	4,05111	3,56828	3,78789	-0,48283	-0,26323
	External	ED	2,77111	2,90160	2,86361	0,13049	0,09249
Sharing	Codification	CS	2,47333	3,33958	3,10464	0,86625	0,63131
	Personalization	PS	3,55333	3,25291	3,83927	-0,30042	0,28594
Exploitation	Internal	IE	3,56944	3,61111	4,09491	0,04167	0,52546
	External	EE	1,96444	2,79526	2,80176	0,83081	0,83731

As-is state represents the present knowledge strategy situation in illycaffè as perceived by the managers (Table 4). In our study we used a 5 points Likert scale, so average points for each knowledge strategy can vary among a minimum of 1 (the lowest level of importance for a specific knowledge strategy) to a maximum of 5 (the highest level of importance for a specific knowledge strategy). Starting from the first column of data in table 2 we can do some considerations:

- at the moment illycaffè managers give more importance to the internal development of knowledge rather than the external one. Thus new knowledge creation is a process owned mainly inside the firm, using resources that are already part of the organization;

- concerning knowledge sharing strategy, the personalization strategy rules over the codification: this means that informal relationships cover an important role for the organization information flows and it is a current practice to contact directly the knowledge owner rather than try to find the same information in stored documents. This situation allows the sharing of tacit knowledge rather than explicit one.

- knowledge exploitation, coherently with the firm nature, is, at the present, mainly intern. This means that illycaffè exploits its sources of knowledge and its own knowledge mainly through applications in products/services to sell to customers, or through direct applications in process that assure money savings.

4.3 Analysis of the results

The as-is state is the reference for the points placement on the diagnostic matrix previously described. As stated before the as-is state, therefore, served as a reference for

the positioning of points on the diagnostic matrix described above. In particular, after the identification of ideal as-is state and ideal to-be state values from the strategic assessment framework, it has been possible to calculate the coordinates of the points to be placed within the matrix as the difference between the ideal as-is state and as-is state (x) and between the ideal to-be state and as-is state (y).

The results are shown in Figure 4 (the nomenclature refers to the ID reported in Table 4).
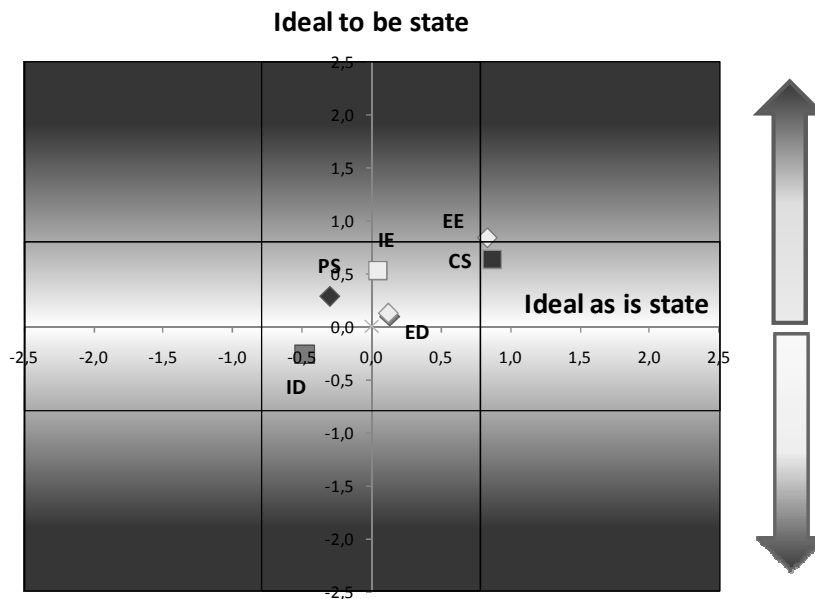
Ideal to be state

Figure 4 - Representation of illy's knowledge strategy in the diagnostic matrix

The positioning of the points within the center box, as mentioned above, indicates a range of coherence where we can find the knowledge management strategy that result are aligned with both the current context and business strategy and with future context and business strategy as foreseen by the respondents.

The matrix shows that the knowledge sharing and exploitation strategies fall outside the zone of coherence: consequently these are areas of improvement. Furthermore the position of points in the matrix also shows the direction of improvement: in this case, both points are located at the top of the matrix, so the direction to pursue is to invest in the improvement of knowledge codification and exploitation allocating more resources.

As concerns the knowledge codification policy, the result is obtained owing to some mismatch between the current codification level and the expected level calculated from our model on the basis of the variables of the competitive, strategic and organizational environment. In particular the matrix suggests to give greater importance to this policy in order to align it to the current context in which it operates illy: an high centrality of organizational function, an high level of product standardization (in fact the core product is always the same mixture but in different packages) and a lack of aggressiveness in the competitive strategy (currently illycaffè could be considered an analyzer in the model of Miles and Snow).

The second knowledge management policy that is positioned outside the range of coherence is the exploitation of external knowledge. Currently illy, as indicated above, apply the knowledge developed and codified almost entirely in products / services to sell to the customer, or in the internal processes that enable cost savings. This strategy is entirely consistent with the nature of manufacturing company. However, the high degree of innovativeness of the company, the high propensity on external relations together with a very broad patent portfolio (many of which are not directly used within the company) and the growing business resulting from the expansion of Espressamenteilly (which actually gives advice to others to improve the management of the bars through the exploitation of the mark in franchise) indicate the possibility, also highlighted by our strategic assessment framework, to give more importance to this practical knowledge strategy.

5   Conclusions, limitations and future directions of research

The first part of the research, the theoretical one, allowed us to develop a model based on a correlation matrix and a methodology for coherence assessment of companies' knowledge strategy and policies with the dimension which characterize the competitive environment and the organizational context and, above all, the business strategy.

This assessment model arises from the need to adapt the implementation of a strategy for knowledge management to the particular context and strategy that characterize a company. So, we have identified in literature three main knowledge strategies, referring mainly to the seminal contributions of Zack (1999), Hansen (1999) and Beckett *et al.* (2000): the development of knowledge (internal or external), the sharing of knowledge (codification or personalization strategy) and the exploitation of knowledge (internal or external). These dimensions, therefore, have been correlated to several variables, build up from literature on the competitive environment, on the business strategy and on the organizational context and resumed in a matrix which can be used in a three step methodology to:

- assess the alignment of existing knowledge strategy (as-is state) with the characteristics of the company;

- identify, on the basis of the current competitive environment, organizational context and business strategy, the ideal knowledge strategy as a balance of the three fundamental strategies (ideal as-is state);

- identify, on the basis of the future competitive environment, organizational context and business strategy, the ideal knowledge strategy as a balance of the three fundamental strategies (ideal to-be state).

The second part of the research, on the other side, of an experimental nature, has validated the methodology and its visual tool, the knowledge strategy coherence diagnostic matrix, through the application in the illycaffè case study. The results of the practical application of the methodology highlight how this company operates from the knowledge management point of view but taking into account the context and the business strategy that characterize it.

The analysis, however, inevitably brings with it certain limitations::

- the knowledge exploitation strategy considers only the direct economic return of knowledge, without considering indirect economic returns. The evidences coming from the analysis of the business case illycaffè show as factors like customer training, transfer of knowledge across the supply chain and management of corporate image among the public, just to name a few examples, were not considered in this or other policies. It might therefore be appropriate to reconsider this policy of knowledge management, dividing it into direct and indirect exploitation, or dimensions of efficiency and effectiveness;

- The relationship between the variables of the competitive environment, business strategy and organizational context and strategy knowledge, taken from the literature, can be further developed and validated, for example, with a survey extended to various companies.

At the conclusion of the work, it can be argued that this study may serve as a starting point for future research and analysis related to the theme. In particular future direction of research could be:

- validation of some correlations among dimensions that, in the present literature, have not yet been proved through rigorous studies;

- identification of new dimensions and new correlations among these dimensions;

- validation of the model by a survey of a large set of companies of different nature.

APPENDIX 1 – References of the correlation matrix for coherence assessment of companies' knowledge strategy

| | Knowledge Strategy | | | | | |
| | Exploration | | Sharing | | Exploitation | |
	Internal	External	Codification	Personalization	Internal	External
Market Dynamism	Nonaka et al. (1996); Thornill (2006); Droge et al. (2003)	Chen e Lin (2004)			Droge et al. (2003)	
Competitive pressure	Bierly e Daly (2002)	Bierly e Daly (2002)				
Competitive strategy aggressiveness			Hult (2006)	Hult (2006)	Hult (2006)	
Product standardization			Hansen et al. (1999)	Hansen et al. (1999)	Droge et al. (2003)	
External relationship		Zahra e George (2002)	Zahra e George (2002)			Dyer e Nobeoka (2000); Chesbrough (2003)
Centralization			Wang (2001)			
Rate of new products introduction	Smith et. Al. (2005); Greiner et al. (2007)		Greiner et al. (2007), Hansen et al. (1999)	Greiner et al. (2007), Hansen et al. (1999)	Brachos et al. (2007); Smith et al. (2005)	
Competitive strategy	Bierly e Daly (2002)		Greiner et al. (2007)	Greiner et al. (2007)		
Climate	Zarraga e Bonache (2005); Smith et al. (2005), Alavi et al. (2001)		Watson, Hewett (2006)	Watson, Hewett (2006)	Brachos et al. (2007)	
Level of education/experience	Thornill (2006), Smith et al. (2005)		Watson, Hewett (2006)			
Team working inclination	Smith et al. (2005); Zarraga, Bonache (2005)					
Function centrality in the budgeting process			Wang (2001)			
Formalization level			Wang (2001)			
Personal autonomy	Nonaka et al. (1996); Chen e Lin (2004)					
Comunication intensity in the internal network	Zarraga e Bonache, 2005; Zahra e George, 2002; Alavi, Leidner, 2001; Smith et al., 2005				Zahra e George (2002), Hansen et al. (1999)	
Problem complexity	Bou-Llusar e Segarra-Cipres (2006)		Greinert et al. (2007)	Greinert et al. (2007)		
Firm specific knowledge	Chen e Lin (2004)	Chen, Lin (2004)		Merono-Cerdan et al. (2007)		
Knowledge diversity and breadth	Chen e Lin (2004); Goll et al. (2007), Bou-Llusar, Segarra-Cipres (2006), Argote et. al. (2003) Smith et al. (2005)					
Incentive policy			Alavi, Leidner (2001)			
Firm dimension	Gopalakrishnan e Bierly (2006)					
Firm age	Gopalakrishnan, Bierly (2006); Thornill (2006); Chen, Lin (2004)	Zahra, George (2002)				

APPENDIX 2 – Dimensions of analysis and questionnaire

		DIMENSION	MEASURES		QUESTIONS	AUTHOR
Competitive context	**1**	Market dynamism	Manufacturing processes innovation rate	**a**	In the industry of the company the rate of innovation in manufacturing processes is high	Droge *et al.* (2003)
			Logistic processes innovation rate	**b**	In the industry of the company the rate of innovation in logistic processes is high	
			Product obsolescence	**c**	The company products are characterized by a high rate of obsolescence (short life cycle)	
			Demand unpredictability	**d**	The industry of the company is characterized by a high demand unpredictability	
			trend market trend	**e**	In the industry of the company is very difficult to monitor the main market trends	
	2	Competitive pressure	Bargaining power of suppliers/clients	**a**	It is easy for our customers to switch to another company for services or products without much difficulty	Wang (2001)
			Competition	**b**	The rivalry among companies in the industry my company is operating in is very intense	
			Equivalent products	**c**	There are many products/services in the market which are different from ours but perform the same functions	
Business strategy	**3**	Aggressiveness of competitive strategy	Aggressiveness of competitive strategy	**a**	The company is usually one of the firsts to reach innovative solution in its core business, instead of following competitors' actions.	Hult (2006), Miles and Snow (1978)
	4	Product standardization	Product standardization	**a**	Indicate on a scale from 1 to 5 if the company offers a high personalized product on the basis of customer's requests (1) or a high standardized one (5).	Hansen *et al.* (1999)
			Production technology	**c**	Which of the follow production technology better describe the manufacturing process of the firm: custom production; small batch (or job shop) production; large batch production; mass assembly production; and continuous process production.	Droge *et al.* (2003)
	5	Propensity to external relationship	Acquisition	**a**	The company is usually involved with acquisition processes	Zahra and George (2002)
			Strategic agreements	**b**	The company is usually involved with licensing activities and/or contractual agreements	
			Inter-organizational relationship	**c**	The company usually retains strong relationships with other organizations, such as R&D consortia, alliances and joint ventures	

	18	Rate of new products introduction in the market	Rate of new products introduction in the market	a	In the last year, the company has introduced into the market a high number of new product if compared with its competitors	Smith *et al.* (2005)
	19	Strategic orientation	differentiation vs. cost leadership	a	Indicate if the main target of the competitive strategy is to focus on the innovation of products and processes (differentiation) (1) or on the efficiency and cost reduction (5)	Porter (1980), Greiner *et al.* (2007)
			people vs. technology	b	Indicate if the competitive strategy is mainly focus on people valorisation (1) or technology (5)	
	11	Centrality of top management	New product introduction responsibility	b	The responsibility to make the decision concerning new product introduction is centralized at the top-most levels of management*(La*	Wang (2001)
			New markets responsibility	c	The responsibility to make the decision about entry into major new markets is centralized at the top-most levels of management	
			Price Responsibility	d	The responsibility to make the decision about pricing of new product lines is centralized at the top-most levels of management	
	6	Firm dimensions	Revenues	a	Revenues	Real *et al.* (2006)
			Number of employees	b	Personal	
	7	Firm age	Years of activity	a	Years of experience in the industry or sector	Thornill (2006), Zahra and George (2002), Gopalakishnan (2006), Real *et al* (2006)
Organizational context (company/function)	8	Internal climate	Risk inclination	a	In the company there is a strong risk inclination	Smith *et al.* (2005)
			Ethical code	b	In the company you can find a strong set of moral values that make easier the involvement of employees and knowledge sharing	Lucas and Olgivie (2006)
			Trust between employees	c	In the company the trust climate between the employees is very strong	

		Trust among personal and company	d	The trust climate among personal and company is very strong	
9	Level of training/experience	Education	a	Average level of education of the personal involved in a specific function	Lucas and Olgivie (2006)
		Experience in the industry	b	Average years of experience in the industry for the specific function persoanl	Smith *et al.* (2005)
10	Team working inclination	Critical situations	a	Critical situations are usually managed by groups	Smith *et al.* (2005)
		Inter-functional relationships	b	When the company adopts new processes/methodologies the interested personal is in touch with employees working in other functions	Lucas and Olgivie (2006)
11	Centrality of functional units in the budgeting process	Budgeting responsibility	a	The responsibility to make the decision concerning capital budgeting is centralized at the top-most levels of management	Wang (2001)
12	Codification level	Procedures	a	For every critical situation exists a pre-determined procedure to solve it	Wang (2001)
		Procedures codification	b	If these procedures and rules exist, they are usually codified	
		Rules violation	c	Employees activities are constantly checked to not violate rules	
		Amends	d	Amends exist to punish violation of rules	
13	Personal autonomy		a	Personal autonomy in this function is high	
14	Communication intensity in the internal network	Contacts with hierarchical levels	a	I have a high frequency of contacts with different hierarchical positions	Smith *et al.* (2005)
		Contacts with other functions	b	I have a high number of direct contacts with employees in other functions	
		Strength of ties	c	On average, the strength of ties is high	
15	Problem complexity	Technological complexity	a	Problems in the company/function are usually characterized by a high technological complexity (the problem deals with advanced technological solution which are difficult to understand/implement)	Bou-Llusar *et al.* (2006)
		Social Complexity	b	Problems in the company/function are usually characterized by a high social complexity (there are often contrasts between personal of different functions)	

		Problems typology	c	Indicate if problems are usually similar and repetitive (1) or new (5)	Greiner *et al.* (2007)
16	Firm specific knowledge	Firm specific knowledge	a	Company/functional knowledge is firm specific and represents a strong competitive advantage	Merono-Cerdan (2007)
17	Diversity and breadth of knowledge	Breadth of experience	a	The function top managers own different kinds of knowledge, due to the fact they had different education, professional experiences and personal interests	
		Team diversity	b	Team members usually come from different functions providing different knowledge and point of views	Goll *et al.* (2007)
21	Incentive policy	Codification	a	The incentives policy promotes knowledge codification	Lucas and Olgivie (2006)
		Reuse	b	The incentives policy promotes knowledge reusing	
		Informal sharing	c	The incentives policy doesn't promote the informal sharing of knowledge	
				In the company/function in which I work:	
A (Exploration)	I	External	Customer	1	A large portion of new knowledge in my company has been developed on the basis of customers' knowledge.	Choi, Poon and Davis (2008)
			Supplier	2	A large portion of new knowledge in my company has been developed on the basis of suppliers' knowledge.	
			Competitors	3	A large portion of new knowledge in my company has been developed through analysis ofcompetitors' knowledge (e.g., products or services).	
			Consulting	4	My company prefers external consulting companies' knowledge to internal departments' one in developing new knowledge.	
			External collaborations	5	A large portion of new knowledge in my company has been developed through collaboration and alliance with external institutions or organizations.	
			benchmarking	6	My company periodically checks competitors' strategy and products (services) to get new knowledge.	
	II	Internal	Importance	1	Internal knowledge is important resource to create new knowledge in my company.	Choi, Poon and Davis (2008)
			Frequency	2	Internal knowledge is frequently used for developing knowledge in my company.	

			Trust	3	Internal knowledge is trustable resource for developing new knowledge in my company.	
			Principal resource	4	Internal knowledge is core resource to create new knowledge in my company.	
			Internal knowledge quality compered to competitors	5	The quantity and quality of knowledge created internally are superior to those of competitors for developing new knowledge.	
			Internal vs External knowledge	6	My company prefers internal knowledge to external one in developing new knowledge.	
B (Knowledge sharing)	I	Codification	Codification Level	1	Knowledge (idea, know-how, technical skill, problem solving methods, or etc.) is well codifiedin my company.	Choi, Poon and Davis (2008)
			Manuals	2	Knowledge can be acquired easily through formal documents and manuals in my company.	
			Meeting results	3	Results of projects and meetings should be documented in my company.	
			Sharing through documents	4	Knowledge is shared in codified forms like manuals or documents in my company.	
			Incentives to codification	5	Formal incentive scheme help to enrich the databases	
	II	Personalization	Experts	1	Knowledge is easily acquired from experts and co-workers in my company.	Choi, Poon and Davis (2008)
			Face to face advice	2	It is easy to get face-to-face advice from experts in my company.	
			Informal dialogues	3	Informal dialogues and meetings are important methods for knowledge sharing in my company.	
			one to one/mentoring	4	One-to-one mentoring is frequently used for knowledge acquisition in my company.	
			Incentives to personalization	5	Formal incentive scheme helps to share knowledge through informal dialogues	
C (Exploitation)	I	External	patents	1	A lot of resources are used for developing patents (or sell them) for other companies	Beckett *et al.* (2000)
			Consulting activities	2	A lot of resources are used for doing consulting activities at other companies	

			Knowledge sharing towards other companies	3	A lot of resources are used for sharing knowledge with other compagnie, ad exemple through joint ventures.	
			Brand licensing	4	A lot of resources are used for granting the brand licensing at other companies	
			Technology licensing	5	A lot of resources are used for granting the technology licensing at other companies	
	II	Internal	New products	1	A lot of resources are used for developing new product to sell to customers	Beckett *et al.* (2000)
			New processes	2	A lot of resources are used for developing new processes (inside or outside the function) that allow economic save	
			Internal consulting	3	A lot of resources are used for consulting activities inside the company	
			Specialists team	4	A lot of resources are used for exploiting knowledge towards specialists team	

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