Overcoming Knowledge Sharing Barriers through Communities of Practice

Overcoming Knowledge Sharing Barriers through Communities of Practice: Empirical Evidence from a Big Automotive Supplier

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PREFACE

Managing complexity and continuous innovations are widely recognized as a major source of sustained competitive advantage. The changed rules of competition require higher investments in knowledge management due to the rapid transformation of customer requirements, to shorter product life cycles, and to the growing costs of technologies succeeding those needs.

The growing importance of knowledge sharing has fostered the development of a growing body of research in different areas. Researchers have started to identify the presence of barriers to knowledge sharing both at inter- and intra-firm level.

This research extends the literature on knowledge sharing by grouping these constructs into four main macro-dimensions: socio-psychological, technological, knowledge-related factors and organizational ones. The aim of the research is to investigate the strongest barrier to knowledge sharing.

The research has adopted both a qualitative and a quantitative methodology to test the predictive power of knowledge sharing barriers. A pre-selection of these factors was done through informal interviews with managers and other employees of a big automotive supplier of R&D. Regression analysis was used to identify the strongest barriers to knowledge sharing among the four dimensions. Thereafter, we have analyzed a firms' proprietary process that clearly show how knowledge sharing barrier impact on the virtual building of a vehicle prototype.

Increasingly, another key asset for achieving competitive advantage is the way firms understand and manage intra-firm informal knowledge flows. However, despite the knowledge-intensive nature of R&D activities, social network analysis within R&D function remains relatively rare. To date, few researches have applied the social network analysis to map the intra-firm knowledge sharing network, and to identify and solve organizational problems.

Accordingly, there is a growing interest on social network analysis (SNA) as a tool for mapping knowledge and capabilities and the nature of relationships within informal networks (Allen et al., 2007) or Communities of Practice (Cross et al., 2006). This study extends the literature on the argument by performing a SNA to map the informal knowledge sharing networks within a big supplier of R&D.

Implications for the management are clear, first of all through social network analysis the management may get a better understanding of the informal work in the organization, showing how R&D workers structure their knowledge sharing networks. The recognition of the hidden network of collaboration have several implications. One of these, is the creation of an informal *ad hoc* communities of practices for solving knowledge sharing problems.

This book is composed of four parts.

In the first part, we have analysed the literature of knowledge management and knowledge sharing.

The second part contains the methodology, the conceptual model, and the constructs of this study.

The third part is focused on the analysis of data through quantitative research methods.

The fourth part deals with communities of practice and the social network analysis of informal knowledge sharing flows between two business units in a R&D automotive supplier.

PART I

THEORETICAL BASIS

Research outline

Scholars have investigated the 'frictions' that slow or prevent knowledge transfer and are likely to erode some of the advantages related to knowledge transfer within and across organizations.

The present study follows this line of research and it posits that often the rare tacit knowledge needed to develop more rapidly new products is present within business' boundaries; however, due to the operating of some barriers, such knowledge is difficult to retrieve and to implement. Companies assume that the costs of searching for knowledge sharing barriers outweigh potential benefits. However, in this research we infer that difficulties in sharing knowledge can have high costs in terms of time needed to develop new products. Differently from previous approaches (Szulanski, 1996; Goodman and Darr, 1998; Menon and Pfeffer, 2003), we argue that it is not only important to understand the reasons why individuals may not be motivated to receive and use knowledge, or may not be capable of doing so, rather we are interested in understanding what are the strongest barriers in the knowledge sharing process.

Therefore, knowledge sharing has become an interesting topic of research at both intra and inter-firm level. In this study the focus is on the intra-firm level. In particular, the author has investigated the strongest knowledge transfer predictors between three business units in a big first tier supplier of R&D in the automotive sector.

The research is based on a broad and multidisciplinary review of intra-firm knowledge transfer barriers (Filieri and Alguezaui, 2009). Such barriers were grouped under four main macro-dimensions: socio-psychological, technological, knowledge-related and organizational dimensions.

The knowledge transfer barriers identified have been pre-tested through 12 interviews with managers and other employees working in the supplier. Previous studies on knowledge transfer in the automotive industry have used exclusively qualitative methods (Dyer and Nobeoka,

2000; Wenger et al., 2002; Kotabe et al., 2003). Indeed, the present research adopts a quantitative approach to measuring the strongest barriers to knowledge sharing.

Viable solutions to overcome knowledge sharing problems are both discussed and implemented from a practical point of view. In fact, the final output of the study is the identification of an *ad hoc* strategy to solve the knowledge sharing problems encountered in the analysis.

Moreover, the research extends the literatures on knowledge transfer barriers by investigating the relationship between knowledge sharing efficacy and new product development performance in the automotive industry.

Findings show that intra-firm knowledge sharing barriers may hinder the possibility to reuse and apply knowledge developed in previous projects, impacting negatively on new product development activities.

1. The Resource Based Theory

The resource-based theory (RBT) represents the general theoretical framework of this work. The RBT ratifies a theoretical break from the neo-classical tradition: from the firm as a mere profit function to the firm as an organization with the control of potentially valuable resources. This is consistent with Penrose's view of the firm as *both an administrative organization and a pool of productive resources* (Penrose, 1959:2).

The RBT since the late 1959s have focused his attention on internal sources of competitive advantage and inter-firm variations in performance. The focus for searching the sources of advantage is internal, but it's aimed at creating an advantage on external competitors.

Penrose's seminal work (1959) on the growth of the firms anticipated the view of the firm as a clear-cut entity made up of different "bundles" or portfolios of resources, an entity difficult to define, except to what it does or what is done with it.

Penrose (1959) and the precursors of the Resource Based View 8and later Theory) of the firm (Wernerfelt, 1984; Rumelt, 1984; Barney, 1986, 1991) anticipated the interest for start-ups pursuing entrepreneurial strategies on the accumulation of intangible resources for survival or growth.

The novelty carried out by the RBT was the distinction between tangible (such as physical, human capital etc.) and intangible assets (such as organizational routines, brand positioning etc.). Thus, Penrose was the first who stated that labor, capital and land, constituted the tangible nature

of many valuable resources tied to the firms, and that these resources could be owned by the firm or external to it.

Then, he also highlighted the role and the importance of intangible resources, such as the capabilities of the entrepreneur. Accordingly, he stated that opportunities are numerous, but the entrepreneur can see or take advantage of some of them; so the entrepreneurship is what limits the profitability and the size of the firm. Entrepreneurship is a kind of intangible asset and it is associated with temperament or personal qualities of individuals; so it results to be difficult to measure the performance of the firm just considering measurable indicators and ignoring the non-measurable ones, like the entrepreneurship.

Then, he concluded that the creation of value was due to the capacity of the entrepreneur in the effective and innovative management of productive opportunities. Therefore, he hypothesized a cause- effect relation between resources management and the creation of growth and innovation, with a renewed centrality of the human resource (entrepreneurship).

Also in Wernerfelt (1984) and in Barney (1986; 1991) the management of the firm has a central role. Antecedents in economics see management roles merely as a function for processes' optimization within a firm. Barney sees managers as 'strategizers' and he accords them a central role in identifying, exploiting and developing profitable opportunities. This is consistent with Penrose, who assumed that management's capabilities permit to exploit unused productive resources.

Penrose opens a new orientation in considering the efficiency of a firm, in which tangible and measurable assets were as valuable as intangible and not measurable assets. He was the first who highlighted the importance of social and psychological factors to determine the success of a firm (conceptualized as the size of the firm). Then, RBT's scholars anticipated the necessity to start to consider non-measurable aspects.

Wernerfelt (1984) in his analysis provided an analytical tool for the evaluation of the resources that could lead to higher returns over long periods of time. He has also seen the imitation as a potential threat for all firms' resources; in fact, he focused more on analysis, acquisition and protection's dynamics. The author states that resource position's barriers are the barriers that firms are able to build in order to protect their resource from other incumbent's acquisition influencing their revenues or costs. And he adopted the growth-share matrix, for evaluating the importance of a resource in a product and *viceversa*. Wernerfelt does not give a prescription of how to get a competitive advantage and how resources have to be for getting such a goal. However, he puts resources and

products on the same level and tries to adopt the product-tools and threats also for resource as he believes that resources are very important in order to assure an advantage over other competitors. Wernerfelt (1984) wanted to show how this change of perspective can give a different, and perhaps richer, perspective on products growth prospects in a long period of time. According to Wernerfelt, the firm is a collection of productive resources that are defined as anything that is a strength or a weakness of the firm. He considers in his analysis both tangible (such as physical, human capital etc.) and intangible assets (such as organizational routines, brand positioning etc.), the latter are tied semi-permanently to the firm (Caves, 1980). Wernerfelt attempted to quantify the strategic weight of resources' importance for firm's activities in different products-markets. Here resources are the prerequisite for higher returns and expansion but through a sequential entry strategy: *looking at diversified firms as portfolios of resources rather than portfolios of products gives a different and perhaps richer perspective on their growth prospects* (Wernefelt, 1984:178).

Penrose (1959) state that idiosyncratic resources provide services, and those services depend on the capacities of the employees to use them. But these capacities are partly shaped by the resources with which employees deal with. Thus, resources and capabilities are interdependent and their combination enable the exploitation of the productive opportunities of the firm, providing a competitive advantage. Therefore, getting a competitive advantage in a specific time is not enough, as firms need to sustain their competitive advantage (SCA) in the long period. A SCA is acquired when:

a) It takes into consideration also of potential competitors (Barney, McWilliams and Turk, 1989);
b) it considers competitive advantage that lasts a long period of calendar time (Jacobson, 1988; Porter, 1985);
c) It exists after the efforts to duplicate it have ceased (Lippman and Rumelt 1982; Rumelt, 1984).

Therefore, according to these theorists resources need to possess 5 attributes in order to become the sources of sustained competitive advantage (the VRIS model, see in the picture below) (Barney, 1991; Teece, 2000). Resources have to be:

- Valuable;

'Resources are valuable when they enable a firm to conceive or implement strategies that improve its efficiency and effectiveness' (Barney, 1991). In particular those attributes neutralizing threats and/or exploiting opportunities can be considered resources.

- Rare;

Resources are possessed by a single or a few firms in an industry.

- Imperfect Imitable;

Firms' resources can be imperfectly imitable for one or a combination of three reasons:

(a) The ability of a firm to obtain a resource depends on unique historical condition. This involves that firms are conceived as historical and social entities such that the resource accumulation is considered a path-dependent process. Thus, the particular set of resources of a firm are, in part, specific to that firm given its particular trajectory in space and time (Barney, 1991). These authors don't use the term path dependence but in Penrose as in Wernerfelt and Barney we see this concept, a firm's history shapes its future opportunities and diversity of firm resources will lead to diversity of strategies and hence increasing diversity of resources;

(b) The link between the resources possessed by a firm and a firm's sustained competitive advantage is causally ambiguous; when the link between the resources controlled by a firm and a firm's sustained competitive advantage is not understood or only very imperfectly understood.

(c) The resource generating a firm's advantage is socially complex (Dierickx & Cool, 1989), such as the interpersonal relations among managers in a firm (Hambrick, 1987), a firm's culture (Barney 1986b), a firm's reputation among suppliers (Porter, 1980) and customers (Klein, et al., 1978; Klein & Leffler, 1981).

- Non Substitutable;

It should not have strategically equivalent substitutes that are valuable but neither rare nor imperfectly imitable. Resources are strategically equivalent when they each can be exploited separately to implement the same strategies.

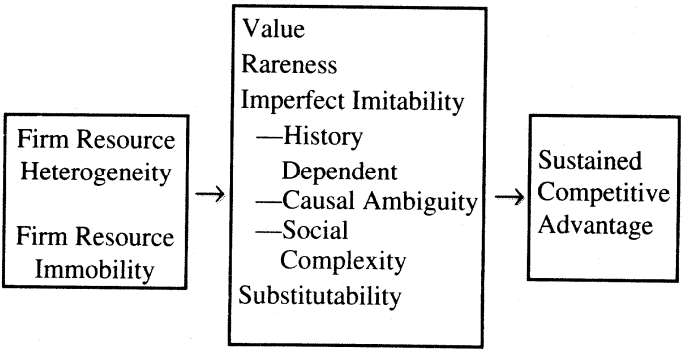

Figure 1. The relationship between resources heterogeneity and immobility, value, rareness, imperfect imitability, and substitutability, and sustained competitive advantage. Source: Barney, 1986

Barney focused his attention on what type of resources can create a sustained competitive advantage and on what kind of imperfections can create above normal returns. He has always wanted to provide strategic insights to firms for sustaining advantage on competitors through the knowledge of the typology of resources firms need and on how to predict their value for long run competition.

Barney looked at the firm the same way, firm is a bundle of resources, which includes all assets that may enable firm to conceive and implement strategies that improve its efficiency and effectiveness (Wernerfelt, 1984). In addiction Barney specify the typology of assets: physical capital resources (Williamson, 1975); human capital resources (Becker, 1964); organizational capital (Tomer, 1987).

According to the author, resources' immobility and heterogeneity (valuable, rare, imperfectly imitable and non substitutable), and right expectations (through information) are a potential source of sustained competitive advantage (ibid.). According to him, resource heterogeneity is the most basic condition of RBT. It is assumed that some resource bundles and capabilities are heterogeneous across firms. Barney suggested that heterogeneity is a necessary but not sufficient condition for a sustainable advantage. In fact, if we consider top management, it may not be copied exactly, although strategies implemented often might be equivalent. If a large number of competing firms have a similar vision, even if one firm has rare and imperfectly imitable resources as top management, however it will not acquire a sustained competitive advantage. In Barney (1986), firms are heterogeneous different and have different information and

expectations about the future value strategies. He extended the product-market view and included factor markets, suggesting that firms wishing to obtain expected above normal returns from implementing factor market strategies must be consistently better informed about the future value of those strategies than other firms in the same market (ibid.).

Wernerfelt considered resources heterogeneity an important element that gives a competitive advantage to firms through differentiation, expansion and growth.

Indeed, firms with such resources will be strategic innovators, for they will be able to conceive and engage in strategies that other firms could either not conceive, or not implement, or both, because these other firms lacked the relevant resources (Barney, 1991).

1.2 The knowledge-based view of the firm

The current environment is more turbulent, disturbed and instable than in the past, changes are dramatic and unpredictable. Forecasting and mathematical models of prediction are showing their limitations, the future is no more perfectly predictable, that involves a situation of instability.

Today firms have to deal with several transformations: the intensification and globalisation of competition, the acceleration of technology advancements, increased investments in technologies, the emergence of connected, informed, empowered, and active consumers; the convergence of industries, technologies, shorter product life cycles and so on.

Thus, the increased complexity of the society has created some problems to many firms. At all levels, businesses have experienced the emergence of numerous market niches, customers are less willing (than in the past) to do what their group of peers do. A new individualism is emerging in the consumer behavior, every single customer wants to distinguish from all the others and show his personality through every kind of good, such as suits, cars, mobile phones.

Therefore, the emergence of new niche markets has created the necessity to adapt accordingly production processes and products to the new needs time by time. For example, customers today require environmentally-friendly products and are willing to pay more for having them.

Today products have to be:

- Technologically feasible and advanced;
- Respect environment and public health;
- Take into consideration national, European and International products of competitors;

- Customized for different customers;
- Supported by trusted, ethical, valued brand.

Firms are not ready to compete in such environment, managers cannot preview exactly what product or capability will guarantee the sustainability of the business. Briefly they lack of a flexible and clairvoyant strategy, enabling the anticipation and the adaptation to the fluidity of changes.

Perhaps, most firms are still focused on the accumulation of tangible resources such as land, buildings, or they dedicate too much time to administrative and routinely occupations and to reduce costs.

The delocalization of industrial settlements for gaining cost-advantages has increased the competition and the number of enterprises producing the same goods for everybody at cheaper prices.

China, India and other emerging economies in Easter countries have strongly pushed the industrial revolution in their countries by creating and exporting finished products not only for their buyers (Western companies), but increasingly for the end users.

Increasingly, brands are experiencing loss of competition, market share decrease and lower profits. This transformation has moved the attention of entrepreneurs to focus on product innovation and quality to face new competitors.

A new ways to compete is also needed. Moreover, the fact of benefiting of cost-production advantages in emerging countries (where the costs of workers is definitely lower than within Western-industrialized countries), is not more a sufficient condition to compete successfully in the global market. As matter of fact, in European countries is emerging the necessity of focusing on the intellectual capital and the acceleration of innovation for fostering successful competition. Therefore, since knowledge is path-dependent and it is the raw material for every innovation, today it represents the most valuable resource for many firms.

Accordingly, in all industrialized countries, knowledge workers are replacing industrial workers, and businesses should not be seen from an industrial, but from a knowledge perspective (Sveiby, 1997). Thus: *The transformation of work and workers into knowledge work and knowledge workers is at the core of a larger shift at the organizational and the societal level* (Maier, 2007:3). This phenomenon was first noticed in the American society, where multinationals like Nike, Coca Cola, Levi's started to outsource the mere production, maintaining in-house only the management of the brand and the other marketing activities, like sponsoring, life cycle management, identity building (Klein, 2000).

This is happening also for many high-tech companies that are outsourcing components manufacturing to eastern suppliers but they are maintaining R&D and more intellectual oriented activities in-house.

This is reflected by a *share of 60 % of US organizations, which think that between 60% and 100% of their employees are knowledge workers* (Delphi, 1997: 10). Businesses like automakers, software houses, pharmaceuticals or biotechnology are typical examples of knowledge intensive organizations (Jordan and Jones, 1997). In addition, many other businesses, not yet knowledge–intensive, are introducing more qualified staffs, and they are configuring their business with a major focus on knowledge management.

To face new challenges and to exploit opportunities firms require an increased quality and quantity of competencies, knowledge and technologies to be searched within and across their boundaries. Inside, by optimizing the capabilities and knowledge of employees and by facilitating their interactions; outside, by making partnerships and alliances and exploiting the knowledge created in inter-firm network. Parallel to the surge in interest among practitioners, academic interest in organizational learning and knowledge management also grew considerably, as evidenced by the proliferation of books and articles recently published on the subject (Argote et al., 2003).

According to the Resource Based Theory (RBT), some resources can create a sustained competitive advantage whether they possess certain attributes such as value, rareness, imperfect imitability, and non-substitutability (Barney, 1991). For long time several authors have questioned what resources contribute more strongly to firm's sustained competitive advantage. At the time when businesses were based on mass production, machines, time and production capacity were the most important asset for competing.

The RBT started the interest for intangible assets, but the importance of knowledge, and more specifically the value of its tacit nature, was highlighted for the first time by Japanese scholars. Western culture and philosophy is described as having struggled to understand whether knowledge is based on what we experience (empiricism) or inherent truths (rationalism), and to have focused more on explicit knowledge. Japanese thought has tended to treat tacit knowledge as an important asset.

Nowadays, the increasing complexity and rapidity of the pace of change within the society has created the necessity to know customers better, to continuously update knowledge and competencies, and to search for the most effective and efficient way of doing things.

Nowadays, the competitive environment evolves rapidly and the capacity to manage knowledge-based intellect is the critical skill of this era (Quinn, 1992). The wealth-creating capacity of the enterprise is based on the knowledge and capabilities of its people (Savage, 1990). In order to adapt to the changing environment firms see themselves as learning organizations pursuing the objective of continuously improve their knowledge assets (Senge, 1990).

These aspects are linked with knowledge creation and acquisition. Such knowledge and knowledge management systems are applied to manage work processes, products' components, customer's expectations, emerging technologies and so on. In fact, as stated by Maier in order to be effective and efficient *firms today have to possess a KM strategy, develop KM goals, an appropriate organizational design describing KM instruments to be used, roles responsible for knowledge-related tasks, processes that use knowledge management systems, a supportive organizational culture, and a corresponding KMS controlling that evaluates whether the goals of using these systems have been achieved* (Maier, 2007:8).

Scholars questioned why knowledge is so important for promoting sustained competitive advantage. Zack (1999) answered to this question, stating that:

1. knowledge is not easily purchased in the marketplace in a ready-to-use form,
2. knowledge is acquired through experience and takes time (path-dependence),
3. the more firms know the more they can learn (cumulative nature of learning or absorptive capacity),
4. the synergistic combination may add value to knowledge,
5. knowing more about something than competitors,
6. knowledge provides increasing returns as it is used,
7. there are areas where some knowledge leads the competition, acquiring and using that unique knowledge can be applied profitably in the marketplace,
8. firms have to identify knowledge upon which is based their current or future position and continually improve or update it.

Nonaka and Takeuchi (1997) affirmed that knowledge, in his dual nature of tacit and explicit (Polanyi, 1958; 1966), may be viewed as the basis for creativity and innovation. Clark and Fujimoto state that new product development embodies knowledge creation as new products embody new knowledge (Clark and Fujimoto, 1990). Therefore the NPD process is greatly influenced by learning processes and knowledge

management (KM) applied within the company. Knowledge adds value to products and services, such as technical know-how, product design, understanding of customer needs, creativity and so on.

Consistently, scholars concluded that knowledge and the capacity to create such knowledge is the most important source of sustainable competitive advantage (Dierickx & Cool, 1989; Kogut & Zander, 1992; Nonaka & Takeuchi, 1995; Nonaka,1994; Prahalad and Hamel, 1990; Nelson, 1995; Leonard-Barton, 1995; Liebeskind, 1996; Grant, 1996; Nahapiet and Ghoshal 1998; Spender 1996; Teece et al., 1997; Zack, 1999; Teece, 1990; 2000...).

1.2.1 A clear definition of knowledge

But what is exactly knowledge? And how can we distinguish between knowledge and information?

It is important to give a clear definition of what knowledge is and what it is not, how it is recognizable, and so on. A wide body of literature has not always clearly faced the problem.

Some years ago firms started to manage information, that is different from managing knowledge. The Latin origin of the word information is *informo* and it means 'giving shape to something'. Differently from data, information is a data that makes a difference (Davenport and Prusak, 1998: 3), such as it has an impact on receiver's behavior and judgment.

Knowledge and especially the way we know things, is the most ancient subject of inquiry in different fields, especially philosophy. The discussions started with Parmenides, for him knowledge directly comes from reason, for Plato senses were as well important; Aristotle said that men knew through senses but they got the essence of things through the active participation of the human intellect, which helped in abstracting from the particular and specific facts, events the universal nature of things and phenomena.

Actually, many authors mainly belonging to business and management studies, are trying to measure and quantify its importance and contribution to firm's performance. Moreover, authors have then proposed different definition for distinguishing information from knowledge. One of the most diffused definition of knowledge is Davenport and Prusak's one; according to these authors (1998: 5) knowledge *is a fluid mix of framed experiences, values, contextual information, and expert insight that proves a framework for evaluating and incorporating new experiences and information. It originates and it is applied in the mind of knowers. In organizations, it often becomes embedded not only in documents or*

repositories but also in organizational routines, processes, practices and norms. Increasingly, knowledge is the capacity of distinguishing one approach from another, to face different situations or problems, the capacity to speak different languages and it contributes to build the reputation and credibility of people and the acceptance of their statements as true. Thus, knowledge is considered as an attribute of credible sources. In fact, the degree of credibility of a statement, message is due to the status of 'expert' in a (knowledge) domain as recognized by the community or by a group of people that have produced that message, statement and so on.

However, dynamically knowledge differently from information has some attributes, such as (ibid.: 7-12):

- *develops through experiences*; knowledge develops over time, through learning experiences such as seminars, workshops, also referring to what we have already done in the past. An expert is a person that overcomes successfully a test thanks to his experience in a certain domain. The experience in doing something help people in doing things quickly and better than others that have not the same experience with it.
- *Ground truth*; means what really works and what doesn't. An example is lessons learned.
- *Complexity*; the importance of experience and ground trust in knowledge is one indication of the ability of knowledge to deal with complexity. As such, knowing more leads to better decision than knowing less, even if the less seems more definite and clearer. Highly knowledgeable people are aware of what they don't know. It looks like Socrates' statement: 'The more I know the more I'm aware of my ignorance', a humble attitude that makes people ready to deal with the unexpected, unpredicted events that break up certitudes and forecasting. The more one person knows, the more is aware of not knowing everything, and the lesser is rigid and prone to accept and expect changes or radical transformation.
- *Judgment*; knowledge contains judgments of past situations and it is flexible to refine itself for adapting to changing environments.
- *Rules of Thumb and Intuition*; knowledge is codified in flexible guides to action developed through trial and error processes and over the long experience and observation. These are heuristics that contain solution to new problems that resemble problems previously solved by experienced workers. So they don't have to build an answer from scratch every time. Sometimes we arrive to solve problems very quickly by intuition, but intuition is not mystical; it means that we have thoroughly learned the steps that they happen automatically without conscious thought, and

therefore at great speed. Karl Weick named it ‘compressed experience’ (Weick, 1995).

- *Values and Beliefs*; people’s values and beliefs have an impact on organizational knowledge, such as the history of the company that should influence people’s actions and values working within it. People with different values and beliefs see things differently in the same situation. According to Nonaka and Takeuchi (1995) the power of knowledge to organize, select, learn and judge comes from values and beliefs rather than information and logic.

Coming back to the distinction between knowledge and information, Wiig (1993) say that information are facts, organized to describe a situation or condition, while knowledge is truth and beliefs, perspectives and concepts, judgments and expectations, methodologies and know how. According to Quigley and Debons (1999) information are text that answer to the questions who, when, what or where, while knowledge is text that answer the question why or how. Leonard-Barton and Sensiper (1998) point out to the subtle difference between knowledge and information, suggesting that knowledge in the business context comprises of relevant, actionable, information, partially based on experience. For Moenaert and Caeldries *each member of an organization can be seen as a pocket of knowledge and such knowledge includes facts, principles, experience-based insights, working procedures, research findings and ideas* (1994:26).

According to Nonaka and Takeuchi: *information is a flow of messages, while knowledge is created by that very flow of information, anchored in the beliefs and commitment of its holder. . .Knowledge is essentially related to human action* (Nonaka and Takeuchi, 1995:58–59).

Definitions of knowledge	Authors
Knowledge ‘is a fluid mix of framed experiences, values, contextual information, and expert insight that proves a framework for evaluating and incorporating new experiences and information. It originates and is applied in the mind of the knowers… It often becomes embedded not only in documents or repositories but also in organizational routines, processes, practices and norms.’	Davenport and Prusak 1998
Knowledge is truths and beliefs, perspectives and concepts, judgments and expectations, methodologies and know how.	Wiig 1993

Knowledge comprises of relevant, actionable, information that is partially based on experience.	Leonard-Barton and Sensiper 1998
Knowledge is created by the flow of information, anchored in the beliefs and commitment of its holder. . . .Knowledge is essentially related to human action.'	Nonaka and Takeuchi 1995: 58–59
'Each member of an organization can be seen as a pocket of knowledge and such knowledge includes knowledge includes facts, principles, experience-based insights, working procedures, research findings and ideas'	Moenaert and Caeldries 1994
Knowledge comprises all cognitive expectancies- observations that have been meaningfully organized, accumulated and embedded in a context through experience, communication or inference- that an individual or organization actor uses to interpret situations and to generate activities, behaviour, and solutions no matter whether these experiences are rational or used intentionally.	Maier 2007: 76
Knowledge is to some extent the process of communicating, directly or indirectly, an articulated meaning, ideas, or practices by two subjects that produce and send messages, verbally or not, which are processed mentally by the receiver that, to his turn, replicate the same process, idea, meaning or its own vision according to his experience, beliefs, practical experiences, values.	*Proposed definition*

Table 1. Definitions of Knowledge

1.2.2 Tacit and Explicit Knowledge

With the attempt to reduce the ambiguity of knowledge definition, scholars have distinguished among different typologies of knowledge. Probably the most popular distinction is the one between tacit and explicit knowledge (Polanyi, 1966).

Accordingly, only a small part of our knowledge is explicit since *we can know more than we can tell* (ibid.: 4). This distinction between the two types of knowledge is important because of the transferability and appropriability of explicit knowledge, as opposed to tacit knowledge (Grant 1996). In fact, the main part of knowledge present in organizations is tacit or *know-how*, and it is hard to articulate and difficult to communicate, since it is difficult to codify in the natural language, it is normally embedded in performing complex tasks and held in peoples'

heads. The explicit knowledge or information is easily to codify and to communicate and is normally accessible to everyone. It includes *facts, axiomatic propositions, and symbols such as information on size and growth of a market, production schedules, and so forth* (Dyer, 2000: 63). In fact, *while explicit knowledge is more easily managed and shared, tacit knowledge potentially has more strategic value, being derived from particular circumstances and events and thus unique and hard to imitate* (Zack, 2000: 81). Thus, it is clear the higher strategic value of tacit knowledge, which can be considered a source of sustainable competitive advantage.

Finally all the activities directly related to the acquisition, management and sharing of knowledge across the firm acquire huge importance in its organization.

Knowledge can be present in the head of people, in the document or knowledge management systems of the firm, and in the processes of the organizations. Knowledge is also present in the processes of the organization, and it represents rules, routines, behavior that is not written and acquired during years of work experience.

During the years individuals in an organization make experience of different situation, face different problems, find solutions, develop a common language, and so on. All this knowledge helps individuals in their daily work. Moreover, it represents the historic knowledge of a firm.

However, sometimes such knowledge is codified and archived in databases, or knowledge management systems and it is at disposition also for the newcomers and for other workers. Such knowledge, becomes available to be reapplied to new problems and projects whether it is possible.

1.3 Managing Knowledge into Organizations

Knowledge is an intangible asset, and its management is more complex than any other physical asset such as machineries, raw materials, industrial establishments, and so on. Due to its casual ambiguity often the benefits of acquiring knowledge are difficult to recognize and even to measure after the knowledge has been acquired. Moreover, it often happens that firms preview routines for sharing or archiving knowledge facilitating the accumulation of historical knowledge.

Knowledge management (KM) represent a set of processes aimed at maximizing the outcomes of the knowledge produced within a business unit, a firm, a network of firms. Knowledge management is not only

related with the activity of storing documents and papers in a database; however it entails a much complex set of activities and roles.

Knowledge management roots can be identified in the Anglo-American literature of the late 60s and the early 70s. Zand (1969) anticipated the changes that were leading to the emergence of the knowledge society and the appraisal of the knowledge workers, but he did not use the term knowledge management, rather management of the knowledge organization (Maier, 2007). On the contrary Rickson (1976), a sociologist, used the term knowledge management to refer to analysis application of knowledge in the society and not within organizations (ibid.).

KM has been defined differently by different authors (and different disciplines); however, the goal is always the same: to make knowledge available to the right person at the right moment in the right form. This condition means to identify and codify such knowledge and make it available through documents, informal conversations, on the job learning routines, best practices collections, plenary sessions and so on.

KM is also a multidisciplinary discipline; it has been approached by sociologists, informatics, psychologists, and economists and so on. Economists focus more on productivity pitfalls of knowledge management; psychologists investigate the motivations and behaviour of people during the knowledge creation/sharing processes; sociologists investigate the condition that facilitate or hinder interpersonal knowledge sharing; strategists analyze the inhibiting and enabling factors of knowledge creation and sharing between firms; while informatics focus more on technological aspects that enable the management of knowledge, namely knowledge management systems. Thus scholars emphasized the fact that *the heterogeneity of knowledge management research raises important questions about the degree of integration across disciplines and the extent to which a truly cumulative body of knowledge is emerging* (Argote et al., 2003:572).

Generally, there is agreement about the distinction between two different approaches: human and technology-oriented KM, which basically reflects the origin of the two approaches either in a human/process oriented organizational learning, organization science background, or on the other hand in a technological/structural organization science, a MIS or computer science/artificial intelligence background (Maier, 2007). There is also agreement that there are more holistic approaches, but they do not really integrate the two directions (ibid.).

Knowledge management projects are more likely to be led by the IT Department (22%) than by marketing (16%), human resources (5%), or

operations (4%), and are often built around some kind of intranet, shared database, or groupware software that allows people to communicate with one another, share ideas, and engage in discussions (KPMG, 2000).

KM has been defined differently in different disciplines. There are strategy or management-oriented definitions, such as: *applying KM throughout the organization requires taking a systematic and holistic view of the knowledge agenda-understanding the strategic role of knowledge, linking it to key management decisions and business processes and improving processes for knowledge creation, sharing and use* (Skyrme and Amidon, 1997:30).

There are psychologically oriented definitions, like: *knowledge is the uniquely human capability of making meaning from information - ideally in relationships with other human beings... Knowledge is, after all, what we know. And what we know cannot be commodified. Perhaps if we did not have the word 'knowledge' and were constrained to say 'what I know', the notion of 'knowledge capture' would be seen for what it is - nonsense!* (Miller, 2002).

Other definitions more oriented to knowledge tasks, functions and processes like: *knowledge management comprises methods, procedures and tools which support the core activities: generate, transfer, store and apply knowledge* (Heisig and Vorbeck, 1998:3).

There are definitions more technology oriented, such as: *KM extends the object of information management which include knowledge management, both in the form of 'somewhat of more valuable valuable information and context enriched information to be stored with the help of communication and information systems, and in the form of knowledge in people's head* (Maier, 2007:54).

Then, there is a wide range of other definitions.

Wiig (1997) defines knowledge management as a systemic, explicit and deliberate building, renewal and application of knowledge to maximize an enterprise's knowledge related effectiveness and returns from its knowledge assets. The processes identified in this definition are knowledge creation, knowledge update, knowledge application.

For the Gartner Group (1999) knowledge management promotes an integrated approach to identifying, capturing, retrieving, sharing and evaluating an enterprise's information asset. Information assets include databases, documents, policies and procedures, as well as the uncaptured tacit expertise and experience stored in individual workers' heads. Then, we can identify the following processes: knowledge identification, storage, retrieval, sharing, and evaluating.

Alavi and Leidner (1999:6) view KM as *a systemic and organizationally specified process for acquiring, organizing and communicating knowledge of employees so that other employees may make use of it to be more effective and productive in their work*. The resulting processes are knowledge acquisition, organization (storage and retrieval), sharing, and application.

According to Macintosh et al. (1999), knowledge management involves the identification and analysis of available and required knowledge, and the subsequent planning and control of actions to develop knowledge assets, so as to fulfil organizational objectives.

The above cited definitions of KM imply that it is necessary for organizations:

- to be able to *capture and represent* their knowledge assets;
- to *share and reuse* their knowledge for differing applications and differing users; this implies making knowledge available where it is needed within the organization;
- to *create a culture* that encourages knowledge sharing and reuse.

Maier defines KM as *the management function responsible for the regular selection, implementation and evaluation of goal-oriented knowledge strategies that aim at improving an organization's way of handling knowledge internal and external to the organization in order to improve organizational performance. The implementation of knowledge strategies comprises all person-oriented, organizational and technological instruments suitable to dynamically optimize the organization-wide level if competencies, education and ability to learn of the members of the organization as well as to develop collective intelligence* (ibid., 2007:57).

Maier identify several KM processes, such as:

- Knowledge identification,
- Knowledge acquisition,
- Knowledge creation,
- Knowledge organization,
- Knowledge publication,
- Knowledge distribution,
- Knowledge search and retrieval,
- Knowledge application,
- Knowledge evolution,
- Knowledge deletion and archiving.