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Creative employees and organizational learning

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Abstract

Research on management of knowledge highlight the strategic role of intellectual assets as a part of the learning by exploration or exploitation processes, processes which both lead to the creation of value by deepening and broadening the knowledge bases of the firm. Creativity studies search to identify the way a firm can use the knowledge bases to obtain a novel source of value. We address the strategy of firms for managing these assets by developing the division of knowledge aspects and the division of labour aspects. Specifically we introduce a relationship between creativity and characteristics related to the individual level creator (network position, affective and cognitive) and the relation with others (the use value and exchange value of its actions). These characteristics influence the learning activities and therefore modify the knowledge base through which the creativity is influenced. We identify two extreme types of relations: one based on the division of knowledge, another on the division of labour. These two types collude for a linchpin actor that must be primarily managed. The work concludes on some administration principles required so that the division of labour and the division of knowledge lead to value creation and value retention.

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Creative Employees and Organizational Learning

Resource-based theories of the firm draw attention to a firm's ability to explore and exploit new knowledge as the source of value creation and sustainable development (Conner and Prahalad, 1996). To achieve a good balance between exploration and exploitation activities in a firm is a puzzling question for the manager. For the applied economist, it is difficult to develop effective criteria of decision in a dynamic context for dispatching the resources between the two activities (O'Reilly and Tushman, 2004). The problem becomes even more cumbersome in creative industries where production and creation are intimately related. In those industries, creation often occurs during the production phase. Therefore the notion of value creation and the source of value creation become an important topic. Our contribution will be to add a new perspective to the debate: the division of knowledge and division of labour perspective.

Knowledge is the essence of the resource based-perspective and it is also the source of innovation. In a strategic perspective, knowledge can be viewed on the one hand as a stock (Dierickx and Cool, 1989) or base (Asheim, 2007) when we refer to accumulated routines, skills and expertise in relation to a specific domain, and on the other hand knowledge is a flow when we refer to transfer, integration, and development of new knowledge. Knowledge bases are essential for the exploitation activities of the firm and knowledge flows are indispensable in explorative activities, creativity is then at the genesis of these flows (Kang *et al.*, 2007; Teece, 2007). The literature highlights the necessity to adapt dynamically the governance modes to ensure an optimal fit between the resource allocated to exploration and

exploitation to create value and to capture the created value (Reed *et al.*, 2006; Subramaniam and Youndt, 2005; Youndt *et al.*, 2004).

We propose a representation of how the knowledge bases are sources of value creation during the exploitation/productive activities by re-enforcing the division of labour. Then we integrate the idea that the division of knowledge can be a source of creativity and value creation during the exploration activities. As a linchpin model we take the special case of creative activities where exploration and exploitation coexist and coevolves and where a single type of individuals stands at the collusion of the division of labour and of knowledge. From that model basis, and following Antonelli (2006), we induce some implications on the governance and on how a firm can limit opportunism and grasp the value created.

To reach our goal we use a methodology that fits intermediate theory development, an interaction between existing theory and case study findings (Edmonson and McManus, 2007). Here we reinvestigate mature bodies of literature (works on the ambidextrous firm and division of labour) through the lenses of knowledge division and communities in creative entrepreneurial firms. The empirical findings we call upon to illustrate and justify the theory development stem from studies on biotech, cell phones, video-games and university spin-offs (Maurer and Ebers, 2006; Burger-Helmchen, 2008; Burger-Helmchen, Cohendet, Llerena, 2008; Llerena and Matt, 2005).

In order to reach this deeper understanding of how learning, knowledge bases and creativity are interrelated and can be managed through adequate division of labour and division of knowledge to create and capture value we proceed as follows. First we reinvestigate the notion of value creation and value capture. This reinvestigation is done by seeking the

difference between the value created by an individual, a workgroup or a firm as a whole. It is also the place to recall the notions of knowledge bases. Then, in a second section we clarify the relations between knowledge flows and bases, organizational learning and value creation and link them to the puzzles of division of knowledge and division of labour. This allows us to rephrase the notion of division of labour and division of knowledge depending on the position inside the firm or outside of the asset considered. Next we propose a linchpin model where the creative knowledge worker is the pivotal element. And lastly we give some administration advice concerning this specific linchpin model.

CREATING AND CAPTURING VALUE: THE LABOUR, KNOWLEDGE BASES AND KNOWLEDGE FLOWS

Value creation is a central concept in management science and economics at both the micro level (individual, group) and macro level (the firm or nexus of firms). Nevertheless, there is little consensus on what value creation and creativity really are, where they come from, how they can be achieved and how to capture the outcomes of the creativity. This may reflect the multidisciplinary nature and/or the multilevel aspects of value creation. By e.g. strategic management, corporate finance and entrepreneurship studies focus mainly on creating value by and for the leader of the firm, the shareholders and the consumers. Researchers in HRM and organizational theory take rather into account the value creation from the point of view of employees and teams. Finally, economists often take a broader approach encompassing several firms, a network of firm and institutions or even a whole industry or country. These few examples show the differences that may exist between these approaches and their influence on the content of the research done following each perspective. Each of the

perspectives focuses on a different level of analysis for the creation of value but also for the beneficiary of the value. From a labour and knowledge perspective this raises the question of whether the division of labour is possible between the different levels of analysis (from bottom-up, an individual can divide the labour in a group, a team or a firm, or top-down a firm can divide the labour between the different individuals) or is the division of labour only possible on a same level of analysis if the goal is to create value by this division. The same question is relevant for the division of knowledge. Must there be a quantitatively or qualitatively greater base in one level to be able to divide that stock and dispatch it to other levels? The exchanges between layers of analysis are naturally appealing for a discussion on flows and stocks of knowledge and the learning mechanisms behind the renewal of the knowledge bases.

Another source of difficulty regarding the creation of value is that it refers both to content or outcome (the value) and a process (the creation) and one cannot be analyzed without the other. The content relates to questions such as what is of value? This question can be asked in absolute terms but is more relevant in relative terms: what has value for whom? The process of value creation questions naturally who is in charge of the management of this process.

Linked to the management of the process of value creation is also the question of the management of value capture. Value creation and capture processes are often confused. Many authors suggest distinguishing the two processes on the basis of empirical evidence where the firms are unable to capture the value they created. Therefore the two processes should be distinguished.

The value is often created at one level of analysis and captured at another. For example an employee can develop a new way to perform a specific task diminishing his effort and reducing thereby the firm's costs; it is likely that the firm will be the main beneficiary of this creation. Or, if a firm develops a new product by binding together modular parts, it is likely that a network of firms (those producing the modular parts) will benefit from the creation and catch a large part of the value.

As mentioned there are many possible vantage points in the literature on value creation depending on the theoretical stream followed. In the following we focus our efforts on three points that we link to the division of labour and knowledge in the subsequent sections of this work. We discuss (i) a definition of value creation that can take into account the interactions between various levels of analysis and different knowledge bases, (ii) we illustrate how the value creation process may vary depending on the path taken by the creative activity and the intervening knowledge bases, (iii) we discuss the process of value capture and show how it can change depending on the creation path. Figure 1 summarizes these points by representing the value creativity path and capturing processes that are possible between the different levels of analysis.

INSERT FIGURE 1 ABOUT HERE

Value creation and knowledge bases

Value is a concept deeply rooted in the economic literature; therefore it is not surprising that management science studies of value creation follow a standard established in economics by

dividing the value in (i) use value and (ii) exchange value (Bowman and Ambrosini, 2000). The use value refers to the uniqueness, quality and nature of a new job, a task, a good or service received by users in relation to their needs (price, quality, functionalities, artistic components, aesthetics ...). The use value is essentially subjective, relative and specific to each individual. “Specific and subjective” because the use each may make of a product or a service can be appreciated very differently and “relative” because the value in this case can be appreciated by referring to other products or services the value of which are already appreciated. The exchange value is defined as the monetary equivalent that the final user gives to the supplier in exchange for the use value of the service or product. In this case the exchange value depends not on a specific individual but on the views of all individuals who may have an interest in the exchange (Hirschleifer *et al.*, 2005:416).

Both definitions imply that the creation of value is a subjective and relative amount obtained by an economic agent (who is the target of value creation). This agent may be an individual, a group, a firm or a nexus of firms and this creation is marked by the willingness to exchange a specific amount of money against that value. Also the creation of value is (i) clearly a multi-level activity going from individuals to firms; (ii) the amount of money exchanged should be higher than the cost of the producer (as measured by the total costs over a given period); (iii) the amount that the applicant is prepared to provide for the exchange depends on the expected performance difference between the new value and existing substitutes, or existing in the near future.

If those are the two basic economic features of value, management scholars developed the definition of creativity behind the value. Creativity is generally defined as the production of a novel, useful ideas or solutions to a problem. It refers to both the process of idea generation or problem solving and the actual idea or solution (Amabile, 1988; Amabile and Mukti, 2008).

To be able to assess the novelty of a task, product or service users must have specialized knowledge related to the subject in question and to the alternatives available. Then users will adapt the product to their own specific context. This context is dependent on the social and cultural universe in which the user employs the object. Amabile (1988) mentions the nature of value creation as a subjective and context specific activity but also specific to the level of analysis. Users evaluate differently the novelty, value and ownership rights based on their knowledge and their representations (Boisot and MacMillan, 2004). This also implies that the supplier has a possible explanation why the product is new and in what context it can be used. Figure 1 represents a matrix that we completed stepwise during this work following several aspects. In this figure we show all participants and the different knowledge assets occurring in the creative exploration and exploitation processes. The basic drawing considers whether the employees are inside and outside of the firm (the horizontal axis: on the left mainly outside of the firm, on the right mainly inside the firm) and the type of knowledge used (the vertical axis: the upper row corresponds to specific intellectual assets the lower row to more trivial assets). In the matrix we indicate the types of employees concerned in each box and the types of knowledge they are handling mainly (Nonaka and Konno, 2000). As noted by Asheim (2007): “there is a large variety of knowledge sources and inputs to be used by organizations and firms, and there is more interdependence and division of labour among actors (individuals, companies and other organization) (...) Innovation processes of these firms differ substantially between various industries and sectors whose activities require specific knowledge bases.”

We distinguish three types of knowledge bases: an analytical, a synthetic and a symbolic knowledge base. These bases correspond to different mixes of tacit and codified knowledge, skills and qualifications and lead to different forms of creativity and innovations.

The analytical knowledge base. This base corresponds principally to the know-why for the development of new knowledge, by using deduction but in a framework depending on scientific knowledge and it is best obtained by collaboration within and between research units.

Synthetic knowledge base. It is merely know-how, applying or combining existing knowledge, and it is strongly tacit. The development of this base can be achieved through interaction with customers and suppliers.

Symbolic knowledge base. It corresponds to know-who and develops strong aesthetic qualities. It is fostered by learning-by-doing inside specific project teams and is highly context specific.

We mention that there are different knowledge bases, but we do not say that one of these bases is pre-eminent in one of the boxes of Figure 1. As we will see, to create value and be creative it is not so much a question of the initial size of each base, but rather a question of how each base develops. In the following we will see how these different bases interact to create value for the firm and link this creation of value with the notions of division of labour and division of work.

Creativity paths: The value creation processes

How is value created? It is possible to represent the value creation process in many ways, depending on the level of analysis used. That is why we chose two approaches. Both are contingent to the level of analysis chosen / a particular source of value creation. When the individual is the level of analysis, the process on which we focus is the creative activity carried out by a certain individual by taking into account the attributes of the individual

(ability, motivation, intelligence...) and interactions with the environment. When the organization is the source of value creation, then attributes such as the creation and management of knowledge flows become prominent.

These two approaches are linked in the following manner with Figure 1. If we consider the individual as the source of creativity, then we focus on the upper-right box of the matrix that we labelled as the creative individual. If we take the firm as a source of creativity then we consider the entire right column corresponding to the firm (we then speak as creative employee instead of creative individual). The exchanges between the boxes in the right column are the interactions inside the firm, and the exchanges with the left column are the interactions with the outside of the firm individuals or organizations.

The individual as the source of creativity. People create value by developing new products and services or any contributions with a certain value perceived by a user by taking into account his future needs and the monetary amount he is ready to engage in comparison to alternatives or a combination of alternatives. The creation has therefore to produce a higher utility at the same cost, or the same value at lower cost. For Felin and Hesterly (2007) and Teece (2007) the micro level of the individual should be the starting level of analysis. For these authors knowledge creation is the source of value creation, creativity is the transformation of the stock of knowledge into a process, a dynamic, creative value. As noted by Diercix and Cool (1989), if knowledge can be both a stock and a flow, creativity is always a flow (Amabile, 1996). The lack of something like a creative stock makes it more difficult to understand and measure in comparison to knowledge where you can appreciate the initial and final stock like for products and taking the difference between the beginning and end of a stream.

On Figure 1 the creative individual is characterise as a conceptual knowledge asset (Nonaka and Konno, 2000) performing articulation efforts for explaining his knowledge and creation through images, symbols, language... These types of individuals are at the origin of the product concept, the design... Which corresponds to a source of possible value, but the main value is created by interacting with others. The creative individual puts down the roots of the use value, now the concept must be given a reality and by doing this enhance the use value and develop the exchange value. For this the creative individuals interact with knowledge base workers and production workers following two different, often complementary value creating paths.

The first creativity path corresponds to the interaction with knowledge base workers. Those workers are mainly based on know-how, explicit technical and scientific knowledge obtained by embodiment of explicit knowledge by experience. When the creative individuals interact with this type of workers what is obtained is the technical/scientific building of the product or service, which corresponds to the enhancement of the use value. From a knowledge base point of view, the interaction between the two types of individuals leads to the broadening of the analytical and symbolic knowledge base, by e.g. a creative process that gives a working prototype.

The second creativity path corresponds to the interaction with production workers or a production team. Those are characterized as a systemic knowledge asset, producing documents, specifications, manuals etc. and can be assimilated, when effective, to a community of practice. The interaction between creative individuals and production work teams leads to an industrially exploitable product or service. The interaction creates probably a higher exchange value by diminishing the production costs. The knowledge base concerned by this interaction is the synthetic and symbolic knowledge base. We can speak of a

deepening of the bases rather than a broadening because what is created is a better more detailed use of the existing stock.

The firm as the source of creativity. When we now consider the firm as a whole or a network of firms linked by the creative activity the value creation is often a development of a sustainable competitive advantage that allows the company to produce a unique valuable product or service. For many writers, the act of invention, innovation at the enterprise level has an intentional content much stronger than the individual level (Van de Ven *et al.*, 1999). This upper-level of intent expressed encompasses many resources allocated to the creation process (financial, technical, organizational, time allocation...) that are not present in the same way at the individual level. Creativity and value creation are apparently facilitated if the firm facing uncertainty has an organizational slack and is managed as a entrepreneurial organization relying on a large social network constituted by communities, partners and users (Brown and Eisenhardt, 1998; Van de Ven, 1989). The rich literature on the dynamic capacities participates in the process of creativity (Zollo and Winter, 2002). This literature is largely focused on the internal factors of firms and the renewal of the firm's operative functions through the creation of knowledge, the entrepreneurial process and also the reconfiguration of the firm's networks (Smith *et al.*, 2005). However, as noted by Lepak *et al.* (2007), this literature focuses heavily on the internal functions of the company and not enough on the external partners and on the beneficiaries of these efforts. Lepak *et al.* (2007) also identify organizational practices, like the strategic management of human resources including knowledge and labour division and governance methods as an alternative source of value creation. Thus, the performance of knowledge-intensive firms, employees with high intellectual capital and their combinations with other assets and resources within and outside the firm can be a significant source of value creation.

From a firm point of view, more worrying, is the fact that she must decide how to organize the exchanges between the employees inside the firm with those outside the firm. It seems adequate that the exchange with knowledge base workers inside and outside the firm is mainly a problem of division of knowledge and that the interaction with production teams in order to obtain better performance is mainly a division of labour problem.

The division of knowledge and division of labour are two levers of the management of an innovative firm. As explained by Becker *et al.* (2007) for Adam Smith the division of labour leads to the division of knowledge. The development of skills is more a consequence than a cause of the division of labour, in particular through learning by doing mechanisms. The division of labour entails a process of learning by doing, that contributes to increasing skills and expertise and thus to enhancing the accumulation of specialized knowledge. The opposite position, the division of knowledge position, implies that knowledge distribution drives the division of labour.

Therefore from a division of labour point of view a progressive specialisation of work induces progressive specialised knowledge through learning by doing. This occurs under the following conditions: the pre-existing division of labour, to be coordinated, to produce given (or even changing) artefacts. As a consequence the firm organization follows a functional division of labour. Routines are then the 'memory' of organisations, truces to handle divergence of interests and conflicts, and the focus is on the 'activities' and their coordination. The implications of the hypothesis « the division of labour precedes the division of knowledge » on the theory of the firm is that transactions drive competences and define the boundaries of the firm. The explanation of networking, partnering, alliances, acquisitions, of a given firm mostly rely on strategic considerations related to the processing of information, to the level of transaction costs. In such a context it becomes extremely difficult to explain the functioning of the creative firm.

From a division of labour point of view the differences in skills and “mental labour” precede the division of labour and are also subject to learning and specialisation. This suggests that one can unbundle the labour skills and pay only for the exact quantity the firm needs to produce. Many conditions must be fulfilled for such a mechanism to operate. The main conditions are that there is an individual with all the necessary competences who knows how much of each type of labour must be acquired and that the required variety of labour also exists. As a consequence the division of knowledge does not necessarily match the division of labour; the organisation/coordination of dispersed knowledge does not necessarily overlap with the organisation/coordination of activities.

For these reasons, the creation of exchange value seems to be more likely to be dependent on the division of labour, but this division is only possible when knowledge division has been achieved in the first place. Therefore the creation of value is only efficient if the firm masters the two types of creativity paths. Before we discuss more in detail how a firm can do this, we investigate the capture of value mechanisms.

The diffusion and capture of value

As we have mentioned the creation of value does not always go hand in hand with the appropriation of the value. Obviously the firm must distribute the value created between the employee, supplier, shareholders and business partners. Often this distribution is fixed by contract. However, all beneficiaries of the created value that we have just mentioned are known in advance by the company. There are other beneficiaries, unknown who can capture the value at the expense of the firm. This happens when the use value is high but the exchange value is low or when the division of knowledge is not efficient enough to obtain a good division of labour. The difference in value can be grounded by different mechanisms affecting

the relations between groups of individuals. For example, when a new product is introduced, and if it is perceived as valuable, it must increase both the use value and exchange value. If it is new, the supply is limited (often only the innovator produces it) and the demand is relatively strong for a single supplier. The competition will attract new suppliers and reduce the gap between supply and demand, reducing prices, and therefore decreasing the exchange value. This mechanism means that the firm who has spent most resources in the value creation process must share it with competitors. Of course there are ways to protect it (licensing, patenting) against this type of leakage in value, but it remains constrained due to the type of product or service (rival/not rival, excludable/not excludable) and to the possibility for competitors to offer substitute products.

The competition is not limited to business to consumer relations but spreads to all levels influencing the amount of value captured by newly created businesses, for example in the factors of production markets like the labour market. In such a market if a particular type of workers is in an activity niche and requests a salary increase, this increase is limited to the value retained by the firm over the increasing costs. From the demand point of view the reverse analysis can also be done: a competition between firms involved can lower the price, which corresponds to a growth on the value retained by the consumers. However, this competition may be limited by several mechanisms like specific knowledge or legal, physical and technical barriers. These mechanisms prevent or limit the replication of the process of value creation or appropriation of the value created. If such barriers exist, the creator of the value has more power to retain the benefits.

Catching the value at the individual level. At the individual level many attributes can be the source of the appropriation of value, such as the position of the individual in a network (Baum

and Rowley, 2008), the nature of relationships with others within and outside the production process, the specialization of knowledge. This set is hardly imitable and therefore in the short term, it will be difficult for competitors to deprive an individual of the value he has created.

Catching the value at the firm level. The best known appropriation characteristics are made on the basis of a resource node characterized by the adjectives VRIN (valuable, rare, inimitable and non-substitutable). When these conditions are satisfied the firm can benefit from these resources for some time (Barney, 2001). Also, as we mentioned, only when the firm has achieved sufficient experience in the division of knowledge can she only buy the needed resources at the smallest cost. Then, to catch the created value, the firm must have a good enough match between the division of knowledge and the division of labour.

This match like the creation of value can be explored following different academic perspectives. The development of the theory of the firm and strategic management in recent years bridge the views based on the resources and on knowledge. Quite naturally the first works focused then on the resources and knowledge within a single firm. These resources are related to the characteristics of value, rarity, not imitable and not substitutable sources of competitive advantage (Kogut and Zander, 1992). Then in a second time attention is paid to the combination of resources and knowledge held separately by several firms and the combination reinforces the strategic nature. In this approach, the management of the division of labour and division of knowledge has become a centre piece of the strategy and value creation (Burger and Llerena, 2008).

What we are interested in is the management of flows and stocks of knowledge within a collaborative relationship between individuals inside or outside the firm which implies a certain division of labour. Existing knowledge (know-how, routines) are, according to Dierickx and Cool (1989), part of the firm inventory and can be analyzed as a stock. On the contrary, the knowledge being acquired either by creation, learning or transfer corresponds to a flow. The knowledge stock provides the firms with the foundation of their core competences, the flows of knowledge enable them to modify the existing stock. Therefore knowledge flows are part of dynamic capabilities (Kogut and Zander, 1992). This distinction is important because in the absence of flows the stock of skills of the firm is fixed and leads in the long period to the firm decline. This implies that the management of knowledge stocks is an important activity in order to match well the division of labour with the tasks to perform. The management of knowledge flows is equally important adding a forecasting difficulty. A large proportion of work in strategic management focuses on management of knowledge stocks as the source of value creation. Lepak and Snell (2002) follow this approach which allows them to represent the portfolio of knowledge of the firm and its specific management. However, the management of existing stocks of knowledge, if these stocks are distributed among several firms immediately encompasses the management of labour flows between different groups of workers inside the same firm or employed between several firms.

The process of knowledge sharing within and between firms, and thereby the broadening and deepening of the knowledge bases, is often managed following social interaction codes rather than using IT based processes or another formal exchange structure. It is therefore important to identify the relationships that facilitate the flow of knowledge and to organize the learning process. The objective of the following section is to clarify the value creation this time by taking the point of view of the learning processes. For this we distinguish two types of

organizational learning (exploratory and exploitation) both must be present to efficiently create value. Then we examine the importance of the three characteristics (network structure, trust and cognition) of each of the mechanisms of learning and subsequently determine the appropriate division of knowledge and division of labour for the firm. This allows us to identify two extreme prototypes of relationships: one based mainly on the division of knowledge and the other based mainly on the division of labour. Within each prototype the three characteristics that we have mentioned are combined to achieve the learning activity in relation with the exploitation or exploration.

CREATIVITY, VALUE, ORGANIZATIONAL LEARNING AND SOCIAL CONTEXT

The success of a firm depends on its ability to regularly create value for consumers. The source of this value creation lies in two alternative forms of learning: learning by exploration and learning by exploitation (March, 1991). Both types of learning are based on an organization with very different structures of knowledge flows which is expressed by the costs, benefits obtained, flexibility, specialization or division of these flows. Learning through exploration is the search for knowledge that does not exist within the firm to create value. This knowledge may exist in other firms or can be radically new. The learning operation corresponds to the development of knowledge and leads to an enhancement of the value or extension of perceived value by consumers. Learning through exploitation corresponds basically to the same definition, with two main differences, the expected outcomes are less radical and the costs of the learning are smaller because the learning activity is simultaneously performed with the exploitation (production activity) of the firm. In many cases, companies create value by using most of their stock of knowledge (via a better division of labour). This behaviour corresponding to the learning operation is often described as less risky, less diverse,

more incremental, more routinized and its relevance to current production activities and its actual division of labour (Schulz, 2001).

If we were to define the learning activities by the difference between benefits and costs then the learning through exploitation generates more short term benefits and the associated costs are much more predictable and so it should enhance the exchange value. Incorporating the benefits of improved productivity, incremental innovation and this learning are a weak form of dynamic capabilities which can improve continuously the skills and knowledge in a stable environment by improving the integration of knowledge and division of labour.

However, as mentioned, if the company does this type of learning, it may see the overall performance deteriorating in the long term (Levinthal and March, 1993) if the firms rely entirely on this type of learning, it would deplete its stock of knowledge and fail to renew it. The other possibility that the firm can bet on to create value is to develop radically different ideas, innovative ideas, so to say the firm must be creative. For the firm it means to engage in learning through exploration with the objective to generate flows of new knowledge, to radically change the product or process. Therefore this type of learning gives the firm a strong form of dynamic capacities.

From the point of view of the value creation this type of learning is characterized by both higher benefits and higher costs and deeper uncertainty and generates new use value. Potentially this type of learning can influence each item of the business or have no influence at all. The daily survival of a firm cannot be based solely on this type of learning because it is too random. Many empirical works therefore conclude that the sustainable development of a firm depends on the balance between these two learning mechanisms. Many models exist for understanding the balance between exploration and exploitation, including the nature of the

productions, a balanced portfolio of options, the distribution of risk, environmental change and the division of labour and knowledge.

If the general distinctions that we have mentioned show the importance of each form of learning in the creation of value, we have not discussed the management of these forms of learning. Much of this is the management of the learning system that includes the social interactions in particular through the creation of communities. Management of learning and value creation implies the management of these communities and of contexts favourable to their creation and development (e.g. the Ba developed by Nonaka and Konno, 1998). To be effective management must take into account the network structure, trust and the cognitive dimensions (Kang *et al.*, 2007). In the remainder of this section we draw a parallel between these dimensions and forms of learning, in particular we are interested in the impact of variations on the flow of knowledge (a division of knowledge) and the divisions of labour.

The network structure dimension

Several authors have suggested that organizational learning is primarily determined by the structure of relations in a network - the interactions between the actors - within a firm and between firms. The network structure is crucial because it gives an individual the opportunity to evaluate and appropriate knowledge of others within the network. The best known measures are found in Granovetter (1973) and Uzzi (1997) on the strength of ties and proximity to see the links between two members of the same network and the network density (the average intensity among all members of the network). The strength of the links depends on the frequency of relations between two individuals of the same network, while the density determines who can interact with whom.

Learning by exploitation, network density and division of labour. The density of the network and the strength of the ties positively influence the learning by exploitation. The stronger the links, the more efficient the exchange of knowledge will be with a high level of sophistication and precision. The more frequently people interact, the more easily they recognize the value and importance of the knowledge of others and then try to learn from them.

Learning by exploration, sparse network and division of knowledge. Too dense links in a network can block exploration by blocking individuals in a specific type of knowledge and lower their creativity (Gargiulo and Benassi, 2000). This possibility was recognised by Granovetter (1973) for whom sparse links leave the network sufficiently flexible to identify entrepreneurial opportunities and use new knowledge. A similar result can be obtained by opening the network to other firms or even users as it is suggested in the fast growing literature on open innovation (Von Hippel, 2006).

The trust dimension

If the network structure dimension raises the issue of quantity of interactions, the affective dimension corresponds to the quality of the interaction to be experienced based on the motivations of the individuals, their expectations and behaviours standards. These elements will influence the nature and quality of knowledge exchanged within the network. An expectation of reciprocity is necessary so that the network members are willing to learn and share their knowledge with others. Also, it can create value only if the members trust each other (Nooteboom, 2003).

This dimension can be studied by using two main forms of trust. Institutional trust is an impersonal form of trust which is given to a person in relation to its employer firm or belonging to an institution or a group but does not depend on its personal merits. Dyadic trust, the second form, refers to the trust between two individuals resulting from their past interactions.

Learning by exploitation, institutional trust and division of labour. The literature suggests that the development of a bundle of knowledge has very little to do with the confidence that we give to the members of an institution but a lot to do with the confidence we have in institutions. Thus members of different institutions can exchange without having to know each other in advance insofar as they trust the person on the basis of the institution to which he or she belongs. Shared standards allow the creation of value between members of different institutions who share these values and conversely there is no value creation possible between individuals from institutions who do not share these standards. Institutional trust helps to develop knowledge in a very precise domain but does or does not sufficiently allow for the development of knowledge outside this area.

Learning by exploration, dyadic trust and division of knowledge. Dyadic trust can develop knowledge in a rich way by facilitating learning through exploration. By its nature this type of trust allows more flexibility and is obtained more rapidly than institutional trust.

The cognitive dimension

The cognitive dimension is related to the nature of the exchange and answers the question of

what is exchanged. It focuses on the importance of common representations and the same system of value, the mental models, the same code book, all of those allow learning in the organization (Bureth *et al.*, 2000). Many authors acknowledge that it is not possible to recognize an idiosyncratic knowledge exchange in the absence of a framework and common references. This common repository corresponds to the firm's absorptive capacity, depending on the individual and the organization.

Nootebomm (2009) and Henderson and Clark (1990) divide knowledge into two categories: knowledge related to a specific component and architectural knowledge or integration knowledge. These two sets of knowledge should be identified when companies seek to develop the value of a good or service. Knowledge related to components refer to, as its name indicates, the components, parts of modules, rather than to the whole product or service, while architectural knowledge related to the interconnection of components covers the overall product or service. The same classification applies to the body of knowledge held by an individual and the knowledge exchanged within a network. It is worth noticing that each of the firms in the network is related to a particular type of learning.

Learning by exploitation, architectural knowledge and division of labour. A better understanding of everyone's job and its importance in relation to the value and costs of the whole process improves the efficiency of each individual. Also, obtaining a certain level of knowledge related to architecture allows everyone to be more motivated and perform better in their own learning by exploitation (Kang *et al.*, 2007). Therefore each individual learns more from the exploitation activity, the knowledge related to architecture should be improved.

Learning by exploration, knowledge related to components and division of knowledge. During the exploration of new areas, the need to have the same knowledge related to architecture

becomes less prevalent, as it is to focus on a component the integration of which can be addressed only after its own definition. However, it is necessary that the individuals share the same knowledge related to the components if they wish to collaborate and explore the same area.

Antithetical prototype, organizational learning and division of knowledge and labour

Each of the three dimensions just mentioned is conceptually distinct and complementary to the other for the creation of relationships and the high creation of value. If these three dimensions are distinct conceptually they are linked in practice as shown in a number of works. Thus Nahapiet and Ghosal (1998) and Yli-Renko *et al.* (2001) show that there is a causal relation where network structure influences trust, that trust influences cognition, cognition influences the network structure and so on. Therefore it is unproductive to separate these three effects; rather it is interesting to put them together in bundles where they provide synergies to each others. Kang *et al.* (2007) in a context similar to ours but with a HRM perspective identify two configurations of these three attributes that are consistent with the learning by exploration or by exploitation. Both configurations are based more on the theoretical work we have mentioned than on empirical work and this for the sake of clarity. These two relationships are summed up in Table I.

INSERT TABLE I ABOUT HERE

The first row of the table represents the type which characterises a division of labour intensive

prototype with a dense social network, strong institutional trust and shared architecture knowledge. The knowledge base involved is synthetic and symbolic because of the practical nature of the learning going on. It is based on a high division of labour but the learning process can challenge the division of knowledge (and ultimately lead to a better division of labour). This is the ideal type for learning by exploitation, a deepening of the knowledge held and a better distribution of activities corresponding to a more efficient division of labour.

In the second row, the division of knowledge intensive relation prototype is characterized by a sparse and flexible network, dyadic relationships between individuals sharing a common stock of knowledge about the components. This is the ideal type for learning by exploration, a broadening of the knowledge held and a better distribution of the creative fostering activities and allowing a future division of knowledge that is more efficient.

THE LINCHPIN ACTOR IN DIVISION OF LABOUR AND DIVISION OF KNOWLEDGE

In order for a firm to be able to create value for her short and long term needs these two prototypes must coexist in a certain proportion without any damaging prey/foe competition over the resources. But there is no predisposition for this to happen naturally. This is the fundamental argument of Kogut and Zander on the management of organizational learning, for those authors the management of the employees and the relationships between employees within a firm but also between different firms is the basic endeavourer of the knowledge management activity. To be executed correctly this management must stance a division of labour and a division of knowledge. To meet this objective, we propose to concentrate the

effort on a linchpin actor in the firm, concerned by both types of division, the creative employee.

The creative employee: between division of knowledge and division of labour

We base our approach on a matrix inspired by the works of Lepak and Snell (1999, 2002) and the Ba types of Nonaka and Konno (1998). These authors take into account two dimensions of the value of human capital and the scarcity of these knowledge assets. This distinction allows them to highlight a preferred mode of employment (internal, external) and the form to be given to this employment (on a relational or transactional basis). The character of scarcity expressed is formulated from the point of view of the firm to which the employees are primarily attached.

INSERT FIGURE 2 ABOUT HERE

The value is the value added created by this activity. In this matrix then the two other zones appear, one for the allocation of resources, internal or external to the company. Clearly if the value is high the firm should ensure the control by internalizing this resource. On the other hand if the value is low, the company benefits from having them from an external partner whose form is to be specified. This observation is also valid for the case where knowledge is scarce. Indeed, if it is rare but of a low value the firm will not have frequent use but the scarcity may be tainted with excessive costs that the company should not have to bear over a long period. Therefore this knowledge could be externalized.

The other area corresponds to the form of management of the relationship between the firm and the individuals, whether they are within or outside the firm. But when the activity is less knowledge intensive or involves a trivial knowledge, it is easier for the firm to describe what she expects and to control the execution of the tasks and the results. Such a relationship can be contracted with many details. On the contrary when the relationship requires rare knowledge and therefore is difficult to control, the approach is necessarily more than a contractual relationship and cannot be based on a precise description of the implementation.

Figure 2 shows that the critical knowledge held by employees is actually a part of existing knowledge, and it suggests the fact that internal knowledge is primarily a stock of resources that is obtained by learning and inclusion of knowledge originating from outside the firm.

Knowledge and labour-intensive tasks: premium to creativity

Is there a parallel between the three characteristics (cognitive, network structure and trust) and how to manage the stocks and flows of knowledge for achieving better creativity? In theory it would not be surprising to find such a relation because it would imply that the management of the opportunities, opportunism, motivation and the interaction between individuals within the same firm or belonging to different firms are of utmost importance. But this necessitates a point by point discussion following the nature of the two prototypes we showed previously.

Creative employees and cognitive connections. First, based on the intellectual capital characteristics of the partners, different forms of knowledge can be developed by and between the different employees (this corresponds to knowledge assets types in the Nonaka and Konno representation). If the partners have knowledge that can be adapted, customized to the

knowledge of the firm, which is the case for service providers like consultants or experts, then they work in a defined time frame with some employees during a short period of time. This type of contract leads to knowledge development related to components between partners outside the firm and employees of the firm (Brown and Duguid, 2001).

Creative employees and network structure. The management of employment relations is dependent on the network structure and influences the management of the interactions between employees and partners as well as the opportunities that can be created and captured. Expectations and results vary greatly between the internal and external partners in relation to this criterion. External partners have a sparser network with the employees of the company especially those with a strong intellectual capital and weaker ties. Therefore this type of approach is more common for interactions between different firms as far as it concerns employees with high intellectual capital rather than the others.

Creative employees and the development of trust. The third dimension that allows us to distinguish individuals in those prototypes based on employment relationship is the amount of trust and the reciprocal obligations between employers and employees and between the employees. Lepak and Snell (1999) note that external partners and internal employees with high intellectual capital have often co-specialized knowledge, knowledge that can only be a source of value when combined. There is a synergy between the two. Such an alliance can not be permanently maintained unless there is reciprocity between the individuals and mutual trust. Only in this case do companies develop mutual investments and mutual benefits. In this type of exchange it is essentially an institutional trust that is created through the development and the recognition of shared standards.

We can summarize the previous discussions with Figure 3.

INSERT FIGURE 3 ABOUT HERE

We see that creative employees with strong intellectual capital attract division of knowledge and division of labour activities. Creative employees are the linchpin between these two types of division. If the relationship between knowledge-intensive workers and others are generally denser, based on institutional trust and norms than integrated firms connected by a common goal as opposed to the relations with external partners are less strongly connected, with dyadic trust based on personal experience and connected by a single field of expertise. Does this mean that any other relationship would not be strategic, does not use efficiently the stocks of knowledge to create immediate value and generate flows of knowledge that allow the creation of future value? Several examples of firms that follow different strategies exist (Youndt *et al.*, 2004). They show that firms can choose original strategies, such strategies that are not implemented naturally but indicate an intense effort of different firms that manage the stocks and flows of knowledge, and they remain essentially the exceptions which prove the rule. When relations between employees with high intellectual capital and external partners are governed mainly on the basis of divisions of labour rules then links between knowledge workers and the other employees reap the benefits of learning related to exploration rather than those coming from exploitation.

CREATIVE ADMINISTRATION OF THE DIVISION OF LABOUR AND DIVISION OF KNOWLEDGE

In the following we present two administration schemes in order to develop the creativity and produce value in accordance with learning mechanisms and the flows and stocks of knowledge we described. Those two schemes are summarized in Table II. The recommendations we make apply primarily to creative employees with high intellectual capital and their productions in ways to simplify their interactions with other employees (within and outside the firm.

INSERT TABLE II ABOUT HERE

Many studies have shown that management techniques can and must be reduced to the administration of opportunities, motivation and accounting of each of the three elements that influence the performance (Katz, 2003). These three elements are described as (i) building labour structures that specify the content, scope, independence and interdependence which determine the opportunities for each employee and under what condition the interaction with other in the accomplishment of tasks. (ii) The structure of incentives includes salary, performance evaluation, the safety of the employees and provides a way to motivate employees to seek and acquire new knowledge, (iii) the development of new skills (by training) that allows employees to understand and combine new knowledge.

The administration of the division of labour relations

The administration of the division of labour is simplest when (i) the structures of work are

independent, (ii) remuneration is done at the team level and (iii) allows the development of specific expertise or extends the knowledge insights that link them.

Administration of creative employees and interdependent work structures. When work is interdependent then strong links can be developed and maintained with interdependence between employees with high intellectual capital, other employees and external partners. Specifically teamwork that requires interdependent and reciprocal interaction may help improve the interaction between these different types of employees and has led to mutual adjustments and coordination. This fosters the improvement of architectural knowledge (Brown and Duguid, 2001).

Administration of creative employees and group spirit. Institutional trust between employees with high intellectual capital and internal and external partners can be improved through initiatives creating groups, communities that reinforce the goals and the shared values. The creation of this type of community and reinforcement of values can also be helped by systems of performance management which focus on the collective results (360° management systems). A system of collective remuneration can also strengthen the relation. This system can be particularly effective if the remuneration depends on the collective performance obtained through exchange with employees outside the company. Indeed, it urges people to participate in communities and to develop common frameworks.

Administration of creative employees and the development of intra-specialty expertise. Knowledge connected to the architecture can be built through exchanges between different functions within the firm as well as intra firms exchange when they are affected by the same process. Joint training can also be a way to construct knowledge related to the architecture

between employees with high intellectual capital and other employees of the firm or outside of the firm. Socialization programs are practices that help employees and partners understand and internalize the values, goals, history and culture of the company and share tacit knowledge.

The administration of the division of knowledge relations

Unlike the division of labour the basis of the business relationship behind the division of knowledge is the identification and exploitation of new ideas through interactions within and between enterprises. Also the management meant to facilitate this type of relationship should strive to create infrastructures that allow flexibility to work in creative networks but also the mechanisms that enhance the flexibility of this network and its development.

Administration of creative employees and flexible work structures. Flexible structures authorize temporary exchanges between employees with high intellectual capital and other members within or outside the firm, this is valid for short and long term exchanges. This flexibility goes hand in hand with high autonomy granted to this type of shared knowledge, autonomy and flexibility should allow for greater access to the exploration and better creativity.

Administration of creative employees and individual results. The behaviour necessary to obtain and use knowledge is difficult to identify and standardize *a priori*. Exchanges of knowledge for business development should not be expected if the individuals do not obtain a

fair profit in return. This is why we have a system that rewards all the partners on the basis of their relationship and build dyadic confidence. Leonhart-Barton (1995) shows that the most creative and well paid employees are those who practice 'creative abrasion' of employees to link ideas, sometimes even conflicting ideas in order to create value. It then looks more exhausted the knowledge of past and truly create new ones.

Administration of creative employees and the development of inter-specialty expertise. To obtain more advanced knowledge related to components an individual must develop knowledge in different specialties. Also, employees with strong intellectual capital to develop such a type of knowledge must be able to better understand and improve their own work but also to better understand the integration of different elements. To achieve this firms may include in the employment administration specific career paths, each individual is employed in different positions successively and therefore can broaden his expertise based on many different contexts and develop knowledge in relation to several specialities. This also requires that employees recognize the value of the knowledge of others.

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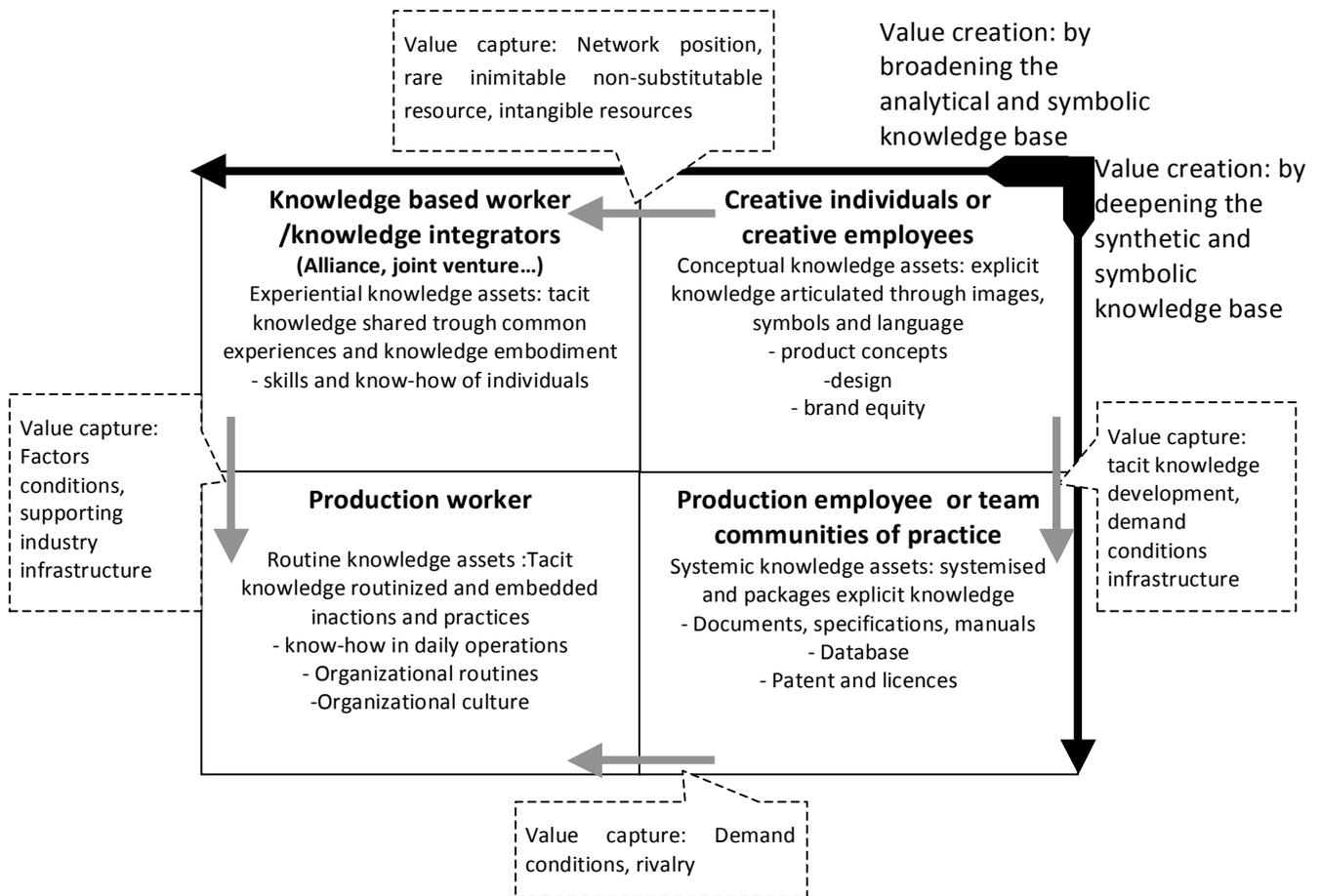


Figure 1. Categories of knowledge assets, value creation and value capture

Source: based on Nonaka and Konno (2000), Asheim (2007), Lepak *et al.* (2007).

	Network structure	Trust	Cognitive	Value	Knowledge base involved	Intensive in	Challenges
Learning by exploitation	Dense network, strong ties	Institutional trust	Common architectural knowledge	Mainly exchange value	Synthetic and symbolic knowledge base	Division of labour	The division of knowledge
Learning by exploration	Sparse network, weak ties	Dyadic trust	Common component knowledge	Mainly use value	Analytic and symbolic knowledge base	Division of knowledge	The division of labour

Table I. Learning forms and creativity development factors

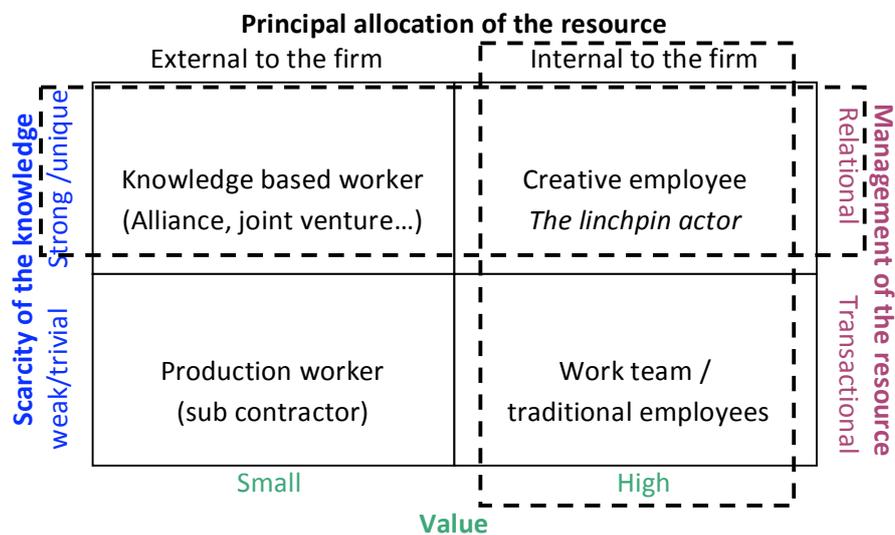


Figure 2. Value creation linchpin from a management perspective.

Source : Based on Kang *et al.*(2007), Burger et Llerena (2008)

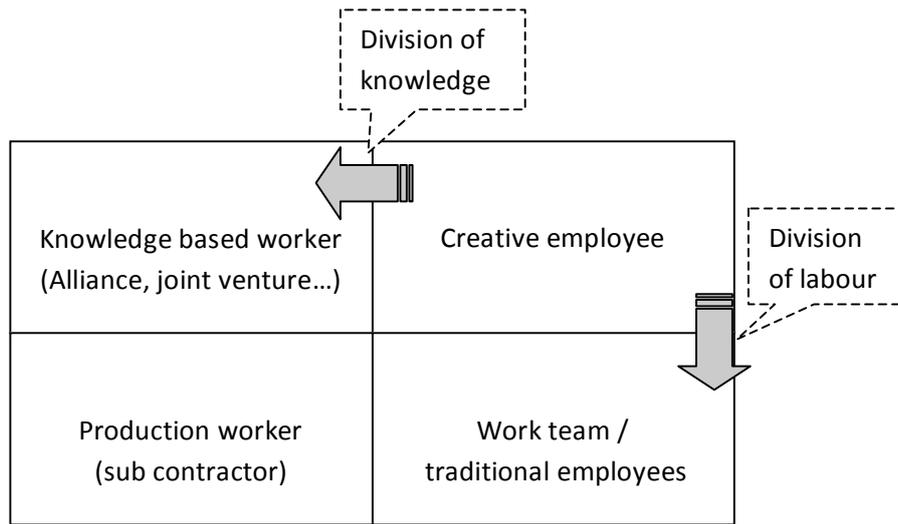


Figure 3. Division of labour and division of knowledge balance

	Network structure	Trust	Cognitive
Division of labour	Flexible structure organization	Monetary and non monetary incentive based on individual results	Development of knowledge related to the speciality
Division of knowledge	Interdependent work structures	Monetary and non monetary incentive based on group results	Development of knowledge related to different specialities

Table II. Administration modes of division of labour and division of knowledge