Internal diversification strategies and the processes of knowledge creation

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Abstract *The knowledge-based theory argues that the strategy of internal diversification reflects a process of branching-out, combination and transformation of the organization's traditional knowledge bases. From this theory, this paper has the purpose to describe the cycles and phases in the process of knowledge creation that lead to the creation of new knowledge and consequently new product and business in a diversified Spanish firm. From the case study findings a theoretical proposition is derived in order to support the theoretical argument of the theory of knowledge creation.*

Keywords *Knowledge management, Case studies, Management strategy, Diversification*

Introduction

The strategy of internal diversification of a company may be explained in terms of branching-out from its existing dominant areas of knowledge and key competences, and the application of these to the marketing of new and improved products and services (Meyer and Utterback, 1993; Kim and Kogut, 1996). Developing and investing in knowledge and related capabilities enables companies to undertake processes of expansion and diversification, and to take advantage of the evolution of markets and future opportunities in industries of rapid growth (Kim and Kogut, 1996). Kim and Kogut (1996) stated that, in evolving environments, the capability of a company to improve and renew its products and services, and to diversify within related segments, is based on the construction and accumulation of knowledge derived from past experience. Therefore, the capability to evolve and diversify is an on-going process of construction and accumulation of new knowledge extending beyond that which already exists within the company. As a result, the knowledge held by the company must be transferred to fields of application and action that are different from the current ones, through processes by which this new knowledge takes the material form of new products or of complete new businesses (Burgelman, 1983; Bowen *et al.*, 1994; Bowonder and Miyake, 1994; Jaskolski, 1996; Riggs *et al.*, 1996; Helfat and Raubitschek, 2000). Within this approach, the arguments presented will have their foundations essentially in the theory postulated by Nonaka (1991, 1994), Hedlund (1993) and Nonaka and Takeuchi (1995), who focus on the analysis of the processes by which knowledge is generated and of the particular factors of organizational design that are necessary for this generation to be undertaken successfully. The generic objective of the research presented in this paper is to analyze the processes that are necessary for implementing a strategy of internal diversification (Nonaka, 1988a,b, 1991, 1994; Hedlund and Nonaka, 1993; Hedlund, 1994; Nonaka and Takeuchi, 1995).

The paper is divided into five sections. After the introduction, the second section discusses how companies can develop processes of internal diversification by means of a model inspired by the theory of knowledge generation of Nonaka and Takeuchi (1995). In the third and fourth sections, a case study is presented of a Spanish company that is carrying out a process of internal diversification, after first establishing the methodology used for the collection and analysis of data. Lastly, the more relevant conclusions are drawn.

Internal diversification through processes of knowledge development

The knowledge-generation model proposed by the Japanese school within the knowledge-based theory (KBT) starts from the premise that organizational knowledge is created by transforming the tacit knowledge held by individual members of the organization into explicit knowledge held at the level of the organization itself (Nonaka, 1991, 1994; Nonaka and Takeuchi, 1995; Hedlund and Nonaka, 1993; Hedlund, 1994). Emphasis is placed on the following factors (Kulkki, 1996): the role of the tacit knowledge of the individuals; the nature of the company as a social context in which processes of communication and interaction arise; and the extent to which the company is flexible and open, thus generating opportunities for creation of new knowledge through the communication of the experience and expertise of its individual members.

The basic argument underlying the generation and exploitation of knowledge in an organizational context concerns two critical processes that take place simultaneously (Hedlund and Nonaka, 1993; Nonaka, 1991): a mutual exchange between tacit and articulated knowledge, representing the epistemological dimension of the model (successive phases of socialization, externalization, combination and internalization); and the transfer of knowledge between individuals, organizational units, and the close surrounding environment, which constitutes the ontological dimension. The importance of this model, unlike other contributions (Anderson, 1983; Kogut and Zander, 1992; Garud and Nayyar, 1994), lies in two aspects: it involves a bi-directional transformation of the knowledge by means of the inter-relationships between the two dimensions (Weick, 1976); and it adopts a multilevel perspective that implies a circular rather than vertical relationship between individuals, groups and work teams (Eulau, 1969; Lindsley *et al.*, 1995). This is a spiral model in which five phases can be distinguished (Nonaka and Takeuchi, 1995, p. 84): (1) the sharing of tacit knowledge; (2) the creation of concepts; (3) the justification or validation of the concepts created; (4) the construction of archetypes; (5) the mobilization or transference of the new concept and prototype to all the levels of the organization (see Figure 1).

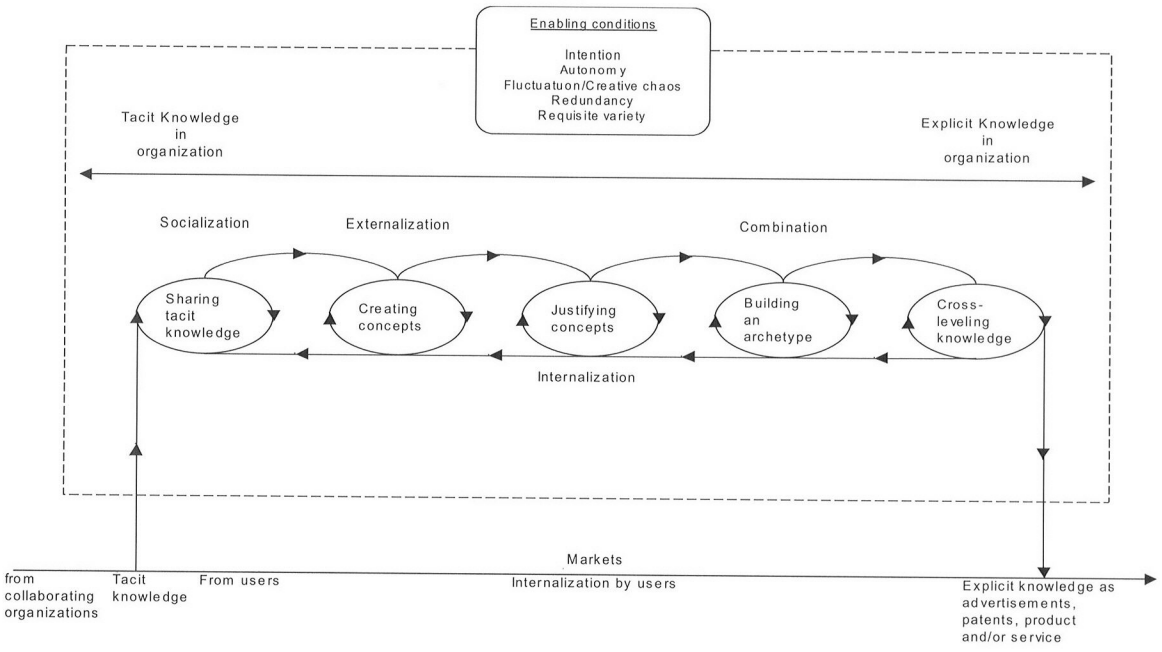
Furthermore, Nonaka (1991, 1994), proposes certain factors of organizational design that enable the processes of knowledge development to take place, with the aim of recommending how companies should be structured and what practices they should use to convert their vision into new technologies or products. Although these factors do not represent a break from classic ideas, they do provide a different perspective; these factors are: organizational intent, autonomy, creative chaos, redundancy, and requisite variety (Ashby, 1960; Nonaka, 1991, 1994; Nonaka and Takeuchi, 1995)[1] .

Internal diversification and the creation of organizational knowledge: organizational design factors and cycles

The model of knowledge creation proposed by Nonaka and Takeuchi (1995) provides an explanation of the process of internal diversification in companies. For this, it is necessary to establish the conditions and factors that must be present in organizations in order to drive and strengthen them. Then the stages of this process are analyzed, identifying the various elements of the model of knowledge generation described.

“ Senior managers need to introduce and develop the concept of creative chaos. ”

Figure 1 Model of knowledge creation



Source: Nonaka and Takeuchi (1995, p. 84)

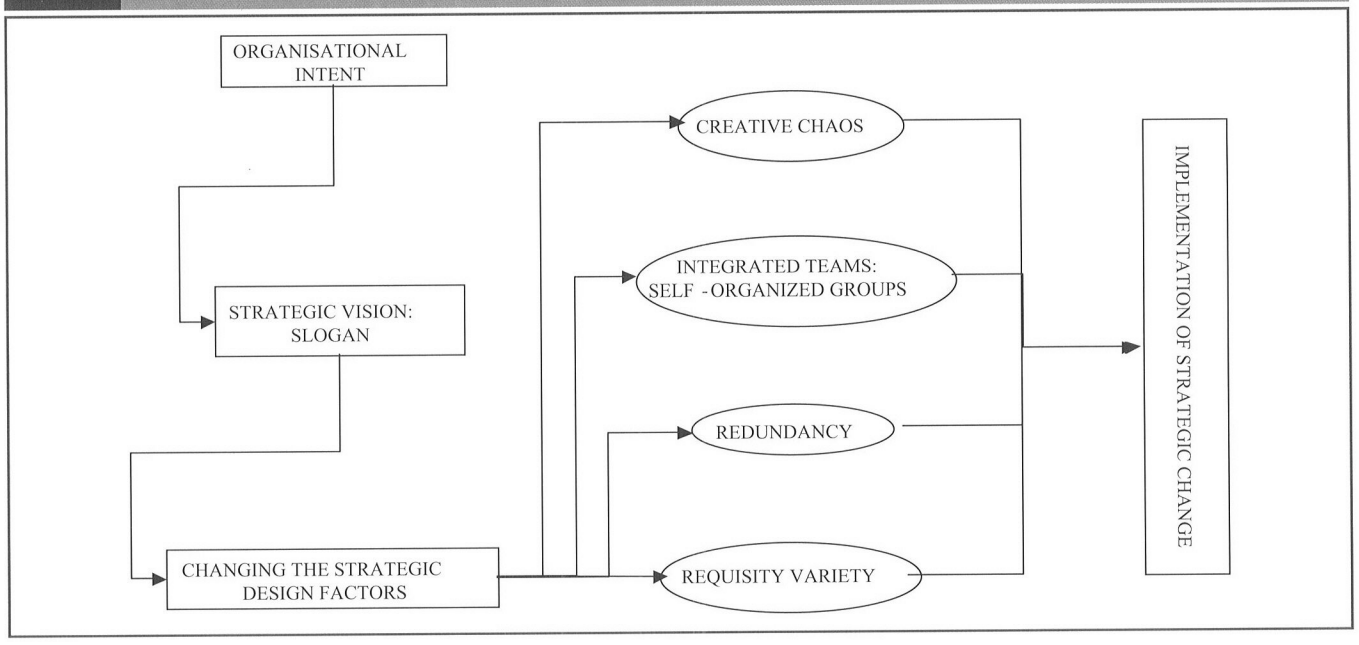
The model is based on the premise that any company starting out on a strategy of diversification must have a dynamic strategic vision of its future, and must positively desire to change and renew itself. The role of the senior management consists of outlining a framework for action to guide the company towards the envisioned future that it wants; this guide is often expressed very concisely by means of a memorable "slogan". This constitutes the articulation of the so-called "organizational intent", that stimulates and encourages the management of the company towards the development of new knowledge that will enable them to construct the company's future (Prahalad and Hamel, 1994).

The senior managers must also establish mechanisms for introducing the changes necessary in the design of their organization. For this they will need to introduce and develop the concepts of creative chaos, the integration of often widely-differing parts of the organization by means of self-organized teams, and redundancy, in order to drive individual intent, commitment and understanding between the different groups involved. Therefore, establishing this "organizational intent" to create the future, by means of a simple "slogan", and implementing the mechanisms of organizational re-design are the necessary initial conditions for a company to undertake the adventurous path of strategic renewal. Iansiti (1993) has a similar approach, considering that the constitution of integrated teams, together with the issuing of a guide or plan of action established by the management, constitute the necessary design elements for the initial stages of this process. The thinking presented so far is summarized in Figure 2.

Bowen *et al.* (1994) state the need for the existence of certain key factors in order for a company to be successful in its projects for the creation of new products or new businesses. These elements applied in a holistic way, optimize the development, promote learning, and initiate change throughout the organization. Among these, the following elements should be emphasized:

- **guiding vision** – the senior managers should paint a picture of the desired future of the company;
- **commitment and sense of ownership** – the members of the group need to feel a personal vocation and responsibility for the strategic change, guiding their intention;

Figure 2 Initial conditions encouraging and driving the strategy of diversification



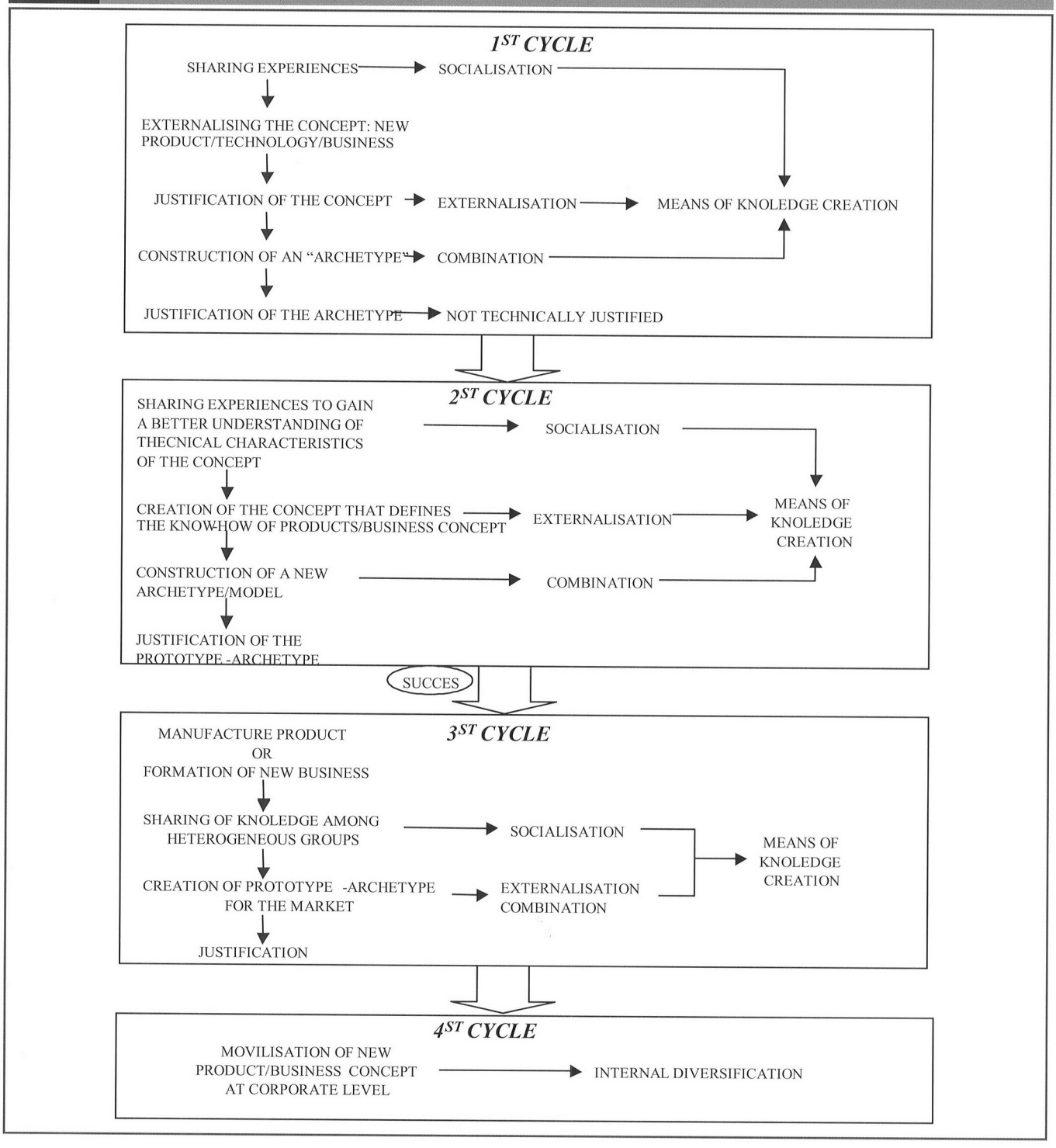
- **a dynamic and entrepreneurial internal environment** – this factor corresponds to the previously-discussed need to promote strategic change by means of creative chaos;
- **integration** – this is much more than mere coordination; this involves the re-design of job content and the tasks of each individual, to maximize the efficiency of the group.

The constitution of integrated working teams is an element that, in the literature, is considered fundamental for achieving not only the creation but also the application of new knowledge (Leonard and Sensiper, 1998; Helfat and Raubitschek, 2000). The members of such teams must have a combination of skills and must demonstrate the necessary diversity (Leonard and Sensiper, 1998). Iansiti (1993) states that the most important task of the leaders of these teams consists of allocating the projects that the individuals should undertake in such a way that gives them maximum opportunity to learn about areas other than their own, i.e. redundancy. It is these integrated teams who are going to be charged with designing the new concept of product and process, therefore the success of the integration process is fundamental (Brown and Buguid, 1998; Leonard and Sensiper, 1998). The most important requirement is that the integrated team should be working on a line of products that are related to both old and new technologies. Thus in the development of successive generations of products, the members of the team become the holders of a system of integrated knowledge. Therefore the principal function of this team consists of transforming new ideas that may arise from one or more individuals into something useful by means of the conceptualization of new products – new knowledge (Iansiti, 1993; Leonard and Sensiper, 1998).

Once the correct initial conditions have been established through the organizational design and the intent of the senior managers, the process of internal diversification would take place in a company by means of the "spiral" model of knowledge generation proposed. This would be implemented as represented in Figure 3.

The organizational design factors promote the process of knowledge creation, which take place around the following cycles and phases (see Figure 3). The first cycle of the model consists of four stages. The first begins with the incorporation of individuals from different units or parts of the organization into integrated teams demonstrating clear diversity. This context facilitates the interaction of individuals through dialogue, by which they share experiences; this gives rise to the creation of knowledge through the process of socialization. From this activity they come to develop a concept of the new product or business in the light of the slogan that defines the

Figure 3 Process of internal diversification



"organizational intent" of the company, in which the characteristics and properties required of the new product or business are specified (second stage). The consensus involved in this process stimulates and determines the commitment of the group. Such specifications of characteristics and design are presented more in ideal or general terms than concerning the viability or technological effectiveness of the concept. This second stage constitutes a process of creation of knowledge through externalization.

"Members of the team become the holders of a system of integrated knowledge."

The third stage consists of justifying the specifications or characteristics of the concept created in the light of the organizational intent of the company. Once the concept has been justified, the project is formally approved, and then an "official" project team can be formed with members drawn from the various different divisions or parts of the company as appropriate, or in the words of Burgelman (1983), the project is awarded the status of a corporate "adventure".

In the fourth stage, the attempt is made to design an archetype or model based on the concept already created and justified, utilizing the key or base technology of the company – a process of combination. This archetype is invariably presented without the many important technical details that would make it a commercially-viable product, component or design, and generally cannot be justified definitively as meeting the requirements expressed in the organizational intent. Therefore it is necessary to pass to a second cycle, aimed again at generating new knowledge through similar processes of interaction, with the objective of converting the concept into a practicable project.

The second cycle, as can be observed in Figure 3, is also begun by sharing experiences within the group, for the purpose of trying to resolve the technical difficulties detected in the stage prior to the construction of an archetype or model for the concept defined. With this aim, by means of socialization, the tacit knowledge of the members is increased, through learning the technical skills required, by integrating new individuals into the group for this. In other words, in this stage the team must learn and understand the necessary technology and skills to make the concept feasible, to give it a concrete material form. If the team does not possess the technical know-how and expertise for this, it will need to interact with other groups in the organization or incorporate new individuals, even from outside the organization. A second stage consists of articulating the new technical knowledge. This is termed externalizing the knowledge, creating a concept that defines what has been learned through action, experimentation or observation. The concept should be expressed in terms of the technology necessary to construct an efficient archetype or model. One way of doing this is the transference of knowledge through analogies. In this way, individuals in the organization with the required technical capability can generate technical specifications that incorporate these analogies and try to embody them in the new process.

The combination of the new technological concept and the knowledge of a technical character already existing in the organization gives rise to competence in a new technology. In the last stage of this cycle, the technological archetype must be justified in the light of the product concept validated in the first cycle before moving on to the third cycle.

The essential idea is that, in this stage, competence in a new technological area is being created, with the aim of making possible the manufacture of the new component or product, or the commercial launch of a new business. Central to this is that the company's capacity to evolve and diversify is founded on a continuous process of searching within itself to build new areas of knowledge onto the base represented by its established fields of knowledge. This new knowledge can then, in turn, be transferred to areas of commercial activity different from those currently pursued by the company, by means of the materialization of the knowledge in the form of new designs, components and products, and then, given sufficient potential, into new businesses.

The first and second cycles thus described are assimilated into the first part of the conceptual scenario of the internal diversification model proposed by Burgelman (1983), termed "definition of the project".

The success of the new concept of component, product, process, etc., in respect of the standards required by the company, next involves moving it from the stage of technological development to that of commercialization. In this cycle – the third one – the group is again

reinforced with members added from other relevant departments; in other words, there is a further process of integration. In this phase, the group must deal with matters such as the design or plan for sales and marketing, quality control, cost reduction, etc. For this it is necessary to make changes in order to meet the requirements identified, not only in respect of costs but also for effective marketing, sales and service.

The second stage of this cycle consists of justifying the concept and the proposed methods of manufacture in the light of the standards required for costs and quality. If these do not meet requirements, then changes must be made to the methods proposed in order to present an improved archetype that can be launched at competitive prices and quality standards onto the market. Following another process of justification, in effect to convince the company that the project is "right" for it, the fourth cycle then comes into effect.

The process of commercial analysis of the new product is not only circumscribed by the internal processes described. There must be constant awareness of the environment, as reflected in the "organizational intent" of the company; this is the expression of the opportunities displayed for the company to exploit in its environment. However, before converting an archetype into a new component capable of commercialization, product or design, it is of fundamental importance to observe the environment, to analyze customer needs and reactions, to undertake market research, etc., as well as attending to cost and quality standards.

This third cycle may be compared with the activities of support for the new product that Burgelman (1983) states are necessary for the development of "internal adventures". In short, these activities are necessary so that the technical and market development of a new idea can begin and it can move on to being considered a specific new project of the company.

The various stages of the process described in the first three cycles have been applied basically to the development of a new product that is effectively the articulation of new knowledge, and if this is sufficiently different from the products that the company is already marketing, would constitute a form of diversification. However, the new knowledge could equally have been established or applied to the development of a new process of production, a new technology or a new design of product, etc. In other words, similar stages or activities are applicable for developing various types of articulated knowledge.

The process described in the preceding three cycles explains only one way of diversifying in a company – the development of an isolated new product. To be able to speak of internal diversification as a strategic option for a company, a fourth cycle is necessary. In this phase the new knowledge generated is transferred to the whole company, so that this can be combined with existing competences giving the potential to produce families of new products or a bifurcation of the existing business into two or more new ones. This may avoid the need continuously to make special efforts, with special teams, seeking radical innovations.

Therefore companies can be considered capable of pursuing a strategy of internal diversification when, in addition to creating new organizational knowledge, they develop the capability of transferring this new knowledge throughout their whole organization and of combining it with other existing knowledge (Nobeoka and Cusumano, 1997; Helfat and Raubitschek, 2000; Meyer and Utterback, 1993; Garud and Kumaraswamy, 1995; Sanchez, 1993, 1995). Some authors have stated that both capabilities should provide a company important competitive advantages (Garud and Kumaraswamy, 1995; Sanchez, 1995). This essential capability has been referred to as "cross-levelling" or "cross-fertilization" of the new knowledge (Nonaka, 1991, 1994; Nonaka and Takeuchi, 1995; Helfat and Raubitschek, 2000).

Meyer and Utterback (1993) analyze this aspect, concentrating on the level of families of products. Each generation of a family of products represents a technical dominance or competence possessed by the company that it can use to support specific products or families of products aimed at complementary or different markets. Renewal is achieved by integrating new knowledge to improve and modify components, to introduce new designs, or to change the ways components are combined together, with the objective of improving and perfecting

the products within these families, and even developing new families. Diversification is achieved by constructing new capabilities and extending existing ones to form the bases or founding technologies of new but related families of products.

Other authors have discussed the development of new products by means of combining key existing technology with the gradual introduction of new knowledge (Garud and Kumaraswamy, 1995). Burgelman (1983) examines the management of new ventures or projects in companies in which diversification and growth represent a common strategy. The process he investigates is how companies transform their knowledge generating activities – such as R&D activity, for example – into new businesses through internal projects of corporate new ventures. In his propositions, the transfer, dissemination or combination of existing technology platforms and new knowledge also form a notable key element.

Therefore it can be stated that there is a general recognition in the literature of the importance of the transfer and combination of knowledge consolidated in different units, businesses and product families with new knowledge, for the purpose of developing new products, new families of products, and new businesses. The strategy of diversification would consist of programming projects that share knowledge (components, designs, etc.) and combining existing with newly-developed knowledge. The new products and businesses, based on related technologies and knowledge branching out in diverse new directions, will offer companies greater opportunities for growth than if they devoted all their efforts towards the creation of products derived from unfamiliar knowledge and capacities (Nobeoka and Cusumano, 1997; Helfat and Raubitschek, 2000).

Research methodology

The case study method has been chosen to derive the theoretical propositions. This method allows us to explore, in a historical, holistic and current way, the key research questions: how the processes of knowledge development assist companies to implement strategies of internal diversification, and how the factors of organization design affect and encourage this process and its success (Valdelin, 1974; Gummesson, 1991). The empirical research has been conducted in a company, operating in a dynamic environment, that has developed a strategy of internal growth through diversification out of a traditional business.

The triangulation approach was adopted using three main sources to compile the information sought: (1) documentary archives, specifically, current and historical documents, memoranda, organization charts, reports and strategic plans were analyzed, to enable a historical and longitudinal analysis of the company, its business and strategies; (2) direct observation during personal visits and periods spent with the company. Contacts held with the subject company took place over a period of six months, and provided information gathered in the form of field notes; and (3) interviews with senior directors and executives, and with middle managers (four senior executives who took part in the strategic decision-making process, plus seven middle-ranking executives who were responsible for the functional divisions and business units). Those with the former were semi-structured and lasted for an hour each. Tape recordings were made which were then transcribed. The interviews with the latter were supported by a semi-closed questionnaire with some open questions.

The company, Salvador Rus López Construcciones S.A. (RUS), was created in 1921 and is a family-owned medium sized company (223 employees) that is active in the public works sector. Its sales turnover for the year 2000 was 8,028 million pesetas (€48 million). A total of seven distinct areas of business can be identified in the company; these are closely inter-related both generally and with the central activities. These business areas are: civil works (CW) and manufacture of bituminous mixture (BM), the traditional businesses of the company and considered the "stars"; the new business units are: property management and development

“There must be constant awareness of the environment, as reflected in ‘organizational intent’ of the company”

(PMD), engineering and projects (EP), complete water treatment projects (WT), retail sales and maintenance of computer systems (SMCS), Tavora Tubing and Los Gregorios.

Research effort was concentrated on six of these eight businesses, with greater emphasis on the newly-created units: PMD, WT and EP. This emphasis reflects that the launching and establishment of some of these units were the result of transfer and bifurcation of the expert knowledge accumulated in the two traditional businesses: CW and BM. In these traditional units, renewal strategies were identified which represented the response to changes in the competitive environment and which fundamentally constituted a re-conceptualization of the management of the traditional businesses towards the search for innovation.

There were both external and internal factors underlying the decision to embark on the process of diversification in the company RUS. In respect of the first, of particular relevance are the changes in the public works sector. The maturity and degree of uncertainty of the market exacerbate the difficulty of reaching and holding a leadership position. This forced the company to seek a change in its key businesses. The reduction of levels of public expenditure in this area (reduced investment in infrastructure) and the consequent squeezing of margins were the specific reasons why RUS perceived the need to find new sources of work and new clients both within and outside the sector, and hence the importance of change and the modification of its "star" products. In respect of the internal motives, the following are significant: the change from second to the third generation of managers contributed to modifying the vision of the company; and the possession of resources and knowledge of great strategic value that constituted an important basis for the development of new knowledge. Notable among these are: experience, know-how or expertise, reputation and accumulated technical knowledge. In combination, these factors are responsible for the strategic choice of diversification.

The case study: the process of knowledge development

Traditional businesses

In order to understand the process of internal diversification of the company RUS, it is necessary to start from an analysis of the process of renewal of the two traditional businesses of the company. This is the way new technology and products arise to trigger this renewal and change, bases for the diversification into new businesses.

This traditional business of CW was subjected to a notable process of renewal as a consequence of changes in the business environment and the formulation of a new organizational intent by the company's owners. The completion of a large part of the modern road network within the geographical scope of the company's activities caused a change of demand from construction towards the management and conservation of the network and created the need for a substantial change in this traditional business. For this, the members of the executive team developed a new slogan, expressing the new organizational intent for the business, in line with the general goal of the group, which was: "to grow and spread geographically, to generate a portfolio of its own clients separate from that of the bituminous mixtures business, and to develop technologically to be able to penetrate other market segments, generating new and improved products" (*Strategic Plan*, 1996). This required some changes in organizational design like the formalization of functional autonomy for the bituminous mixtures business that traditionally had operated jointly. However, the necessary degree of cooperation and coordination was to be maintained.

The spread of a new vision reached by consensus and to develop a new business concept or new products – first and second cycle – were carried out through the following activities and processes:

- the development of research teams with the objective of innovating on the basis of the traditional product of the company and of achieving a new concept for a more differentiated and competitive product; and
- the opening of the company to temporary associations and ventures with other companies with which it could collaborate with the aim of being more competitive and acquiring knowledge from such interactions (*Strategic Plan*).

As a consequence of these activities, a product concept was created under the slogan: "differentiated and respectful of the natural environment".

The differentiation and technological diversification sought by the unit was demonstrated by the commitment made to the introduction of new technology for road resurfacing that incorporated the product concept. In this process, the research activity occupied a central place that contributed decisively to the renewal of this unit, since the technology developed enabled the creation of the new product and contributed to the birth of new businesses. This new technology involved the recycling of the existing material of the road surface without having to spread new layers of aggregate and bitumen as had to be done under the traditional method.

With this innovative product the company was a pioneer in the sector. For road conservation needs, i.e. repairs and maintenance of highways, it was able to offer not the traditional product but something new of clearly higher quality that was then not available from any of its competitors.

The innovative approach of the unit and its decided vocation of cooperation created the bases for the birth of new, closely-related businesses. In short, as will be analyzed, it was the fruit of a process of the combination and social interaction of different areas of knowledge, from which the new business units of WT and PMD were born.

The BM business unit was a leader in the geographical market area of the company's activities and, like the civil work business, was involved in a process of dramatic change, innovation and technological diversification.

The specific organizational intent that the executives were able to formulate for this business is "Growth, technological diversification, and respect for the natural environment while seeking to innovate", which was in line with the organizational intent formulated for the group as a whole (*Strategic Plan*, 1996). The specific design elements introduced were, among others, a system for quality control and functional autonomy in respect of the other traditional business of CW.

The process of knowledge development to achieve this intent is integral with the research and development activity of the company. This research activity and the innovatory vocation of the unit has made it the first company in Spain to produce a rubber-based bitumen from the recycling of used pneumatic tyres – now in the phase of experimental trials. In other words, by research and experimental learning, the unit has branched out from its main area of knowledge and has embodied this new knowledge in the form of a new, improved product. Three cycles of the process of internal diversification were observed in this experience because they had developed the technology as a basis for a new production process – a new product has been subjected to market acceptance trials with the aim of being launched on an industrial scale.

The importance of the research activity in this unit, both for its renewal as a source of new products, and for generating new business concepts based on positive research results is such that the detailed illustration of some of the experiences of the company constitute a worthwhile subject of analysis. The more notable of these are:

- Based on the knowledge generated by the BM unit, a work team managed to create a bitumen using a process that avoids the combustion and release of contaminants in the recycling of old pneumatic tyres to make bitumen.
- Initiation of a pilot experiment in the recycling of agricultural plastic, for which a collaborative project had been set up with experts in the recycling of wastes (socialization) and the resulting material would be utilized by RUS as an additive to its aggregates. This shows the company pursuing a policy of achieving a balance between an economic solution and one of respect and care for the natural environment, as the future path called for by the company's intent (externalization-combination-justification).
- Realistic-scale laboratory trials were undertaken on the recycling of wastes resulting from building construction and demolition work (RCD), with the objective of obtaining useful products and by-products for use in new construction. As part of this interesting experimental project, visits were made to the installations of the company pioneering this field to obtain more information and advanced knowledge. At the same time, it was observed

that laboratory tests were being performed to determine the feasibility of production on a commercial scale, as was already being done in other markets; also in hand were characterizations and trials of possible by-products, with tests beginning for their commercial projection.

All of these experiments demonstrate that research activities dedicated to the development of a new technology or product are really in themselves processes of knowledge generation. As a conclusion, it can be stated that the different kinds of research experimentation under way in this business unit make clear the processes of development of knowledge within a diversification process; some of these are in the phase of development and finalization of a new technology for its commercialization (combination) – as in the case of rubber-based bitumen, others in the phase of creation of a new concept (externalization) – as in the case of RCD.

New businesses

The description of the stages of knowledge development in the empirical case has sometimes been observed in a joint way, because in practice it was difficult to delimit or separate, and because to isolate the stages could be excessively artificial. For this reason, it would not appear, a priori, to be appropriate to deal with these stages in an excessively "watertight" way.

Within the first cycle, the socialization took place through the integration of groups of persons drawn from the traditional business units (CW and BM) and others from outside the company. In this way, groups of diverse composition were established for discussion and dialogue. The various professionals involved, highly qualified in diverse technical areas, who had historically worked for the two core business units, were offering collectively their knowledge and expertise with the aim of formulating new visions of possible future businesses.

The instruments utilized to foster the necessary personal interaction were the creation of teams characterized by diversity, the contracting of the services of outside professionals, together with the forming of temporary alliances or joint ventures with other companies, and activities of learning, investigation and research. The consensus on the lines of business into which the company could and should diversify was formed around businesses related to the development of complete property complexes and estates, civil works, civil engineering and the treatment of materials of construction and bitumen. From this consensus was born the shared vision for the development of the three new businesses – PMD, WT and EP.

The phase of externalization took place simultaneously with the previous one – the rounds of dialogue sought to define the concept and the characteristics of the new businesses. In the words of the General Manager: "The first stage consisted of reaching consensus and structuring an idea of how we could be competitive and of formulating business projects around our key competences". The process of externalization, in short, is the fruit of the interaction of internal organizational knowledge accumulated in the existing businesses of CW and BM, and external knowledge contributed by professionals contracted from outside the company and incorporated into the group.

The new business concepts arrived at by consensus are fully justified within the framework of the guide or organizational intent of the company, expressed as: "diversify, differentiate ourselves, and maintain our own style", and with particular reference to the "style and difference" that they wanted to imprint on each new business and product through special attention to quality and innovation. In respect of the PMD unit, the General Manager stated that the following idea had emerged by consensus: "we wanted to become a company specialized in the development and management of property, in other words, a manager of property assets, organizing, implementing and managing the complete cycle of the product from initial conception to final sale: studying the optimum use and layout of the land available, preparing the plans of the projected development, installing all the services, access roads, etc., constructing the properties and selling them". A similar process took place in respect of the EP business, with the concept agreed being centered on the development of engineering projects but differentiated in terms of structures and installations designed to respect and protect the natural environment. In the case of the third new business, WT, this was created at a later time than the PMD and EP business units – hence the stage of conceptualization of the business

drew on the knowledge that the company possessed in the construction of civil works, and in property development and engineering. In other words, those participating in the process were executives of both the traditional and the other newly-created businesses, together with the senior management, and a professional with extensive experience in the water business contracted externally, who contributed new knowledge. In this process of interaction by rounds of dialogue, the concept of the third new business was formulated as follows: "a construction business with the quality and reputation for which the company has always been recognized, operating in the water supply and treatment sector, and seeking to be in the vanguard technically" (Manager of the unit). In this formulation, reference is specifically made to the intention that this new business should transmit the reputation and image that RUS has always offered, imposing its style of attention to quality but in hydraulic constructions and in managing the complete cycle of water supply and treatment, seeking to provide innovative alternatives to traditional solutions. To summarize, the conceptualization and justification of the three new businesses are presented in Table I.

Within the creation of the necessary technology – second cycle – the four stages of knowledge creation took place simultaneously through three different ways:

(1) The formation of working teams with members from both the new and traditional business units for the purpose of transferring knowledge. "In order to put the new business models into operation, it was necessary to create an area of internal interaction. It should be stressed that there was very close collaboration and cooperation with the CW unit and between EP and PMD" (General Manager). "Various groups from different areas participated in shaping the business model and changes in the organization structure were made to ensure flexibility in the work. Here therefore, dynamic cooperation can be observed between different units and departments as well as the convergence of knowledge from a variety of sources. The closest collaboration was with the civil works business" (PMD Manager). The Manager of EP stated: "The various professionals with high technical qualifications who have historically worked for the core businesses of CW and BM are providing collectively their knowledge and competences for the purpose of modelling and shaping the new vision of the business which, given its complete and integrated character, promises to be very competitive in the market".

(2) Cooperation with suppliers and temporary alliances or ventures with other companies – "with the objective of obtaining certain necessary knowledge, this new business is very receptive to learning from suppliers and other possible companies with which it may form temporary associations" (WT Manager).

(3) Learning from external sources by means of visits to companies, attendance at international fairs and subscription to specialist journals. In the PMD unit it is believed that, to sell better, you need better knowledge of the strengths and weaknesses of your own products, and this can only be obtained from experience and learning, since this is something that is very difficult to teach and explain (see Table II).

Table I Process of conceptualization of the new businesses in the diversification process

Business unit	*Definition of the concept*
Property management and development	Company specializing in the development and management of property; capable of dealing with all stages and aspects of property asset management
Engineering projects	Development of technical projects, structures and installations particularly differentiated by relevance to issues of environmental protection and conservation
Water treatment	Business offering the quality of construction typical of RUS in the water treatment/resources sector, seeking to be in the vanguard technologically and professionally

Table II Sources of technological knowledge and other assets

	EP	PMD	WT	CW*	BM*
Technology of traditional units					
Technological knowledge held by CW and BM	✗	✗	✗	✗	✗
Marketing and distribution channels		✗	✗		
Experience of bidding for and negotiating public contracts		✗	✗		
New technology					
Cooperation with other companies, suppliers, etc.			✗	✗	
Visits to companies and exhibitions; publications			✗	✗	✗
R&D activity, recycled rubber; additives for agglomerates; RCD		✗		✗	✗

Note: * new products for the established businesses

In respect to the third cycle of the process of diversification, the case studY has not been able to detect or isolate the processes of knowledge development. It can only be derived from the design factors that the management takes action to monitor and understand what is happening in its market environment, and takes this into account in its activities and projects. Furthermore, in the R&D activities analyzed, undertaken in the traditional businesses, it was observed that trials were conducted to confirm the commercial viability of the innovations. Lastly, the WT Manager confirmed that they used informal mechanisms, i.e. interviews to obtain suggestions and reactions from clients and suppliers.

The transfer and diffusion of knowledge – the fourth cycle of the diversification process – is established as one of the most relevant cycles of those described to the extent that it represents the expansion of knowledge to other levels, and is able to give rise to yet more interaction and exchanges between different fields of dominant, competitively valuable knowledge.

The objective sought in the identification of this cycle was two-fold. On the one hand, we wanted to identify the mechanisms introduced by RUS to transfer and spread information and knowledge about the characteristics, technology and experiences gained of the new businesses and products to other groups, divisions or units of the company that did not participate in their development. On the other hand, we wanted to determine if this transfer could have stimulated or made possible the development of more new knowledge in terms of technologies, businesses, products, etc.

The data obtained were not conclusive, in the sense that the executives did not refer to any specific mechanisms set up to spread this newly-generated knowledge. However, two features have been detected that could be considered sufficient indication that this process did take place, and will take place in the future. First, mechanisms of interaction and exchange now exist within the company, and have already been employed in previous cycles, that demonstrate how knowledge is being exchanged by means of continuous contacts between the units and their supplier and possible collaborator companies, etc. This is likely to be driving the spread of knowledge to different levels of the organization and even at the inter-organizational level, with the consequent bifurcation or branching-out of the newly-generated knowledge. Second, the branching-out of knowledge from the traditional to the new business units has been clearly demonstrated.

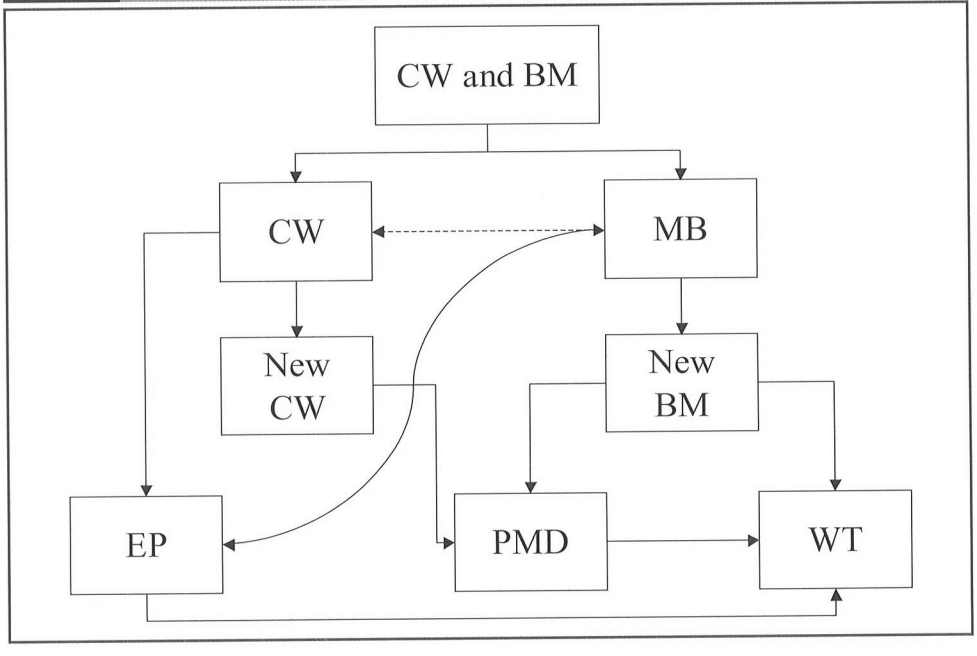
In summary, in the RUS case we can state that, in each of the business units analyzed, to a greater or less degree, the different cycles of the process of internal diversification outlined in the knowledge development model of Nonaka and Takeuchi (1995) have been observed (Table III, Figure 4). Diversification in RUS has been the result of a process of combination of knowledge held in its core businesses with other new knowledge either developed internally or acquired externally (Figure 4). The empirical evidence collected in the case study support the following proposition:

Proposition 1. The processes through which organizational knowledge is generated in a company facilitate and make possible a strategy of internal diversification.

Table III The cycles of the process of knowledge creation in traditional business

	PMD	*EP*	*WT*
First cycle: "seeking the concept"			
Process	■ Integration of groups of persons from CW and MB, with experts from outside the company	■ Integration of groups of persons from CW and BM	■ Integration of a group of persons from CW and BM, with experts from outside the company ■ Temporary collaboration with other companies
Results	■ Competence in all phases of property management	■ Environmental projects, structures and installations	■ Traditional reputation and being in the vanguard
Second cycle: "seeking the technology"			
Process	■ Marketing and distribution channels ■ Experience in bidding for and negotiating public contracts ■ R&D	■ Technological knowledge derived from the traditional businesses of CW and BM	■ Marketing and distribution channels ■ Experience in bidding for and negotiating public contracts ■ Cooperation and contacts with other companies
Results	■ Complete ecological residential property developments on a "turn-key" basis	■ Integrated engineering projects	■ Hydraulic construction projects and management of all phases of water supply and treatment
Third cycle: "seeking a viable project"			
Process	■ The company is sensitive to its competitive situation and takes steps to understand its market environment ■ Performance of viability tests in R&D	■ The company is sensitive to its competitive situation and takes steps to understand its market environment	■ The company is sensitive to its competitive situation and takes steps to understand its market environment ■ Feedback mechanisms with clients and suppliers
Fourth cycle: "expansion and combination of new knowledge"			
Process	■ Continuous interaction and exchange of knowledge between CW and BM, and collaborating companies	■ Continuous interaction and exchange of knowledge between units	■ Continuous interaction and exchange of knowledge between units, collaborating companies and suppliers (CW, BM, PMD & EP)
Result	■ PMD	■ EP	■ WT

Figure 4 Diversification process of RUS



Implications for management

From the view of practitioners and managers, the main aim of this paper is the interconnection between the diversification process in the firm – through new products, services or industries – and the process of creating and transferring new knowledge. The implications for management can be summarized in the following. First, the explanation of the diversification process through the theory of knowledge creation encourages managers to identify current resources, capabilities and knowledge that in the future will prompt it to branch-out to other units of business. Second, these theoretical contributions and empirical evidence lead to managers to understand and encourage the organizational conditions and the design that encourage the creation of new knowledge that in consequence derive in the diversification of the firm. These have implications in the structure – flexible, non traditional and holistic – as in the strategy, the organizational design – work teams and turnover – and the human resource management. Although the cycles we present are non lineal, the awareness of these cycles help managers to implement the instruments – work teams, mobility through units – that trigger off the cycles that have been proposed in the model in order to guarantee that a new knowledge is going to be created and transferred, driving the diversification process. On the other hand, the application of the theory of knowledge creation in the explanation of the diversification lets us understand the way other businesses can be interconnected in order to promote the transfer of knowledge.

Conclusions

From the knowledge-based theory, influenced by the seminal contribution of Penrose (1959), can be argued that the strategy of internal diversification reflects a process of branching-out, combination and transformation of the organization's traditional knowledge bases, guided by the strategic vision of company growth. Starting from this conceptualization of the phenomenon, the processes of knowledge development serves as a basis for trying to establish a model by which this diversification can be explained.

The four cycles of the model for internal diversification proposed have been identified in RUS. Although the four stages of the process of knowledge development are found to apply in each cycle, it has not always been possible to distinguish between them. Considering these stages, socialization has been observed in each of the business units analyzed: the mechanisms or basic tools for implementing socialization principally comprise the setting-up of working teams consisting of individuals drawn from different functional areas and from different business units within the group, and of other professionals contracted from outside, or else by temporary collaboration with other companies. Similarly the phase of creation of concepts (externalization) and justification of the concept, have also been evident during the case study. The phase of construction of archetypes (combination) has been based fundamentally on the learning that the company underwent through collaboration with suppliers and other companies, and through the importance attached by the company to research activities, mainly carried out in the two traditional businesses. Last, the stage of internalization of the knowledge or diffusion of the new knowledge generated seems to be indicated by the many areas of interaction that are taking place between the various business units and between these and other external agents. These interactions could have contributed to the existence of this last phase, and thus to the possible bifurcation of knowledge.

In conclusion, the case study results enables two types of diversification to be explained:

(1) the creation of one or more products, from the development of new bases of knowledge (CW and BM); and

(2) the diversification that can be generated when the company expands by "cross-levelling" the new bases of knowledge created, giving rise to a new combination or point of intersection of different technological bases, and obtaining new products or even new businesses (PMD, WT and EP).

These two types of diversification are not alternatives, but the second can generally arise as a consequence of the first. This is because the process of exposing different types of knowledge to different persons in the organization with different kinds of experience and training makes it

possible, by means of combination, for new knowledge bases to arise as the fruit of shared experiences, and thus for new opportunities for diversification to present themselves.

From the model and theoretical arguments presented, empirically supported by the results derived from the analysis of the information gathered in the case study, we can conclude that the theory of knowledge creation is specially useful in the description and explanation of strategies of internal diversification in organizations.

Note

1. Organizational intent, understood as the set of aspirations of the organization to achieve its goals, is embodied in the "slogan" of the organization (Nonaka and Takeuchi, 1995). Autonomy is what motivates individuals to create knowledge, and is a driving factor giving meaning or direction to individual commitment (Nonaka, 1994; Ghoshal and Bartlett, 1994). Self-organized teams are a powerful tool for giving individuals the opportunity to act autonomously as a collective or group. Creative chaos is a state or condition providing the freedom and strength, enabling and driving people to take actions that constitute the evolutionary processes bringing about change in the company, and specifically the processes of creation of new organizational knowledge (Nonaka, 1994; Nonaka and Takeuchi, 1995). Redundancy is considered a fundamental principle in the design of the company structure (Morgan, 1990; Nonaka, 1991, 1994; Nonaka and Takeuchi, 1995; Grant, 1996), and is defined as the common understanding that allows individuals to share and integrate aspects of their knowledge and experience that are unique, not held in common with the other members, thus integrating their differences in personal expectations and background (Bierly and Chakarabarty, 1996). The origin of the principle of requisite variety is found in the two structural design factors previously discussed – redundancy and chaos. This principle, proposed by Ashby (1960) and Morgan (1990), suggests that the diversity and internal complexity of a self-organized system should match with that of the surrounding environment, in order to maximize efficiency.

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