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The influence of organizational structure on organizational learning

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Abstract

Purpose – The aim of this paper is to determine what type of organizational structure provides appropriate conditions for the development of organizational learning.

Design/methodology/approach – The approach is a research model, which is based on research within the field, using a formative conceptualization for organizational learning.

Findings – The framework makes clear that organizational learning varies according to the kind of structure (organic and mechanistic). The study of the different design variables (specialization, formalization, autonomy, centralization and indoctrination) allows us to deepen our understanding of different organizational learning implications.

Practical implications – Organic structural profile helps favour organizational learning and greater knowledge creation rather than mechanics profile. The critical variables that facilitate learning are centralization and indoctrination.

Originality/value – The article responds to the need to provide empirical evidence about the influence of organizational structure on organizational learning, advancing in the measure of this emergent field of management research, using this formative conceptualization.

Keywords Organizational learning, Organizational structure, Formative measure, Development, Organizational culture, Knowledge management

Paper type Research paper

1. Introduction

The research of organizational learning (OL) has been expanded to different academic disciplines in order to promote a greater understanding of the phenomenon. Learning is a dynamic concept, and its use in theory emphasizes the continually changing nature of organizations (Dodgson, 1993). Hence, the field of OL has been characterized by a wide diversity of definitions and conceptualizations, which have been used to examine OL issues. Bontis *et al.* (2002) and Templeton *et al.* (2002) provide some examples of this variety of perspectives.

The factors affecting the development of OL are still not clearly defined, even though earlier researchers were interested in them (Fiol and Lyles, 1985; Dodgson, 1993; Nicolini and Meznar, 1995; Templeton *et al.*, 2002; Chiva *et al.*, 2007). For example, Fiol and Lyles (1985) identified four contextual factors that affect the probability that learning will occur:

(1) organizational structure;

(2) corporate culture;

International Journal of Manpower
Vol. 32 No. 5/6, 2011
pp. 537-566

0143-7720
DOI 10.1108/01437721111158198

(3) strategy; and
(4) environment.

Recent researchers have identified similar factors with influence both individual learning and OL (trust, leadership and organizational culture and structures). Consequently, organizational structure is a consolidated factor with influence on OL.

Fiol and Lyles (1985) believe organizational structure usually determines OL itself, while most authors believe structure is an outcome of OL. Organizational structure therefore plays a crucial role in determining learning processes (Fiol and Lyles, 1985; Dodgson, 1993; Bapuji and Crossan, 2004), encouraging the attention of other researchers. The characteristics of organizational structure were also recognized as critical elements influencing company productivity and innovation (Germain, 1996). According to Fiol and Lyles (1985), centralized and decentralized decision-making structures have very different impacts on the organization's learning ability. However, little empirical research has been carried out into the role of organizational structure in the learning process or knowledge management outcome. In our opinion, this is a serious deficiency because organizational structure is the basic mechanism available to the organization and their members for learning and creating knowledge.

This study aims to analyze the importance of OL and knowledge and examine empirically whether organizational structure (specialization, formalization, autonomy, centralization and indoctrination) directly affects OL process (information acquisition, information distribution, shared interpretation and organizational memory). The research model and hypothesized relationships are empirically tested using the structural equation modelling (SEM) approach, supported by LISREL software. This study has two different implications. First, analyze the importance of OL and knowledge. And second, examine empirically whether organizational structure directly affects OL or not.

2. Literature review

2.1 Organizational learning

Management literature offers different concepts and definitions of OL. There is not yet a paradigmatic approach in this field, competing numerous concepts in comprehensiveness, empirical operability and practical relevance. In an attempt to clarify the issues concerning the concept and reach consensus views, four different areas will be considered regarding OL:

(1) what learning is;
(2) its main result: the knowledge;
(3) the different types of learning according to the subject; and
(4) how it occurs (process).

The first area centers on the question "Is organizational learning a process or an outcome?". According to Argyris and Schön (1978) OL is a process of detecting and correcting errors. OL is also the process of learning from experience (Duncan and Weiss, 1979; Hedberg, 1981; Levitt and March, 1988). Fiol and Lyles (1985) suggest that OL is "the process of improving actions through better knowledge and understanding". On the other hand, various researches identify OL is a result of individual learning

(Hedberg, 1981; Dodgson, 1993; Nicolini and Meznar, 1995). Complementary, Duncan and Weiss (1979) assert that "organizational learning is a process leading to an outcome: knowledge or skill". In spite of the rare agreement within disciples as to what learning is, the literature considers the OL as a process (Argyris and Schön, 1978; Duncan and Weiss, 1979; Kim, 1993; Bontis *et al.*, 2002; Pérez *et al.*, 2004, 2006). The purpose of the learning process is the knowledge generation (Huber, 1991).

Huber (1991) defines OL with a new focus on the knowledge dimension, considering that "an entity learns if, through its processing of information, the range of its potential behaviours is changed". Another definition is given by Slater and Narver (1995), who notes OL as "the development of new knowledge or insights that have the potential to influence behaviour". Chen (2005) views OL as "the process in which an organization continuously adjusts and/or changes itself by utilizing and enriching organizational knowledge resources in an effort to adapt to both external and internal environmental changes to maintain a sustainable competitive advantage". These definitions emphasize the main outcome of OL i.e. knowledge, one of the most important organizational assets, which will be both acquired from outside and created from inside, stored and exploited, generating and involving performance.

Learning and knowledge are not interchangeable terms, which means that they must be both conceptualised correctly.

2.2 The result of organizational learning process: the knowledge

A second area of analysis concerns studying the concept of knowledge. Knowledge is the result of the learning process. The knowledge is an intangible asset that is found in the minds of individuals, processes, routines, and organizational capacities, as well as, in relationships that companies maintain with their environments. This asset creates the core competence of the company. Therefore, it has attracted the interest of many researchers from various disciplines.

It is not easy to define knowledge, because most people have an intuitive sense that knowledge is broader, deeper and richer than data or information. Knowledge is more than information, it includes the meaning or interpretation of the information. Knowledge is information placed in context through human interpretation. For this reason, knowledge is context-sensitive and history-dependent. This means that knowledge is mainly embedded in people. Hence, knowledge is the anchoring of beliefs and commitment to the information flow by the holder (Nonaka and Takeuchi, 1995). Knowledge is also the justified true beliefs and bodily acquired skills (Nonaka and Takeuchi, 1995) that increase an organization's capacity for effective action (Huber, 1991; Nonaka, 1994) and have the potential to influence action.

The appropriate use of organizational knowledge is a critical source of organizational benefits. First, it enables the development and renewal of strategic assets. Second, knowledge provides a high level of strategic flexibility and allows a more flexible reaction to environmental changes (Grant, 1996). Third, knowledge also improves organizational development through new initiatives (technological, productive or commercial). And fourth, increasing amounts of knowledge are neccesary to adapt and make the changes necessary to remain competitive. These benefits generate strategic results at organizational level. The most significant results are ensuring the company's long-term survival, and responding to dynamic complex

environments under better conditions. Finally, these benefits and results provide advantages which improve the organizational competitive positioning.

However, knowledge demands appropriate management. The companies have focused their attention on four central issues. First, create, expand, disseminate and exploit knowledge internally. Second, protect their knowledge from use and imitation by competitors. Third, share, transfer, apply and receive knowledge from collaborating companies. Finally, capture knowledge efficiently from remote locations.

If companies develop an appropiate knowledge management, the literature considers knowledge the main source for creating organizational competitive advantage (Matusik and Hill, 1998; Barney *et al.*, 2001) and one of the most important assets for sustainable competitive advantage.

This position is coherent with the empirical evidence obtained by Bontis *et al.* (2002), Pérez *et al.* (2004) and Jimenez and Cegarra (2007). OL, therefore, improves future performance (Fiol and Lyles, 1985) and is a significant source of competitive advantage (McGill and Slocum, 1993).

2.3 Subjects of organizational learning

A third area of study involves the analysis and distinction between individual and OL. Most authors have looked at how individuals in organizations learn, or have analyzed how individual learning theories could be applied to OL (Chiva and Alegre, 2005).

The cognitive perspective of OL takes on two approaches: the first focuses on individual learning as a model for organizational action, which assumes that organizations are able to learn, given that they have identical or similar capacities to those of individuals (Cyert and March, 1963; Hedberg, 1981; Levitt and March, 1988).

The second approach understands OL as a type of individual learning carried out in an organizational context by key individuals (Dodgson, 1993). Dodgson (1993) asserts that OL is a result of individual learning (Dodgson, 1993), because "individuals are the primary learning entity in firms and it is individuals which create organizational forms that enables learning in ways which facilitate organizational transformation". In this sense, Kim (1993) asserted "organizations can learn independent of any specific individual but not independent of all individuals".

Although OL has its roots in individual learning (Senge, 1990), it is somewhat more than the simple sum of the individual learning of the organization's different members (Argyris and Schön, 1978; Hedberg, 1981), although they do highlight the key role of the individual and his or her learning.

The cognitive perspective supposes OL to be an efficient procedure to process, interpret and respond to both internal and external information of a predominantly explicit nature. Authors who focus on learning as a cognitive process have tried to identify key learning processes and patterns without reference to the context in which they have been developed (Chiva and Alegre, 2005).

Other authors criticize the cognitive perspective, reaffirming the importance of taking the organization and its structure as the agent of the learning process (Cyert and March, 1963; Duncan and Weiss, 1979; Levitt and March, 1988).

OL is also seen as a dynamic process, which implies moving among the different levels of action, going from the individual to the group level, and then to the organizational level and back again (Huber, 1991; Crossan *et al.*, 1999). Crossan *et al.* (1999) argue that OL is a multilevel process that begins with individual learning, that

leads to group learning, and that then leads to OL. This means that individual learning and OL are likely to exhibit characteristics of co-dependence, though not necessarily coexistence, as learning increasingly occurs at the limits of organizations within networks and teams that cross organizational divides. Therefore, OL is multi-level: individual, group, and organization.

2.4 Organizational learning process

Previously, OL has been defined as a process. It is a starting point for prescribing an optimal OLP to revise the most significant literature about this concept, since cognitive perspective.

The model developed by Kim (1993) describes the interactions between individual and collective mental models as a transfer mechanism between individual and OL. Consequently, OL occurs through the transfer of individual level learning via shared mental models, explaining how individual learning is transferred to the organization. He combined the cognitive and behavioral aspects of learning and individual and OL.

Another significant theoretical model of OL is developed by Crossan *et al.* (1999), based in cognitive and behavioral perspectives. Crossan *et al.* (1999) argue that learning takes place on the individual, group, and organizational levels, and that four subprocesses (intuiting, interpreting, integrating and institutionalizing) link the three levels, involving both behavioral and cognitive changes. They see OL as the process of change in thought and action – both individual and shared –embedded in and affected by the institutions of the organization.

Although the previous model of OL emphasizes the interactions among learning at multiple levels of analysis (Crossan *et al.*, 1999), we confine our study only to the organizational level to be operative. The cognitive perspective focuses primarily on providing an efficient process to OL, independent of the context. However, the competitive and global context should be considered in the OLP. Both reasons may be important, and this paper merges them into one model: Huber (1991). He provides a thorough classification of OLP based on cognitive and information-processing perspective, understanding that organizations learn about "the environment", "the competition", or "production processes" (Huber, 1991).

Huber (1991) has developed a model of OL stressing the importance of four processes: knowledge acquisition, information distribution, information interpretation and organizational memory. In a similar way, Slater and Narver (1995) consider that OL consists of four dimensions:

(1) information acquisition;

(2) information dissemination;

(3) shared interpretation; and

(4) development of organizational memory.

This point-of-view has been used in a variety of research issues, including Templeton *et al.* (2002), Pérez *et al.* (2004, 2006) and Jiménez and Cegarra (2007). These authors consider OL as a dynamic process, developed over time, using different phases or steps.

For these reasons, the four different dimensions or phases identified in this research are as follows:

(1) Information acquisition is the process by which internal and external information are gathered from different sources (i.e. customers, markets, technologies, competitors and direct experiences). This process involves the search for information from both the task environment and from memory and results in the storage of the new information in working memory. Organizations generate information internally by relying on the prevailing technology and understanding of their founders (Huber, 1991); learning from direct experience (Levitt and March, 1988); or learning from the experience of others (Levitt and March, 1988).

(2) Information distribution is the process by which information from different sources is spread among the organization's members (individual and functional units, through formal and informal channels) and thereby leads to new information or understanding. Organizations can create new knowledge, and can learn by combining the information that is disseminated and shared by different units (Slater and Narver, 1995).

(3) Shared interpretation is the process by which distributed information is given various commonly understood interpretations, creating knowledge. Hence, information is given meaning, events translated, and shared understanding is developed. This is a key stage in the future acquisition and interpretation of information; creating models of understanding and bringing out meaning.

(4) Organizational memory is the means by which knowledge is retained for future use either in purpose-designed organizational systems or through rules, procedures and systems. This mechanism reduces great loss of knowledge by means of the explotation of good experience and avoiding the repetition of failure (Chen, 2005). It therefore includes theories in use, shared mental models, information databases, formalized procedures and routines, and formal cultures that guide behaviour all of which affect the OLP.

Most studies of OL have been concerned with the acquisition of information, but not knowledge acquisition. Organizations acquire information to transform into knowledge, using a learning process. Consequently, the knowledge acquisition proposed by Huber (1991) is replaced by information acquisition.

3. Organizational learning factors. The link between organizational learning and organizational structure

Organizational conditions are firmly connected with created knowledge, as contrasted in the literature (Fiol and Lyles, 1985; Dodgson, 1993; Bapuji and Crossan, 2004). Consequently, we need to analyse the factors that affect the OL, linked with its process and context (organizational culture, structure and environment). Our research centres on organizational structure and its effect on the OLP.

Organizational structure is defined as "the set of all the ways in which the work is divided into different tasks, achieving coordination" (Mintzberg, 1983). Child (1972) defined this term as "the formal allocation of work roles and the administrative mechanisms to control and integrate work activities including those which cross formal organizational boundaries". The structure reflects the formal scheme of relationships, communications, decision processes, procedures and systems (Zerilli, 1978), which allow an organization to develop its functions and achieve its objectives.

Organizational structure also reflects the way in which information and knowledge is distributed within an organization, which affects the efficiency of their utilization. Consequently, it substantially influences the distribution and coordination of the company's resources, the communication processes and the social interaction between organizational members (Chen and Huang, 2007). Therefore, the configuration of organizational structure impedes or facilitates the capacity of the company to adapt to change, to learn, to innovate or to improve its ability to generate added value for its customers.

Structure is a dynamic factor because, on the one hand, it can change over time as consequence of new organizational conditions. On the other hand, it can be frequently modified so that staff could have access to and acquire new and varied knowledge that would help them to overcome a range of problems, fluctuations and diverse situations (Lloria, 2007). Thus, structure is not an organizational uniform condition, because different parts of an organization face differing environmental pressures and may need to respond by developing distinct practices, policies and structures, e.g. R&D vs marketing.

Earlier, Fiol and Lyles (1985) point out that structures have influence on the organization's learning ability. Several reasons justify this opinion:

- OLP is developed by different subjects, the organizational structure defines the way in which their processes interact and gives rise to the OLP (Dodgson, 1993);
- OL is itself highly firm-specific, and its structure plays a fundamental role in driving and shaping the OLP (Marengo, 1992);
- learning activities needs coordination, and the mechanisms used to achieve such coordination play a central role in shaping the OLP and determining its outcome (Dodgson, 1993); and
- learning process requires information, the organizational structure influences the information flows.

All points-of-view confirm that structure is important in the learning process, and its adequacy depends on the amount of organizational flexibility required (Nicolini and Meznar, 1995) and the equivocality (or interpretability) of the information. This means that organizational structure can be a highly influential element in the creation (learning), combination, grouping and integration of the knowledge generated by organizational members, which return it directly, making it a lever for competence creation.

Organizational structure also plays a fundamental role in a company's capacity to identify the knowledge sources needed, acquiring new knowledge, integrating it into the organization and recognising its absorptive capacity. Consequently, the organizational structure is very important in how firms process knowledge.

In summary, the type of organizational structure is decisive in the development of OL. The design of the organization constitutes a process through which managers model and characterize their structure and organizational processes, determining managerial procedure and operation. It is also crucial for organizational performance since it influences the organization's ability to act and react effectively. Consequently, different typologies of organizational structure are considered.

3.1 Types of organizational structures and their influence on organizational learning

Burns and Stalker (1961) developed a dichotomy of organizational structures corresponding to differential abilities to process information, which distinguished between mechanistic and organic structure.

Bureaucratic and mechanistic structures were well suited for mass production in a stable environment (Lam and Lundvall, 2006) and were based on the belief that organizations are rational entities, whose design is a science and where people are considered economic components. They are characterized by the following attributes:

- different hierarchy levels, where organizational vision emanates from the top, and through a long process of downwards communication, reaches the employees (Ahmed, 1998); the information is consequently filtered so the agents have only a partial vision of it (Ouksel and Vyhmeister, 2000);
- intense work division, which generates high work specialization (Ahmed, 1998);
- high degree of horizontal differentiation, with specialized role responsibilities, which implies functional grouping and rigid departmental separation;
- high formalization, derived from the strict adherence to formal rules and regulations; and
- high centralization and relational complexity resulting from the managers' need to coordinate the organizational activities required to develop the vision of their planning control and continuous intervention in problem resolution, decision-making and management (Hankinson, 1999).

These organizational forms develop a considerable hierarchical control, where the managers are the key agents responsible for establishing organizational hierarchy and creating highly formalized groups of rules, protocols and formal procedures, which hide information flows through the functional and hierarchical frontiers. Consequently, all job roles are organized according to their power and authority. Hence, all employees are expected to have particular codes of behaviour. The precise definition of rights and obligations and technical methods attached to each functional role subsequently reinforces the above behaviours and reduces collaboration.

High specialization impedes the inclusion of expert or new knowledge, and high formalization reduces the capacity for improvisation and creation of new competences. Consequently, bureaucratic structure is designed to deal with routine problems but is unable to cope with novelty or change (Lam and Lundvall, 2006), reinforcing past behaviour, and inhibiting a rapid response to the competitive environment.

These structural configuration characteristics are counterproductive to new knowledge creation, and therefore inhibit the development of OL (Nicolini and Meznar, 1995). This structure is appropriate for conservative firms, with reactive behaviour and fear of risk-taking.

Organic and decentralized structures see organizations as complex and social entities, where individual and social forces compete and interact. Their main characteristics are:

- their flat structures, formed by top managers, strategic groups and multidisciplinary teamwork, where vertical decision making is replaced by horizontal collaboration;

- narrow horizontal differentiation, based on expertise and knowledge specialization rather than on operative specialization (Vivas and Peris, 2004), where departmental barriers disappear and multidisciplinary work teams are formed, made up of experts from different areas who integrate their specialized knowledge in the design and production of complex products;
- low vertical differentiation, as a consequence of workers participating in their management and control;
- little formalization of behaviour, ensuring information distribution and effective coordination (Mintzberg, 1979; Nonaka and Takeuchi, 1995), facilitating informal and bidirectional communication (Ahmed, 1998), where the main mechanisms for creating new knowledge are related, as managers manage people, technology, knowledge and processes; and
- decentralization of power and control, resulting in proactive employee participation, organizational management, and an open and trust-based culture (Hankinson, 1999).

These organizational forms have a flat and horizontal shape, with only three layers of management between the top and the front line. Knowledge is created by the employees, who operate as independent and separate actors; but middle management communicate the continuous interactive process by which knowledge is created. (Nonaka and Takeuchi, 1995). Organic structures recognize changes in beliefs and actions (Fiol and Lyles, 1985), because they place great importance on experience and knowledge. These structures are ideal for carrying out particular, unusual and/or complex tasks that frequently change, as their specialization is based on knowledge and this asset is, by its very nature, flexible and inclined to change (Vivas and Peris, 2004). This is fundamental in an environment characterized by high dynamism, complexity, hostility and uncertainty, where organizations have to be guided to continuous change, learning and innovation.

Organic structures also reduce the individual cognitive work, because they reduce the demands of information, and facilitate the assimilation of new patterns (Fiol and Lyles, 1985). In this way, these forms improve the control in international organizations or geographically dispersed subsidiaries. These arguments favour OL.

An organic structure is more conducive to learning than a mechanistic one. Organic structure facilitates the crossing of organizational levels and boundaries, and the communication; consequently, the relevant knowledge and expertise is today normally distributed widely among member groups within organizations. A mechanistic structure is less conducive to effective learning, especially in the contemporary environment, because it encourages differentiation between units and their disassociation into separate reporting lines.

Additionally, combining both types of organizational structures have resulted a "hypertext structure" (Nonaka and Takeuchi, 1995). A hypertext structure enables an organization to create knowledge efficiently and continuously. It oscillates between two basic types: bureaucracy and task force (organic). Hence, it reaps the benefit of both structures – namely, the efficiency and stability of the hierarchy and the effectiveness and dynamism of the task force. In this respect, the hypertext organization synthesizes, recategorizes and recontextualizes the knowledge generated in both structures for the entire organization.

Two main reasons justify that the hypertext structure is not considered in our research. First, this structure is focusing on Nonaka and Takeuchi's (1995) model of knowledge conversion, where bureaucracy is effective in bringing about combination and internalization, while the organic structure is suitable for socialization and externalization. And second, the organizational members do not go in and out of multiple contexts or structures, as they are only in one organizational structure.

Other new organizational models have been design to support OL and innovation such as "cellular forms", "modular forms" and "project-based networks". These studies highlight the different ways in which firms seek to create learning organizations capable of continuous problem solving and innovation (Lam and Lundvall, 2006).

4. Organizational design variables oriented to the organizational learning process: research hypothesis

Analyze the organizational structure means considering the different design variables and their influence on OL. A review of the main literature on organizational structure (Child, 1972; Galbraith, 1977; Mintzberg, 1979, 1983; Robbins, 1987) has identified several design variables proposed by different authors; however, although the content is the same, there can be alternative forms for expressing the same content. Mintzberg (1983) is one of the most respected authorities in the field of organization. He describes in detail all design variables proposed by other authors. Consequently, this paper includes all Mintzberg's design variables, except the preparation.

The centralization has also been considered a parameter of structural design by Mintzberg (1979). It describes the delegation of formal power down the hierarchy of authority.

The autonomy is refered to the degree of self-determination in how this work is carried out. To perform such roles, the workers need sufficient freedom to pursue solutions to new problems. This self-determination will of course be bounded and met. Its objective is to improve work in an environment where new ideas are permitted and encouraged.

In summary, the identified design variables are specialization, formalization, autonomy, centralization and indoctrination as the most important. Once their influence on the OLP has been justified, the hypotheses of this research are suggested for each design variable.

Specialization is a design parameter of the organizational structure. It can be horizontal and vertical (Mintzberg, 1979). Horizontal job specialization refers to the number of tasks assigned to any given job, their variety and their proportion of the whole activity represented by each task (Mintzberg, 1979). Vertical job specialization separates the performance of the work from the administration of it.

Specialization is important for OL because it implies the possession of a great quantity of information on only a few variables (Ouksel and Vyhmeister, 2000); and it influences OL, because it requires specialized individuals in specific knowledge areas.

Low horizontal job specialization shows that various different tasks are included in a job description, constantly moving from one activity to another, which creates a range of perspectives on the same information, increases the employee's knowledge, expertise and global vision, which in turn facilitates OL. High horizontal job specialization, on the contrary, refers to the individual performance of a small number of unvarying tasks. It will be difficult for them to create a range of perspectives and

points of view on the same information, reducing the possibility of acquiring extra information. For those reasons, low horizontal specialization directly affects individuals and their positive learning capacity.

Low vertical job specialization involves the employers not only in carrying out the tasks but also participating in the design and control of their own work. Consequently, it provides them with the necessary freedom to design and create new knowledge, improving their knowledge base and expertise, which in turn facilitates OL. In contrast, the level of vertical job specialization is high when employees carry out their work without going through the planning, design and control stages (Mintzberg, 1979).

The above arguments lead us to our first hypothesis of the impact of specialization on OL:

H1. Low horizontal and vertical specialization will have a positive impact on organizational learning.

Formalization refers to the standardization of work processes by imposing operating instructions, job descriptions, rules and regulations (Robbins and Decenzo, 2001). Highly formalized organizations make extensive use of written procedures and explicit rules, which eliminate the discussion about how work should be done, and reduces the alternatives to developing "creative solutions". The organization communicates pre-selected information to its members through its information system. Organization defines and characterizes its environment, not their decision-makers. These arguments justify disminishing employees' creativity and empowerment, as well as impeding the necessary spontaneity and flexibility for OL.

However, in organizations with low formalization, job behaviours are relatively unstructured and members have greater freedom in dealing with the demands of their relevant tasks (Sivadas and Dwyer, 2000). This means they are more willing to consider and discuss alternatives (Robbins and Decenzo, 2001). The social interaction among organizational members is also more frequent and intensive when implementing tasks. A less formalized work process is therefore more likely to encourage social interactions among organizational members and stimulate their creativity and learning processes. This results in our second hypothesis:

H2. Low formalization will have a positive impact on organizational learning.

In spite of previous arguments, a certain degree of standardization in the process of learning or knowledge creation is necessary, because formalization allows for problems to be identified (and these may be the source of new knowledge) and allows new knowledge to be diffused.

Autonomy is defined as the amount of job-related independence, initiative, and freedom either permitted or required in daily work activities. Autonomy gives the workers enough individual freedom to seek out solutions to new problems or self-organize social interaction networks to solve new or existing problems. Consequently, they decide what actions are required and how best to execute them (Janz *et al.*, 1997). Individual autonomy is a basis for self-organizing and increases the likelihood that individuals will motivate themselves to continuous learning in terms of creating novel knowledge and developing new competencies (Nonaka, 1994)[1]. If the autonomy is high, managers do not specify goals, talent allocations, or lines of authority; which imply that employees feel more responsibility for their work role and

context (Janz *et al.*, 1997). In this way, the organization can improve its chances of introducing new ideas and knowledge in a way that is not necessarily planned but is more innovative and efficient (Lloria, 2007).

The discussion is summarized of how autonomy affects internal organizational structure and the resulting impact on OL:

H3. High autonomy will have a positive impact on organizational learning.

The autonomy is different from the vertical decentralization, because job autonomy is operationalized by referring to the extent of employees' freedom of action to change their work duties and activities in response to technical, bureaucratic, and hierarchical constraints on their work domains (Aiken and Hage, 1966); which does not determinate the complete development of all vertical job specialization's activities (carry out the new task, participate in their design and control them). The autonomy does not imply the rewriting of their own job description, but employees need to work in an environment where new ideas are permitted and encouraged. However, a low level of division of vertical labour is positively related to the autonomy enabler (Lloria, 2007). For all these reasons, vertical decentralization may be a necessary condition, but not sufficient in itself for autonomy.

Centralization means the decision-making authority is situated in the higher levels of a hierarchical relationship (Robbins and Decenzo, 2001). Centralization produces very little delegation of decision-making authority, creating a non-participatory environment that reduces communication, motivation, social interaction, and involvement with tasks and projects among participants (Sivadas and Dwyer, 2000); which impede learning in the workplace. It distances decision-makers from the sharp end, so compromising the link between learning and action, and the ability to adapt quickly to a dynamic and uncertain world.

Under the increasingly dynamic and competitive pressure, however, knowledge workers who have wider skills, expertise, and work responsibilities would need greater autonomy and self-regulation. Therefore, decentralization is recommended for these reasons.

Decentralization refers to the degree to which decision-making power is shared. It provides various benefits. First, it allows changes in behaviour, beliefs and actions (Fiol and Lyles, 1985). Second, it encourages the participation of employees, who acquire a fundamental relevance, because the organization tries to retain workers with specific abilities which favour learning, knowledge generation and efficient performance[2]. Third, it consequently increases interpersonal exchange and social interaction (Chen and Huang, 2007), and fourth, it facilitates the assimilation and association of new patterns (Fiol and Lyles, 1985). Fifth, it furthermore reduces the cognitive workload of the employees with more decision-making capacity (Fiol and Lyles, 1985); and sixth, it provides opportunities for employees to learn from their colleagues. Finally, it widens the employee's vision of the company.

These benefits clearly have advantages for learning. In addition, if organizations possess organizational structures with a higher level of decentralization and a more informal character, with few established hierarchical levels, the interaction process between the units is facilitated thus, essential for transferring strategic knowledge.

Summarizing the previous arguments, we offer the following hypothesis:

H4. Low centralization will have a positive impact on organizational learning.

Indoctrination is defined as programmes and techniques by which norms, rules and regulations are standardized so that the workers can be trusted to make decisions and take actions in keeping with the ideology of the organization. Indoctrination is closely aligned with the socialization process. Mintzberg characterizes indoctrination as the parameter in which the organization socializes the newcomer to "fit in" or acquire the organization's values, norms and behavioral patterns. As a result of sharing the same culture, the mutual trust, team spirit and friendship between organizational members, socialization is increased (Von Krogh, 1998), facilitating the transfer of learning from the individual to the group. In this sense, Von Krogh (1998) maintains that "for the effective creation of knowledge it is necessary to pay special attention to the way in which people are related in the company". Socialization, therefore, influences on OLP, favouring its development in group and organizational areas.

H5. High indoctrination will have a positive impact on organizational learning.

The organizational structure therefore plays an important role in the OLP. As a consequence of migrating competitive advantage from tangible to intangible assets, some fundamental aspects of the organization's structure become particularly important for success. As a result, we emphasize the following points:

- Low specialization and acceptance of multipurpose posts (low task specialization) and auto-control (low vertical job specialization).
- Little formalization of behaviour, encouraging fewer written procedures.
- Non-bureaucratic decision-making systems, decentralising these and implementing autonomy as far as possible (Teece, 2000).
- Reduced hierarchical levels, encouraging rapid decision-making and facilitating extensive delegation of decision-making authority (Teece, 2000).
- A socialized community, building a culture which facilitates the flow and interchange of information and knowledge.

This organizational design coincides with characteristically organic structures, as justified in the literature. Its benefits have been shown by examining each of the design variables independently, so that it seems reasonable to assume that rather than design an organization for OL it would be better to follow an organic design approach, characterized by low specialization, formalization and centralization, and high autonomy and socialization (Vivas and Peris, 2004).

5. Research methodology

5.1 Sample and data collection

The sampling universe was the SABI Report 2002 database of companies operating in the Region of Murcia, Spain, and the sampling frame was set to include only companies whose personnel count exceeded 15 employees. Data was solicited from a population of 1,600 firms, through a structured questionnaire dispatched to the managing director in 2005. The unit of analysis for this study was the company on the assumption that aspects relating to OL affected the entire organization.

The presence of a trained interviewer increased the cooperation rates and facilitated immediate response. A total of 451 questionnaires were obtained, yielding a response rate of 28.8 percent. Approximately 55 percent of responses came from manufacturing

firms (251) and the rest from the service sector (200). The sample error was 4.9 percent, with a confidence level of 95 percent.

The respondent companies were compared with non-respondents on variables such as size and company performance. No statistically significant differences were found between the means of these variables at the 0.01 level in the two groups, suggesting no response bias. Overall, although these variables are frequently used, we cannot be certain that the respondents are not unrepresentative of the population on other variables. Another similar regional study has been observed, which the considered dimension cannot compare with other regions.

The formative measurement of the organization learning process proposed by Martínez-León and Martínez (2010) was used. As the authors suggest, this instrument should not be used with small companies because it is plausible that they do not meet certain specifications. This measurement scale is more appropriate for medium and large companies, as larger size is associated with a better learning process as suggested by Pisano's (1994) theory, because the size of an organization influences its learning processes and their results, as the OLP is more formalized. Larger organizations have more elaborate structures, e.g. jobs and units are more specialized and administrative components are more highly developed (Mintzberg, 1983). As a result, the present sample only considered 138 completed questionnaires, with companies with fewer than 45 workers dropped from the initial sample. As large companies were 210 in the population, under the assumption of normality and considering the five-point Likert scales used for measuring variables in the model, the final absolute sampling error was 0.1 units, using a confidence level of 95 percent.

5.2 Measures

5.2.1 Organizational structure. When selecting items, we decided to use only one indicator per latent variable, in line with Bergkvist and Rossiter (2007). One of the main reasons for this was to minimize the halo effect and common method bias. A five-point Likert scale was applied to measure the different items on a scale from "strongly disagree" to "strongly agree".

Based on the analysis of theoretical literatures, we believe that the most representative variables characterizing organizational structure are:

(1) horizontal job specialization level;

(2) vertical job specialization level;

(3) formalization level of tasks, procedures and skills;

(4) degree of individual autonomy;

(5) level of centralization; and

(6) degree of socialization.

5.2.2 Organizational learning process. We followed the recent proposal of Martínez-León and Martínez (2010) to measure the OLP. These authors, after a critical literature review, propose a four-dimensional formative model: information acquisition (external and internal), information distribution, shared interpretation and organizational memory. All dimensions are measured by several formative indicators which cover the domain of their respective dimensions. Martínez-León and Martínez (2010) explain why this form of operationalizing the OLP is theoretically and

methodologically better than the traditional multi-item reflective approach. Then, 20 indicators were considered using a five-point Likert scale from "strongly disagree" to "strongly agree".

The appendix displays the items used to measure all the considered variables.

6. Data analysis and results

6.1 Confirmatory analysis of the hypothesis model

We began by testing our theoretical model using the LISREL 8.80 robust maximum likelihood (RML) method. We considered all input variables as continuous. To account for measurement error in the exogenous variables, we fixed the error variance of each indicator at a specific value. Our image of each exogenous latent variable determines the proximity between that abstract concept and the real world manifestation. The extensive literature review justifies that our commitment to the fictional meaning of the latents is strong. We considered that all the indicators shared 85 percent – 90 percent of the latent variance; consequently the error variance had to be fixed at 10 percent – 15 percent of the indicator variance. We finally decided to choose the more conservative estimation of 15 percent (see Martínez and Martínez, 2008).

OL is the endogenous variable, an algebraic construction derived from the formative indicators. This is an equally weighted composite, and its variance is fully determined by the formative measures. We fixed the endogenous variance in our hypothesized model at this value, to avoid theoretical problems derived from the estimation of the endogenous variance in a more comprehensive model including formative indicators. Our model is therefore a saturated lineal multiple regression model that accounts for measurement error in predictors. In addition, the possible measurement error in OL is a portion of the estimated error variance of the OL variable.

The result of the robust estimation is shown in Table I. As can be seen, LISREL estimation provides surprising and unexpected results. None of the proposed hypotheses are verified. We have reported 95 percent confidence intervals around the estimates to complete the statistical test information. Remembering that our sample is small, the precision of the estimates is as sound as can be expected. Nevertheless, we can consider the effects of exogenous variables on OL as small, almost negligible. Only the socialization variable gives a more notable effect, but again this can be considered small.

We believe data has to be analyzed under different assumptions. Jöreskog and Sörbom (2001) indicate that considering Likert scales as continuous instead of ordinal data can distort estimates and so we carried out a robust diagonally weighted least squares (RDWLS) estimation using the polychoric correlation matrix with LISREL. Results again show how exogenous variables do not significantly affect OLP. Finally, Jöreskog and Sörbom (2001) acknowledge that the asymptotic covariance matrix should be accurately estimated using medium and large sample sizes. As our sample size is small, we decided to carry out an ordinary least squares regression with STATA 8, computing the Huber/White/sandwich estimator of variance. We compared these results with a LISREL analysis using the asymptotic covariance matrix (without counting measurement error in exogenous variables) and results were practically identical. This supports the accurate estimate of the RML that accounts for measurement error. These results are summarized in Table I.

Table I.
Regression estimates

	Organizational learning process					
	RML estimate[a]	Standardized estimate	RDWLS estimate	Standardized estimate	OLS estimate [b]	Standardized estimate
Horizontal specialization	−2.56 (−5.68, 0.56)	−0.17	−0.17 (−0.47, 0.12)	−0.17	−2.23 (−4.66, 0.21)	−0.16
Vertical specialization	1.27 (−1.12, 3.66)	0.10	0.09 (−0.12, 0.29)	0.09	1.10 (−0.70, 2.91)	0.09
Formalization	1.48 (−0.96, 3.92)	0.12	0.12 (−0.08, 0.31)	0.12	1.37 (−0.52, 3.25)	0.12
Autonomy	−1.91 (−4.55, 0.73)	−0.15	−0.15 (−0.39, 0.10)	−0.15	−1.36 (−3.30, 0.58)	−0.11
Centralization	−2.52 (−6.79, 1.75)	−0.19	−0.19 (−0.60, 0.22)	−0.19	−2.28 (−4.72, 0.16)	−0.19
Indoctrination	3.86 (−0.76, 8.48)	0.29	0.29(−0.28, 0.86)	0.29	3.35 (0.62, 6.08)*	0.27
$R^2 = 0.259$ (0.11, 0.36)[c]			$R^2 = 0.251$ (0.10, 0.35)[c]		$R^2 = 0.229$ (0.08, 0.33)[c]	

Note: [a]95 percent approximate confidence interval assuming measurement error in exogenous variables; [b]95 percent approximate confidence interval without counting with measurement error in exogenous variables; [c]Steiger and Fouladi (1992) 95 percent confidence interval; * $p < 0.05$

As our statistical estimation assumes homogeneity in regression coefficients, we conducted a new statistical analysis to test the robustness of this restrictive assumption. Study of unobserved heterogeneity has been gaining importance in the social sciences in recent years (e.g. Lubke and Muthén, 2005) and so a latent class regression analysis was carried out using Latent Gold 4.0 (Vermunt and Magidson, 2005). We followed the model estimation methodology suggested by these authors, beginning with the sequential analysis of disparate latent class models. Following Andrews and Currim (2003), the *AIC3* index based on the log-likelihood (*AIC3-LL*), was used as the criteria for model selection. In addition, *BIC-LL* index was also consulted. The lower *AIC3* and *BIC*, the better the model.

Table II shows the statistics of the different estimated models. Results sustain the homogeneity assumption; the class 1 model (M1) has the lowest BIC index, and AIC3-LL is almost identical to the lowest case (class 3 model), so it is advisable to choose the simplest case, i.e. class 1 model.

6.2 Exploratory analysis

The results of our empirical analysis show that there is no simplistic linear relationship between structural variables and OL. However, this does not mean that some organizational structures facilitate OL better than others. The relevant challenge is to discover the profiles of different companies in relation to organizational structure, and then to check if these different groups have disparate levels of OL. To do this, we can carry out a heuristic type interaction analysis, dividing companies into divergent groups depending on their organizational structure. This is now an exploratory research area, searching for some evidence which can be validated by further investigation.

We again conducted a latent class analysis with the structure variables, using the clustering approach with Latent Gold 4.0., because there is empirical evidence supporting its use in preference to other clustering techniques such as k-means (Magidson and Vermunt, 2002). However, problems occurred in the estimation because we got different likelihood ratio values each time we estimated the model. This is a local solution problem, common in this type of methodology. We increased the number of random start sets but we did not consistently get the same result. We then opted to use another clustering technique: the SPSS TwoStep. The performance of this technique is similar to the Latent Gold algorithm when dealing with continuous variables (Bacher *et al.*, 2004).

We ran the TwoStep cluster algorithm with SPSS 15.0. *BIC* and Ratio of Distance Measures (*RDM*) were taken as criteria for selecting the clusters. The lower the *BIC* and the higher the *RDM*, the better the model. Again the simplest solution, with two clusters, was considered as optimal. Table III shows the auto-clustering statistics and Table IV the cluster distribution of cases.

		BIC-LL	*AIC3-LL*	Number of parameters
M_1	1 class	1101,78	1086,36	8
M_2	2 classes	1118,91	1086,15	17
M_3	3 classes	1129,38	1079,27	26
M_4	4 classes	1160,40	1092,95	35

Table II. Estimated latent class regression models and statistics

The next stage in the analysis was to examine the composition of the clusters. Figure 1 shows the cluster profile adding the corresponding 95 percent confidence interval to each variable mean.

Two disparate structures emerge from the data. Companies in cluster 1 have a structure with no clear position in relation to the centralized-decentralized divergence. In contrast, companies in cluster 2 have a more organic structure because they present low horizontal job specialization and centralization, and high socialization and autonomy. There are therefore four variables with clearly differentiated behaviour.

Horizontal job specialization and centralization have low values. In contrast, socialization has a high score, and autonomy a medium-high value, as we saw above.

Table III.
Autoclustering statistics

Number of clusters	*BIC*	Ratio of distance measures (*RDM*)
1	630.04	
2	608.26	1.37
3	608.53	1.38
4	625.14	1.20
5	648.99	1.55

Table IV.
Distribution of cases in clusters

Cluster	*N*	%
1	51	37.0
2	87	63.0
Total	138	100

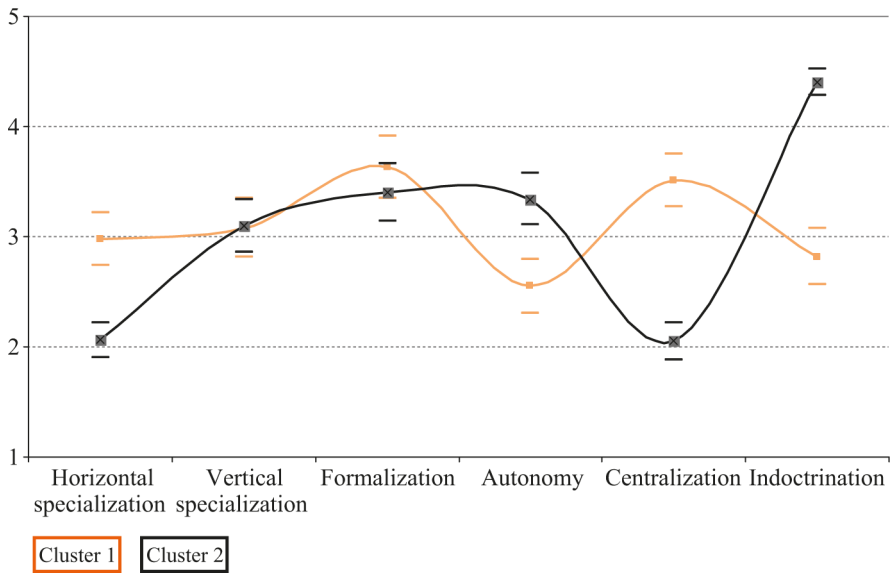

Figure 1.
Profiles of the cluster solution

The scores of these four variables clearly represent characteristics of organic structures. However, the scores of the remaining variables are located around the average values on the scale, so the interpretation is not so clear.

Once we had obtained these two different organizational structure profiles, we analyzed whether the level of OL differs. Figure 2 details the OL score in the two clusters. Again we show the 95 percent approximate confidence interval around the focused score. We converted all measures within the closed range (0, 1), to facilitate interpretation of the scores. We computed the robust Cohen's *d* effect size (Algina *et al.*, 2005), using the bootstrap procedure with 1,000 trials. Results show an effect size of 0.719 with a 95 percent confidence interval = (0.342, 1.096). Although there is considerable variability in effect size, we can see that OL is more represented in cluster 2 than in cluster 1. The difference is not negligible, and the effect size is not small[3].

In relation to the cluster characterization, there are differences in certain variables, such as the percentage of company chairmen with a university degree. Cluster 1 includes 40 percent of companies with university educated chairmen and cluster 2 includes 60 percent of companies. This difference affects the OLP level, because the chairmen of companies in cluster 2 introduce three different behaviours. First, a higher level of decentralization into their companies, because they prefer more workers to participate in company decision-making. Second, a higher level of socialization, with norms and values shared between more employees. And finally, low horizontal job specialization, generating a multipurpose workforce.

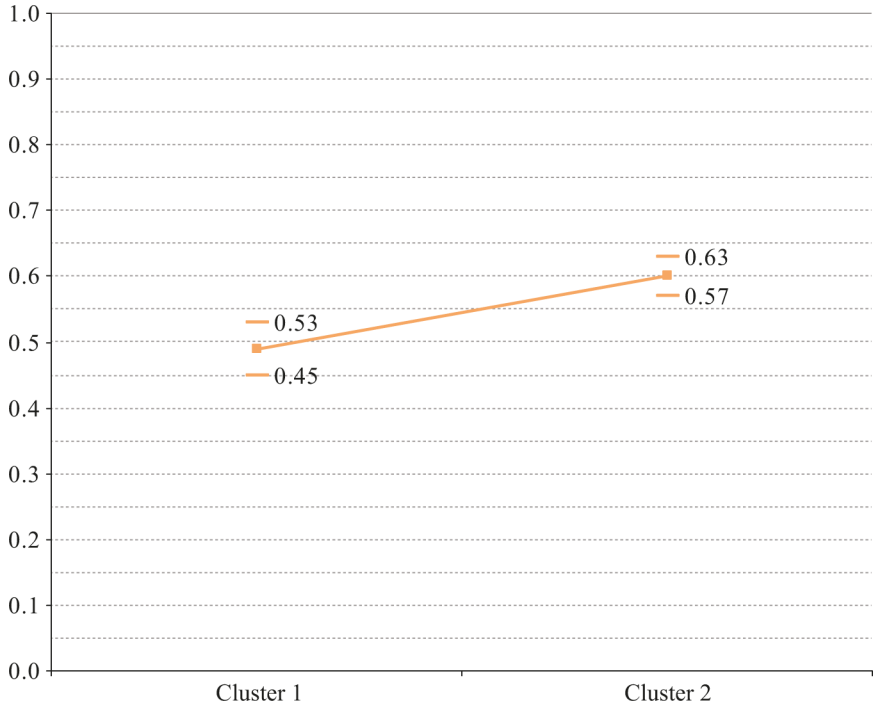

Figure 2.
Organizational learning per cluster

Although the difference between these two percentages is small, it provides an interesting area for further research. In addition, managers of cluster 1 understand learning as a key issue for competition at a lower level than those in cluster 2 (score cluster 1: 3,51 with a 95 percent confidence interval = (3.23, 3.78), score cluster 2: 4.05 with a 95 percent confidence interval = (3.86, 4.23)). Another influential variable in OLP is an organizational culture characterized by a high level of trust. Here, cluster 1 values this variable less than cluster 2 (score cluster 1: 3,56 with a 95 percent confidence interval = (3.33, 3.79); score cluster 2: 4.0 with a 95 percent confidence interval = (3.86, 4.13)), again favouring the OLP. This empirical result confirms that the trust contributes to the effectiveness of intrafirm knowledge transfer.

This kind of structure, therefore, much closer to an organic profile, facilitates learning more than a structure closer to a mechanistic profile. This allows us to assert that horizontal job specialization, autonomy, centralization and socialization are the most significant positive design variables influencing the OLP when they interact as shown in cluster 2.

Finally, we conclude our exploratory analysis with the study of the distribution of the OL scores. As shown in Figure 3, the data approximates to a normal distribution. A skewness/kurtosis test for normality (0.126) also supports this assertion. This bell shape permits a heuristic percentile analysis: we divided the distribution into three parts, using the 25 and 75 percentiles (quartile 1; quartiles 2 and 3; quartile 4), and we looked at whether the company structure in the three groups was divergent. We calculated the mean, and the 95 percent confidence interval for each variable within each group. As Figure 4 shows, the critical variables are centralization and socialization. The differences between these two variables are very noticeable if we compare quartile 4 with quartile 1. This means that companies with a high level of OL have low centralization and high socialization, whereas companies with a low level of OL present average scores in these two variables.

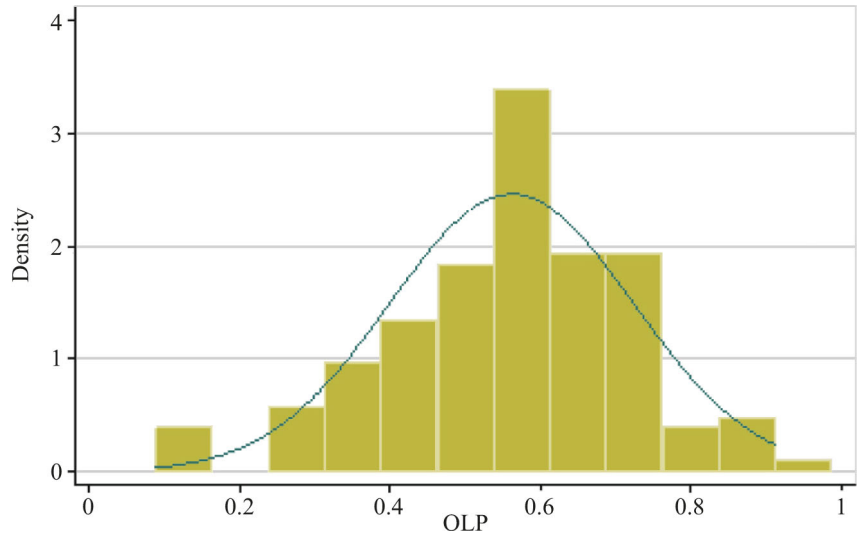

Figure 3.
Distribution of the organizational learning process score

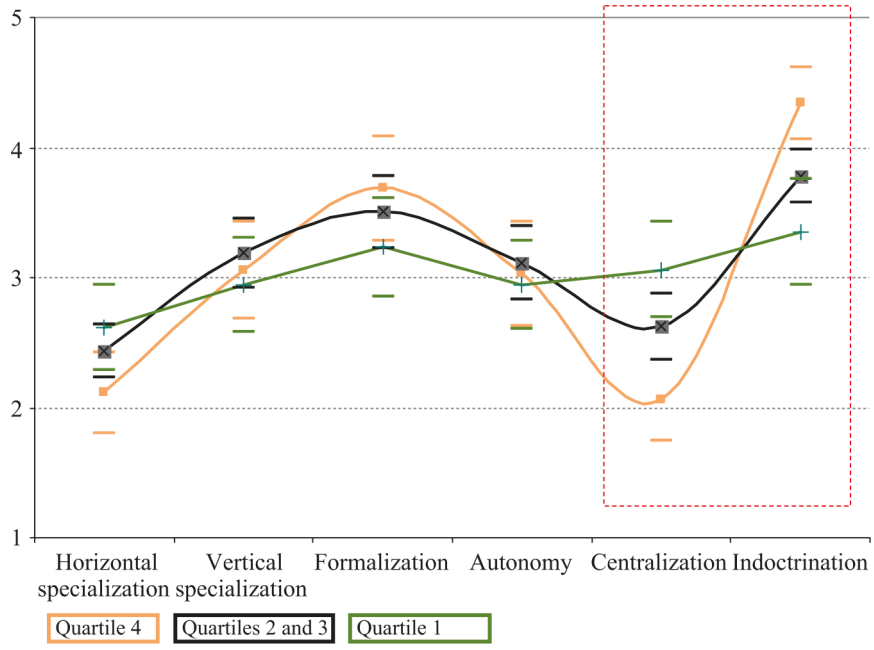

Figure 4.
Organizational structure per quartile

7. Discussion

In this paper, we have reviewed the OL literature, with a particular focus on the OLP and its facilitating factors, and especially the organizational structure and its respective design variables: specialization, formalization, autonomy, centralization and socialization.

This study tested a conceptual model to examine the role of organizational structure in OLP. The OLP was measured using a formative model with four dimensions: acquisition (external and internal), information distribution, shared interpretation and organizational memory, using the 20 indicators proposed by Martínez-León and Martínez (2010). We have observed from our empirical research that there is no significant relationship between design variables and OLP, because the results of the confirmatory analysis show that design variables do not generally have, *ceteris paribus*, a significant impact on OLP. Therefore the proposed hypothesis remains unconfirmed.

This means that a single linear model is not sufficient to explain the complex effect of organizational structure on OLP. We carried out different exploratory analyses to find different organizational structure profiles and then to study the OLP divergences. The results show two groups of companies emerging from the cluster analysis. These two groups do not present clear differences in the formal separation of organic vs centralized structures. Cluster 1 is characterized by a hybrid structure, with no clear position in relation to the centralized-decentralized divergence, although with a more mechanistic profile. In contrast, cluster 2 is characterized by a much more organic profile. Companies with this organic profile learn more than companies with a more mechanistic profile.

Low horizontal job specialization requires the employee to carry out many different, varied tasks, implying more participation in the whole process. If the variable is defined in this way, individuals can generate different perspectives on the same information, gaining knowledge of extra information that is not immediately required. This implies a positive impact on knowledge creation, promoting OLP. On the contrary, a high level of horizontal job specialization means individuals carry out a small number of non-varied tasks, so it is difficult for them to improve their perspectives, information and knowledge. In this case, the organizational goals are to improve work efficiency as a whole and to reduce the skills level required of any individual employee; this implies a negative impact on OLP. However, Mintzberg (1983) claims that a high level of horizontal job specialization can facilitate learning, if the individual works in an environment of technical and organizational complexity, because cognition is limited. In this case, the companies studied do not consider either their environment or their technology to be complex.

The level of vertical job specialization is medium in both clusters. This means the individual is not only limited to carrying out the activity, but has gained control of the activity, of implied decisions and of the objectives and criteria that govern decision-making. If this design variable is low level, we could assume OLP occurs, because individuals have to participate in their job design and control. In this context, Lloria (2007) claims that lower vertical job specialization produces more autonomy and favours new knowledge creation. However, in our case, with medium level specialization in both clusters, the interpretation of the results is limited.

The study also shows the high level of formalization existing in the organizations sampled. As Mintzberg (1983) points out, this is common in large organizations, because they have to control their employees' behaviour, reducing its variability and trying to predict and control their actions. The basic idea is that excessive formalization of communication can block the development of innovative problem solutions needing the collaboration of different areas. This means that innovative organizations must have routines that can cross the limits set up by the organizational structure. However, knowledge included in operating instructions, rules and regulations (Alavi and Leidner, 2001) and stored in the organizational memory has a double effect. First, internalizing knowledge becomes a learning process for those who acquire it. And, second, knowledge can help to create new knowledge, and means all the organizational members know exactly what they have to do in any given situation and therefore the level of organizational knowledge is higher.

According to Alavi and Leidner (2001), high formalization can produce a higher level of OLP, contrary to what is suggested in the literature and in our hypothesis model. This new perspective was analysed in the study by Vivas and Peris (2004), where the results showed that high level formalization generates greater knowledge creation. Nevertheless, our study shows that a high degree of formalization is present in companies with both high and low OLP levels. We suggest, therefore, that this variable is not a critical factor when discriminating between companies with different levels of learning.

Another important effect of high formalization is that the power to determine how work is done passes from the individual to the person who draws up the job description, a technostructure analyst. This implies a high level of behavioural formalization, leading to vertical job specialization, as noted in this paper.

Autonomy, by definition, refers to the degree of self-determination in how this work is carried out, favouring the OL and the creation, application and absorption of new knowledge. Low autonomy indicates that employees have less freedom, independence and discretion in their jobs, which limits their learning capacity and lowers the level of OLP. In contrast, autonomy is high when the employee acts independently as far as circumstances permit (Nonaka, 1994; Nonaka and Takeuchi, 1995). This allows individuals to improve their chances of introducing new ideas and knowledge in a way that may not be planned but is more innovative and efficient, working in coherence with the strategy and without generating duplication of effort. From this definition, we can conclude that a high level of autonomy at work produces more individual OLP, and so facilitates new knowledge creation. This is shown in our empirical study, because cluster 2 achieves higher autonomy levels than cluster 1.

Decentralization refers, by definition, to low centralization, reflecting information and decision-making power concentrated wherever it is needed to innovate or address a particular problem, i.e. with line workers in the operating core; with operational managers, specialists (individuals or teams) in the working environment; or with support staff in administrative units. This has a positive impact on OLP. However, as Mintzberg points out, the most decentralized types of organizations usually end up rather amorphous in structure with little distinction between the different organizational levels. Our research has shown decentralization to be a critical factor differentiating between companies with a high and low level of OLP.

Socialization is the process by which a new member learns the scale of values, the norms and the necessary behavioural rules on joining the organization or group (Mintzberg, 1983). However, since employees will be skilled professionals who have their standards of performance and expectations indoctrinated, rules and regulations will be minimal. In spite of this specific circumnstance, much of socialization is related to the culture of the particular organization, so that it is the responsibility of the organization itself. This design variable creates an organizational environment favouring OLP policies, because it facilitates the sharing of experiences, points-of-view, information and knowledge.

The results of our research are coherent with those obtained in the research by Vivas and Santonja (2007), which also used Spanish firms. According to their results, socialization is considered to be a predictive factor of OL.

8. Conclusion

Our research attempts to move from posing questions to providing significant answers for the OL literature about the facilitating factors affecting OL (inside and outside the organization), analyzed since the Fiol and Lyles (1985) study. However, a comprehensive model of the internal and external factors that facilitate OL is not yet available. For this reason, the aim of this research is to identify the organizational conditions that facilitate OLP, with an in-depth consideration of organizational structure. It is also important to note the new methodology, using a formative model, which should support future empirical research in this broader domain.

Do organizational structures characterized by specialization, formalization, centralization, autonomy and socialization, offer an appropriate context for OLP? According to the results of this study, large companies do not generate more OLP if they have a specific organizational structure, either organic or mechanistic. Generally

speaking, if the characteristics of organizational structure are closer to the organic (cluster 2): less centralized, with less horizontal specialization, less formalized, and more indoctrinated and autonomous, the levels of OLP will be enhanced. On the contrary, if the organizational structure is close to the mechanistic (cluster 1), the OLP level is lower.

We can briefly summarize the main contributions of our research as follows:

- A simple linear model is insufficient to explain the influence of organizational structure on OL. Variables of organizational structure give differences in OL when they interact.
- When interaction occurs through low horizontal job specialization and centralization, and high autonomy and socialization, companies learn more than when the converse of these four variables is true.
- The high level of formalization in the organizations is a common feature in large companies. Formalization is not a critical factor discriminating between companies with different learning levels.
- Variables that characterize organizational structure interact in a complex way, beyond the formal distinction between mechanistic and organic structures. However, if the organizational structure characteristics are more organic, the OLP level is higher than when the profile is more mechanistic.
- The critical variables that facilitate learning are centralization and socialization. Companies with a high level of OL have low centralization and high socialization, whereas companies with low level of OL present average scores on these two variables.

9. Limitations and future research

Finally, we have to mention the main limitations of this study that further research should address. The sample used only recognizes large companies, because a larger size is associated with a greater learning process and a more elaborate organizational structure. For this reason only 138 questionnaires were finally considered. Each firm is considered as a whole, which reduces the information about organizational structure and OLP of organizational units. So, the two different clusters created do not show any difference between their organizational characteristics (age, sector, productivity, or environmental factors: competition and position in the industry), except for the university education of the company chairman; managers understand learning as a key competitive issue and the organizational culture is characterized by a high level. This complicates the cluster characterization. In addition, the formative scale used to measure OLP could be subject to some discussion. This scale is developed on the basis of the scale generation process of formative variables, where items dimensions must cover all the domain of the variable of interest. The deep theoretical work of Martínez-León and Martínez (2010) give robustness to the scale, but do not guarantee that other measurement scales could also be proposed. Finally, this study has focused only on organizational structure.

In relation to future research paths, the authors believe subsequent research could take different directions. These might include information about organizational structure and OLP by organizational units, to allow both to be related better. Other facilitating factors could also be considered, such as organizational culture, strategy

and environment, or human resource management. Another interesting line of research could include qualitative case studies in one of the firms from the sample to contrast the results obtained through the structural equations.

Notes

1. Because they have the opportunity to provide inputs and further communicate their ideas during the decision-making process.
2. By means of training, development in the organization, and identification with the organizational values.
3. Cohen's (1988) conventions for effect size *d*: small (0.20), medium (0.50), large (0.80).

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Appendix

	Variable	Description of the items
Organizational structure	Horizontal specialization	Employees are multipurpose
	Vertical specialization	Employees are submitted to few revision procedures and control in the development of their work
	Formalization	Employees enjoy job flexibility, without working procedures
	Autonomy	Employees can work with autonomy
	Centralization	Company promotes the employee's participation in decision making
	Indoctrination	Company promotes communication flow to share organizational values
Organizational learning process	External information acquisition	Cooperation agreements with other companies, universities and technological centres
		Relationships with expert technicians and professionals
		Organization encourages its employees to join formal or informal networks made up of people from outside the organization
		Employees regularly attend fairs and exhibitions
	Internal information acquisition	Development of a consolidated and resourceful R&D policy
		New ideas and approaches on work performance are experimented continuously
		Innovation is supported by organizational systems and procedures
	Information distribution	All members are informed about the aims of the company
		Meetings are held periodically to inform all the employees about the latest innovations in the company
		The company has formal mechanisms to guarantee sharing of best practices among the different activity fields
		Individuals take part in several teams or divisions and also act as links between them, within the organization
		There are individuals responsible for collecting, assembling and distributing employees' suggestions internally
	Shared interpretation	All members of the organization share the same aim to which they feel committed
		Teamwork is a very common practice in the company
		The company is able to rid itself of obsolete knowledge and seek new alternatives

(*continued*)

Table AI.

Variable	Description of the items
	The company develops internal rotation programmes so as to facilitate the movement of employees from one department or function to another
	The company offers other opportunities to learn (visits to other parts of the organization, internal training, programmes, etc) so as to make individuals aware of other people or departments' duties
Organizational memory	The company has directories or emails filed according to the field they belong to, so as to find an expert on a concrete issue at any time
	The codification and knowledge administration system makes work easier for the employees
	The company has databases to stockpile its experience and knowledge so as to be able to use them later on

Table AI.

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