LANCASTER UNIVERSITY

Organizational Learning and Knowledge

5th International Conference

Friday, 30th May – Monday, 2nd June, 2003

FROM RAISING QUESTIONS TO PROVIDING ANSWERS: REVIEWING ORGANIZATIONAL LEARNING RESEARCH

Theme: Methodology

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Abstract

Prior reviews of organizational learning have noted the phenomenal growth in the literature through the 1990s, expressing concerns about the lack of empirical research. In this paper, we review the research published during the period 1990-2002, particularly empirical studies to take stock of the state of empirical research in organizational learning.

The literature on organizational learning (OL) had witnessed many reviews that helped in the consolidation and organization of the diverse research (e.g.Crossan, Lane, White, and Djurfeldt, 1995; Dodgson, 1993; Easterby-Smith, 1997; Fiol & Lyles, 1985; Huber, 1991; Levitt & March, 1988; Miller, 1996; Shrivastava, 1983). Prior reviews have dealt primarily with theoretical analysis as there had been little empirical research to review. Most of the reviews raised a concern about the lack of empirical research (Easterby-Smith, 1997; Huber, 1991) and frequently called for systematic empirical research (Miner & Mezias, 1996; Vince, Sutcliffe & Olivera, 2002).

Interest in OL had increased in the last decade and it witnessed an exponential growth in the number of publications in the 1990s (Crossan & Guatto, 1996). OL research has been portrayed as a 'volcanic activity' in which multiple foci of interest co-exist all the time, some of which are active while some are passive and may resurface anytime (Easterby-Smith, Crossan and Nicolini, 2000). Reviewing this volcanic activity at regular intervals is important for its progress. Accordingly, in this paper, we review the OL literature published during the period 1990 – 2002, to advance prior work and to focus on the empirical research. Our aim in this paper is to consolidate the research, particularly based on the empirical findings since most of the prior reviews have already examined the theoretical research. Accordingly, our primary focus is to examine what has been learned through the empirical research and how it can inform the OL field.

Reviewing the literature of a field that has witnessed an exponential growth is a difficult exercise. The difficulty is compounded by the fact that the boundaries of OL are often unclear and are shared with similar fields such as organizational knowledge, knowledge management, intellectual capital, and organizational memory (Spender, 1996; Vera & Crossan, 2002). We employed a citation search to identify the publications that have influenced the field. However, citation searches do not provide an accurate measure of the impact of the most recent publications. Accordingly, we incorporated all the recent publications from the journals that published the highly cited OL research.

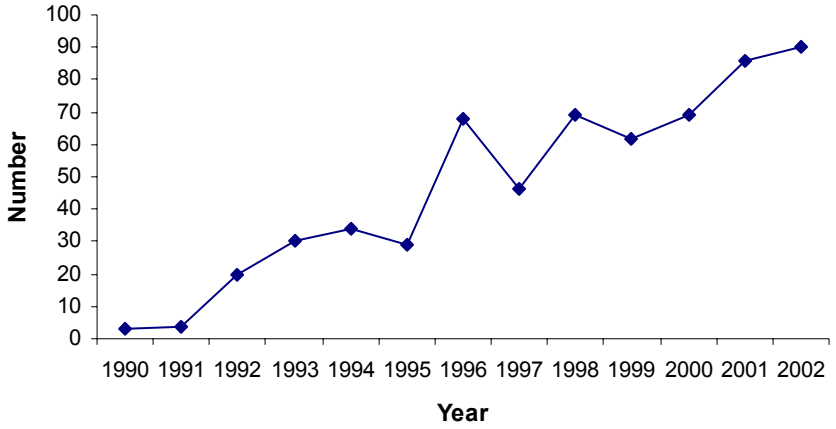
This paper is organized as follows. First, we introduce our review procedure and take an overview of the field. Second, we review the empirical literature and identify the issues of research focus. Third, we discuss empirical research on experiential learning. Fourth, we present the empirical research on the antecedents and facilitators of organizational learning. Fifth, we discuss the application of learning research in other streams and the development of a learning perspective. Finally, we suggest directions for future research.

An overview of organizational learning research

A search for the term 'organizational learning' on the *Web of Science* database resulted in a list of 707 publications for the period 1990-2002. Beginning with a modest number of four in

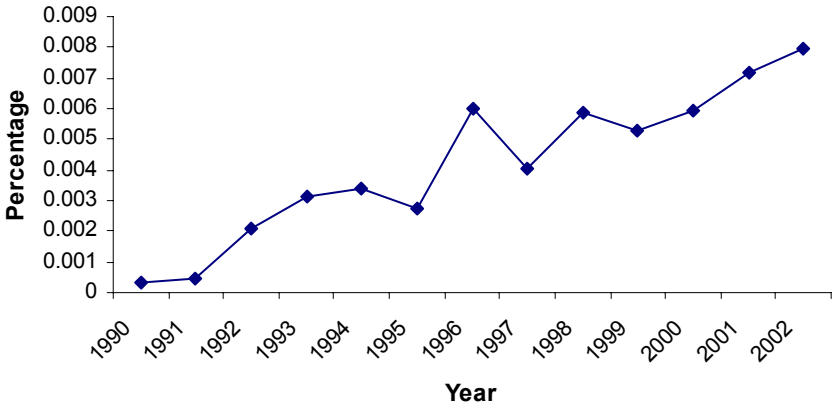
1990, the number of OL publications reached to 40 by 1994 and to 80 by 1998. In the year 2002, the number reached to 98, i.e. about 25 times more than the number of publications in 1990. This phenomenal increase in the number of OL publications indicates that the exponential growth that Crossan and Guatto (1996) noted has continued. Please refer to Figure 1 for a pictorial representation of the number of OL publications during 1990-2002.

Figure 1: OL Publications - Year-wise



The growth in organizational learning literature is not simply due to an overall increase in the publishing activity in social sciences. Overall publishing activity increased during the period 1990-2002. For example, the *Web of Science* database recorded a total of 875,314 publications in 1990. For the year 2002, it recorded a total of 1,167,920 publications, representing an increase of 75% in over a decade. The growth in OL publications during the same period was much higher, i.e. about 2500% increase. Further, the share of organizational learning in the total publications was less than 0.05% in 1990 but has grown to 0.8% by 2002. In Figure 2, we present the year-wise proportion of OL publications as a percentage of total publications.

Figure 2: OL Publications as a percentage of total publications



Of the total 707 publications in organizational learning during the period 1990-2002, 95 papers were found to have average per annum citations of two or more, and were relevant to the field. Papers that had the word 'learning' in the title and/or in the keywords were taken to be relevant to the field. In order to include the latest publications in the review, we selected the journals that published 70% of the 95 papers so identified. These journals were: *Academy of Management Journal (AMJ), Academy of Management Review (AMR), Human Relations (HR), Journal of Marketing (JMK), Management Science (MSC), Organization Dynamics (OD), Organization Science (OSC), Organization Studies (OST), Sloan Management Review (SMR),* and *Strategic Management Journal (SMJ)*. Further, *Administrative Science Quarterly (ASQ)* too was included along with these journals due to its acknowledged position as a publisher of high quality research and that it published a few very influential papers (for example Powell et al., 1996). This process resulted in an additional 28 papers published during the period 2000-2002 raising the total to 123.

Of the 123 papers that have been selected for review in this paper, eight were review papers, 60 were theory papers and 55 were empirical papers. Often, it is difficult to classify the papers either as 'theory' or 'empirical' because some papers, particularly those published since the late 1990s had both theory and empirical components. In such cases, we placed them in the empirical category. Those papers that had very little or no empirical content but a large portion of theory were classified as theory papers. The literature, as represented by the papers in our review, had roughly an equal proportion of theory and empirical papers.

About 10% of the papers selected were either review papers or those that clarified an issue by relying on an extensive literature review, for example resolving the issue of 'organizational learning' and 'learning organization' (Tsang, 1997). These papers provided a general overview of the OL literature and contributed to enriching the field and to providing directions for future research. Therefore, it is important to provide a meta-review of their arguments.

A review of OL literature reviews

One of the first questions debated in the organizational learning literature was whether learning was methodical or emergent (Miller, 1996). The notion of methodical learning received an impetus from Huber (1991), who organized the literature around information acquisition, information distribution, information interpretation, and organizational memory. He viewed experiential learning as a process of information acquisition. His review concluded that experiential learning dominated the literature (Huber, 1991).

Another question the field grappled with was the issue of level of analysis or simply put, *who or what is doing the learning?* (Miner & Mezias, 1996:91). Some scholars argued that learning occurs through individuals and that organizations themselves do not learn (Dodgson, 1993). They cautioned against reifying the organization (Simon, 1991). Other scholars argued that no single individual can determine the knowledge required by an organization (Tsoukas, 1996) and contended that learning occurs at the social levels (group and organization) (March, 1991). It was suggested that the question of levels at which learning occurs is an important research question (Miner & Mezias, 1996:91) and a useful tool for conceptualization (Crossan et al., 1996). However, some researchers argued that limiting the discussion to changes (cognitive vs. behavioural) and to levels (individual vs. organizational)

does not capture the richness of learning (Nicolini & Meznar, 1995). Indeed Easteby-Smith (1997) identified the contributions made to OL by different disciplines (such as psychology & OD, management science, sociology and organization theory, strategy, production management and cultural anthropology) and suggested against searching for a singular research agenda. (Easterby-Smith, 1997).

The literature reviews underscored yet another issue: whether learning is exogenous or endogenous (Dodgson, 1993). This question was further examined by Miller (1996) who directed our attention to the dimension of voluntarism-determinism. Synthesizing the organizational learning literature, he envisaged six types of OL: analytical, synthetic, experimental, interactive, structural, and institutional. According to Miller, the type of OL that occurs in an organization depends on the level of people involved in learning and specifics of the context, i.e. uncertainty and goal conflict (Miller, 1996). However, the notion of dichotomy between methodical and emergent learning has been challenged by some scholars who argued that they coexist in interaction with each other and are situated in the context (Blackler, 1995; Cook & Brown, 1999).

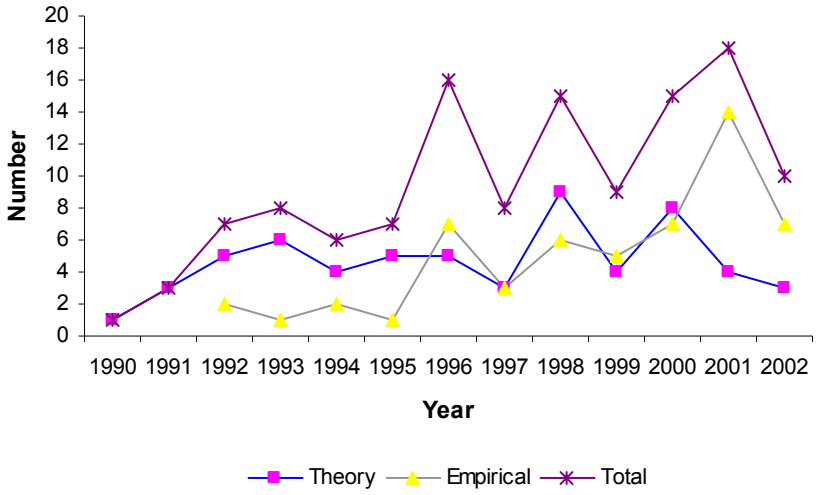
The literature has also discussed whether learning is incremental or radical. However, Miner and Mezias (1996) have argued that it is no longer an issue of concern and pointed that there is a consensus that learning can be both incremental and radical (Miner & Mezias, 1996). Among the recent debates in the field was the distinction between 'organizational learning' and 'learning organization'. Based on a review of the literature on these streams, it was acknowledged that learning organization is prescriptive in nature, practitioner-oriented and lacked scientific rigor (Tsang, 1997).

In sum, the reviews generated a wide variety of calls to the field: First, conduct systematic empirical research (Easterby-Smith, 1996; Huber, 1991; Miner & Mezias, 1996; Vince et al., 2002). Second, more research on learning beyond experiential learning (Huber, 1991), Third, higher attention to learning processes (Easterby-Smith, 1996; Miner & Mezias, 1996; Vince et al., 2002). Fourth, effort at cumulation, synthesis and integration (Huber, 1991). In the following sections, we examine the OL research against each of these concerns.

Empirical research in organizational learning

In the papers that we selected for review, empirical research was hardly visible during the early 1990s. However, a noticeable growth was evident in the empirical papers since 1996, when the number of theory and empirical publications was roughly equal. As presented in Figure 3, the proportion of empirical papers has increased, particularly in the late 1990s.

Figure 3: No. of OL Publications in the review



Empirical research in OL not only grew since the late 1990s, it also greatly impacted the field. Of the papers published since 1996, a total of 16 papers received an average of over five citations per annum. Ten papers among these were empirical studies while only five of them were theory papers and one was a review paper. Please see Table 1 for details. However, the citations received by these papers are not necessarily from OL field alone. Further, as we note later, all these papers do not have learning as their central research question. Some of these have employed learning theories to explain phenomenon such as strategic alliances, acquisitions, joint ventures, market orientation and knowledge transfer.

Table 1: Publications with 5 or more citations (1996-2002)

Paper Type	Authors and Source	Average Annual Citations
Empirical	Powell et al., 1996; ASQ	28.29
Theory	Doz, 1996; SMJ	16.43
Empirical	Lane and Lubatkin, 1998; SMJ	11.40
Empirical	Barkema et al., 1996; SMJ	10.86
Theory	Tsoukas, 1996; SMJ	10.14
Empirical	Gulati, 1999; SMJ	8.25
Empirical	Hurley and Hult, 1998; JMK	7.60
Empirical	Liebeskind et al., 1996; OSC	7.14
Empirical	Hitt et al., 2000; AMJ	7.00
Theory	Crossan et al., 1999; AMR	6.50
Theory	Larsson et al., 1998; OSC	5.80
Review	Miner and Mezias, 1996; OSC	5.71
Empirical	Simonin, 1999; SMJ	5.50
Empirical	Barnett and Hansen, 1996; SMJ	5.43
Theory	Easterby-Smith et al., 1998; ML	5.20
Empirical	Barkema et al., 1997; AMJ	5.17

JMK: Journal of Marketing, ML: Management Learning

Of the 55 empirical studies, 43 (78%) studies used quantitative research methods while 10 studies used qualitative methods. A mixture of qualitative and quantitative methods was used by two studies. The majority of studies, 37 (67%) used the organization as the unit of analysis where as five, three, and ten studies used individual, group and multiple levels, respectively.

A total of 28 studies (out of 55) used experiential learning concepts and variables. The variables included cumulative organizational experience, acquisition experience, alliance experience, partner experience, and industry experience. All these studies, except one used organizational level data and quantitative techniques. These studies mostly used learning as a mechanism to explain variation in organizational performance.

Of the remainder (27 studies), 11 studies used alternative constructs to examine organizational learning, including action-reflection (Edmondson, 2002), crisis (Kim, 1998), improvisation (Miner et al., 2001) and relative absorptive capacity (Lane & Lubatkin, 1998). All these studies, except one, researched and explained the antecedents and facilitators of learning processes. The rest, i.e. 16 studies, did not specifically use experiential or other competing learning concepts. For example, Attewell, 1992 examined technology diffusion and discussed various factors such as role of suppliers, consultants, and organizational systems. Similarly, Hult, 1998 used organizational learning consisting of team orientation, system orientation, learning orientation and memory orientation.

Of the 55 empirical studies, only 19 examined learning phenomenon and organizational learning processes such as autonomy (McGrath, 2001), collaboration (Liebeskind et al., 1996), and organizational structure (Lane & Lubatkin, 1998). The majority of the empirical studies (36 or 65%) used organizational learning concepts to explain various phenomenon such as performance, strategic alliances, innovation, market orientation, and technology adoption. However, some of these studies generated insights into facilitators of organizational learning such as participatory culture (Hurley & Hult, 1998), collaborative know-how (Simonin, 1999), and role of top management (Miller & Shamsie, 2001).

In sum, organizational learning witnessed substantial empirical research. The empirical research has also greatly impacted the development of the OL field. The majority of the empirical studies used organization as the unit of analysis and used quantitative research methods. Most studies used experiential learning concepts as opposed to alternative concepts. Further, most studies used learning theories to explain other phenomenon of interest to management researchers.

Learning from experience

Learning in an organization can occur in two ways: from the firm's own experience and from the experience of others (Bierley & Chakrabarti, 1996; Dodgson, 1993). Learning from one's own experience takes the form of trial and error learning and learning by doing. Learning from the experience of others has been referred to as vicarious learning, congenital learning, and grafting (Huber, 1991). In the following paragraphs, we review empirical research on learning from the organization's own experience and the experience of others.

Learning from internal experience

Empirical studies examined the phenomenon of experiential learning in various contexts and used numerous measures. Experience was measured as age (Grewal et al., 2001; Soreneson & Stuart, 2000) and relevant cumulative experience (Darr et al., 1995; Gulati, 1999; Pisano et al., 2001; Powell et al., 1996) whereas learning was measured in terms of its outcomes such as new acquisition (Baum et al., 2000), new alliance (Gulati, 1999; Powell et al., 1996), level of expertise (Grewal et al., 2001), innovation (Soreneson & Stuart, 2000), and productivity improvements (Darr et al., 1995; Pisano et al., 2001).

Studying the effect of learning by Pizza makers, Darr et al. (1995) found that cumulative experience leads to productivity improvements. They concluded that a learning curve exists in service organizations as well although it is very weak, i.e. only 7% decrease in cost per every doubling of output vis-à-vis 20% in manufacturing firms. Further, it was found that in high-tech industries, older firms innovate more than their younger counterparts by building on their own past innovations (Sorensen & Stuart, 2000). A similar finding from the IT industry too indicated that older firms are expert users of e-markets (Grewal et al., 2001). In another high-tech industry, Powell et al. (1996) found that prior alliance experience increases the number of future alliances. Further evidence to the assertion that prior alliance experience increases future alliances was also found in a multi-industry and multi-country study (Gulati, 1999). In the context of international expansions, it was found that the longevity of a foreign expansion increases with previous experience in the host country (Barkema et al., 1996).

While cumulative experience leads to learning, time and firm specific factors also lead to organizational learning. In a study of the automobile industry, Levin (2000) found the presence of a learning curve, i.e. firms improved efficiency as a result of cumulative experience. However, their ability to improve product quality and reliability was related only to time but not to cumulative experience. Based on this finding, Levin suggested that quality is a function of time whereas efficiency is a function of cumulative experience (Levin, 2000).

Firms differ in their ability to learn from their experience and improve performance. Studying the adoption of minimally invasive cardiac surgery, Pisano et al. (2001) found that firms differed in their ability to adopt the new technology and improve performance. Although a cumulative effect of experience on performance improvement was found, the effect of individual firms was equally strong. Using qualitative data, they suggested that the differences arose due to better procedures and systems, cross-functional communication, leadership, and team work (Pisano et al., 2001). Therefore, accounting for firm-level differences in learning can better capture the phenomenon under investigation. Further, their study points to the need to use better measures for organizational learning than the proxies such as age and cumulative experience.

In sum, the empirical research on learning from internal experience found that organizations do learn form their cumulative experience. However, other firm specific factors such organizational systems and procedures explain the phenomenon of organizational learning better. Further, it was found that firms' ability to learn is a function of time.

Learning from external experience

Experience of other firms is another mechanism through which a firm can learn. Firms were found to invest in R&D not only to innovate but also to enhance their absorptive capacity, i.e. the capacity to identify new knowledge from the environment, acquire it and exploit it (Cohen & Levinthal, 1990). Huber (1991) suggested that a new firm learns from the past experience of other firms in the industry, i.e. congenital learning, and also from the experience of other firms during the course of its operation, i.e. vicarious learning (Huber, 1991). Further, learning from a particular partner, i.e. inter-organizational learning, too has received much research attention in the past. In the following paragraphs, we discuss the research on these three types of learning.

Congenital learning

Learning from one's own experience may not always be productive because it tends to pay too much attention to short-term and local conditions. Learning from the experience of the industry can offset the risks involved with learning from a firm's own experience (Baum & Ingram, 1998; Ingram & Baum, 1997). Studying the Manhattan hotel industry, they found that the industry experience at the time of a hotel's founding, i.e. congenital learning, and during the period of a firm's operation, i.e. vicarious learning are negatively related to its failure (Baum & Ingram, 1998; Ingram & Baum, 1997). Further evidence from the pharmaceutical industry suggests that successful firms were found to place equal emphasis on learning from their own knowledge as well as others' knowledge (Bierly & Chakrabarti, 1996).

Vicarious learning

Competitive exposure to other firms enhances learning because it presents a threat to the existing position of an organization, dealing with which an organization learns (Barnett & Hansen, 1996). Such learning prompts imitation by competitors and results in further competition. In an empirical study conducted in the banking industry, it was found that organizations that faced a large number of competitors learned more from the competition. Further, the benefits of learning were found to be over and above the benefits a firm can derive from market advantages (Barnett & Hansen, 1996). Similarly, the manufacturing strategies of the firms in the hard-disk drive industry were found to have converged across the globe even though they were not connected to each other (McKendrick, 2001).

Empirical research established that hospitals acquire the nursing homes closer to the units of competitors in similar positions (Baum et al., 2000). Similarly, university colleges adopted the programs introduced by those similar to them in the network but not by large and prestigious colleges. Further, they adopted the programs that have proved to be successful and adoption is higher when an organization's own performance is sub-standard (Kraatz, 1998). Small banks, however, seem to follow a different pattern. They established new branches in the areas where large banks have branches (Greve, 2000). Evidence from the radio broadcasting industry too indicated that stations introduced new changes when they were related to the changes their competitors have made (Greve, 1998). These empirical findings establish the notion that firms learn from the actions of other firms.

Studies that examined vicarious learning emphasized the need to understand the basis on which a source is chosen for vicarious learning. Several possibilities have been presented: size of the competitors (Greve, 2000), similarity of the competitors (Baum et al., 2000), and success of the response (Kraatz, 1998). Also, a firm's own performance too found to play a role in choosing the source and type of vicarious learning. An empirical study conducted in a university setting found that firms adopted only those responses that proved to be useful and did so particularly when their own performance was sub-standard (Kraatz & Zajac, 1996; Kraatz, 1998).

Inter-organizational learning

Firms learn from other firms in the industry. However, their capacity to learn from inter-organizational relationships is much higher and more relevant because a firm does not have equal capacity to learn from all other organizations (Lane & Lubatkin, 1998). Lane and Lubatkin argued that a firm learns from its partner when its knowledge base, organizational structure and dominant logic are similar to the other firm. They empirically established their arguments through a study conducted on the strategic alliances in pharmaceutical and biotechnology industries (Lane & Lubatkin, 1998). Further empirical evidence suggests that a firm's learning from its partner depends on the prior experience with that partner and that this effect is over and above the effect of prior alliance experience of the focal firm (Zollo et al., 2002).

Strategic alliances, collaborations and joint ventures are seen as primary vehicles for inter-organizational learning that promotes innovation (Liebeskind et al., 1996; Powell et al., 1996; Zollo et al., 2002). Evidence from the international research suggests that learning considerations operate in joint ventures. For example, Hitt et al., 2000 found that in the selection of strategic alliance partners, emerging market firms emphasize more (than the developed market firms) on the financial assets, intangible assets, willingness to share expertise, and technical capabilities whereas developed market firms emphasize unique competencies, marketing knowledge/access, managerial capabilities, and previous alliance experience (Hitt et al., 2000).

The research from inter-organizational learning suggests that a firm must be linked to the other firm in some manner for the learning to occur. However, the literature provided mixed support on this. For example, Darr et al., (1995) found that the Pizza stores learnt from the experience of other Pizza stores in the chain with whom they are linked but not from the stores outside the chain (Darr et al., 1995). In contrast, Barnett and Hansen (1996) argued that an organization learns from its competitors by virtue of exposure to them and the consequent pressure to improve performance (Barnett & Hansen, 1996). Similarly, firms in the hard-disk drive industry learned and employed successful manufacturing strategies even though they were not connected to each other (McKendrick, 2001).

In sum, the empirical research established that organizations learn from external sources: from alliance partners, other firms in the network, and from the industry. Inter-organizational learning is facilitated by development of inter-organizational routines. Vicarious learning is facilitated by competition and imitation. The criteria on which a firm selects its source for vicarious learning is not clear and seems to differ from one industry to another. Firms also learn from the experience of the industry. However, the research has not delineated the

conditions under which a firm establishes a link with another organization to learn and when it can learn simply through imitation and observation.

Organizational learning facilitators

In concluding his review of the OL literature, Dodgson (1993) suggested that the organizational mechanisms that facilitate OL must be an area for research attention (Dodgson, 1993). Recently, the same concern was echoed by Vince et al., (2002) who suggested that our understanding of the antecedents of OL can be broadened through large-sample empirical research (Vince et al., 2002). Various organizational factors such as culture and organizational systems and procedures contribute to organizational learning. In this section, we discuss the factors that the empirical research has found to have facilitated OL. Keeping with our earlier discussion, we categorize them into two groups: internal to the firm and external to the firm and discuss them separately.

Internal factors

The empirical research found that various organizational factors such as culture, strategy, structure, and other factors have been found to facilitate OL. Based on a study of technology adoption, Woiceshyn (2000) suggested that various factors such as resources allocated to learning, motivation, incentives provided, shared values, and firm strategy influenced organizational learning (Woiceshyn, 2000). In the following paragraphs, we discuss the various factors that have been found by the empirical research to influence OL.

Culture

In a field study of nuclear and chemical plants, Carroll (1998) found that the different cultures and logics operating in an organization make learning difficult. These logics are: design logic, operator logic, executive logic and social scientists' logic. These logics have different purposes and clash with each other while evolving a consensus interpretation thereby blocking learning (Carroll, 1998). In another empirical study, it was found that purchasing culture, reflected in openness and transformational leadership, has a positive influence on organizational learning (Hult et al., 2000). In yet another study, participative decision making culture, and a learning and development orientation were found to be positively associated with innovativeness (Hurley & Hult, 1998).

In a study of project groups, it was found that project groups learned better under goal and supervision autonomy when the degree of exploration required for learning was high. However, autonomy has a negative effect when the required degree of exploration was low (McGrath, 2000). The role of supervisory support was further established in a study of environmental initiatives where positive supervisory behavior and organizational support were found to positively influence organizational learning (Ramus & Steger, 2000). Further, it was found that organizational accountability has a negative impact on learning from imaginative thinking and reflection (Morris and Moore, 2000).

Strategy

Organizational actions and strategies play an important role in facilitating or hindering organizational learning. In the pharmaceutical industries firms that followed different learning strategies were found to learn differently. For example, firms that followed an innovation strategy emphasized both incremental and radical learning (besides internal and external learning). They were more successful than other firms (Bierly & Chakrabarti, 1996). Empirical studies provided evidence that network portfolio diversity (Powell et al., 1996) and ownership level in equity alliances too positively influenced OL (Pennings et al., 1994; Zollo et al., 2002). Further, it was found that a firm's motives behind an action such as legitimacy or efficiency influenced learning; legitimacy motives were negatively associated with learning whereas efficiency motives were positively related (Grewal et al., 2001).

Organizations that face a stable and predictable environment tend to be complacent. Therefore, organizations must consciously create crises in an organization to establish a performance gap and shift an organization's orientation towards innovation, argues Kim (1998) while presenting the case of Hyundai Corporation (Kim, 1998). Boundary spanning is yet another strategy firms can employ to learn and innovate. Research conducted in the optical disk industry found that organizations that continuously cross boundaries of technology and firm made a significant impact on the industry and technology domains (Rosenkopf & Nerkar, 2001). Sharing knowledge with the innovation systems is yet another strategy firms can employ to achieve superior innovative performance, as was found in the flat panel display industry (Spencer, 2003).

Structure

In a study of the restaurant chains in the United States, it was found that governance structures influence the type of learning. Company owned units learned from the parents experience and exploited that learning whereas franchisees explored with new behaviour (Sorenson & Sorensen, 2001). In another study in the hotel industry, it was found that franchise operating experience was positively related with failure rates (Baum & Ingram, 1998; Ingram & Baum, 1997). Based on their findings, Baum and Ingram suggested that research attention must be directed towards franchising as an organizational form and its role in learning. In yet another study, it was found that similarity between the organizational systems and compensation structure facilitated learning between them (Lane & Lubatkin, 1998).

In a study of technology diffusion, it was found that organizations facilitated adoption of new technology by changing the IT from a centralized function to a self-service function (Attewell, 1992). Studying the adoption of new technology in hospitals with the help of quantitative and qualitative data, Pisano et al. (2001) found that better learners differed from others on a variety of factors: They had formal procedures for adoption, i.e. selection of people, their utilization, entry of new members, and their induction. They encouraged cross-functional communication to introduce the technology to organization. They ensured stability of team membership and operative procedures till the learning was internalized in the organization. Further, they engaged in team debrief activities. Finally, it was found that positive surgeon coaching behavior facilitated the learning (Pisano, Bohmer & Edmondson, 2001).

Miscellaneous Factors

Some studies indicated that the evolutionary stage of the organization impacted the learning. It was found that bio-technology firms depended on other firms for learning during their early stages and began to focus on internalizing the learning as they matured (Oliver, 2001). Studying the innovation activity of a joint venture, Van de ven & Polley (1992) found that learning did not occur during the initial expansion phase of the project because the members involved were concerned with impression management, did not have full-time involvement, lacked focus and failed to identify the setbacks. During project contraction, market tests triggered investor intervention and broke the project's escalating commitment to failing courses of action. Consequently, learning occurred during the contraction phase (Van de ven & Polley, 1992).

In a study of a learning network of firms, Hanssen-Bauer and Snow (1996) found that each stage of the network evolution was associated with different learning facilitators. Learning in the launch stage was facilitated by individual and company leadership, network ownership and structure, broker behavior, and shared vision and focus. In the development stage, learning was facilitated by program stability, membership variety, modern management paradigm, professional network development, R&D institutional linkages, local demonstration projects, and external financial support. Finally, the maturity phase was facilitated by thematic renewal, professional input support, flexible sub-network building, expansion of core and peripheral members, and environmental impact (Hanssen-Bauer & Snow, 1996).

Some studies also argued that the resource position of a firm is an important factor in facilitating learning. For example, it was found that firms that are large enough to absorb the high costs of learning and already possess related knowledge tend to incur the costs and make efforts to learn new technology even when there are significant learning barriers (Fichman & Kemerer, 1997). Similarly, Kraatz & Zajac (2001) found that universities with a high level of resources are slow to adopt. However, such disinclination to change had a positive effect on performance (Kraatz & Zajac, 2001).

In sum, the empirical literature found that culture, autonomy, experience diversity, boundary spanning, learning strategy of the organization, evolutionary stage of the firm and resource position affect organizational learning. However, the direction of relationship depends on the type of learning involved as it was evident from the empirical findings.

External factors

An organization's position in the industry, its access to resources and nature of the competitive dynamics in the industry impact an organization's learning (Barnett & Hansen, 1996; DeCarolis & Deeds, 1999; Gulati, 1999). Competition facilitates learning because it presents a threat to the existing position of an organization. While responding to this threat, an organization learns. Such learning prompts imitation by competitors and results in further competition. In this manner, competition from other firms helps an organization to learn and improve (Barnett & Hansen, 1996). When major technological changes take place, they create knowledge barriers between firms in the industry and new technology. As a result of

these barriers, firms cannot learn the new technology until the associated organizations such as suppliers and consultants reduced the learning barriers (Attewell, 1992).

Access to resources such as talent, collaboration partners, and research institutions is yet another determinant of organizational learning (Powell et al., 1996). Conceptualizing firm capabilities as stocks and access to resources as flows, DeCarolis and Deeds found that the performance of biotechnology firms is dependent on their access to resources and internal capabilities (DeCarolis & Deeds, 1999). Further, a firm's position in its network and the number of ties it has with other firms in the network plays an important role in learning because it provides the firm with access to resources and partners for collaboration (Gulati, 1999; Powell et al. 1996; Tsai, 2000).

Environmental characteristics have an important role to play in learning (Grewal et al., 2001; Luo & Peng, 1999). Luo & Peng (1999) found that intensity and diversity of experience are positively related to performance and the positive relationship is stronger under environmental hostility. Under greater environmental dynamism, only the effect of diversity of experience was found to be stronger while under greater environmental complexity, only the effect of intensity of experience was stronger. Similarly, Grewal et al. (2001) found that environmental dynamism has a negative effect on a firm learning and achieving expertise (Grewal et al., 2001).

In sum, external factors such as competition, access to research institutions, access to talent, number of partnerships, and environmental characteristics influence organizational learning. The empirical studies have generated much understanding on the internal and external factors that influence learning. This understanding can provide a strong foundation for developing comprehensive models of antecedents of learning and large-scale empirical testing of such models.

Learning phenomenon and perspective

Although empirical research in organizational learning has grown considerably, only a third of it was devoted to understanding the phenomenon of learning and the processes involved in it. The majority of studies have employed the learning theories to explain various organizational phenomena such as alliances, joint ventures, innovation, and performance. Some of these studies have contributed to understanding the role of various organizational and environmental factors in facilitating organizational learning. Further, the empirical findings of the learning perspective have significant implications for organizational research. In this section, we discuss these findings and their implications for organizational research.

Learning perspective

The learning perspective emerged as a theoretical lens in the 1990s. An example of it is the 'learning school of strategy' (Mintzberg, 1998). This school employed the concepts and theories of organizational learning to explain issues of firm performance and behaviour. An off-shoot of the resource-based view of the firm (Barney, 1991), the knowledge-based view of the firm provided an impetus for organizational learning research prompting many strategy researchers to adopt a learning perspective. These researchers found that learning impacted performance of the firm and/or moderated the effect of other variables on firm performance.

Organizational learning was found to enhance the survival and effectiveness of acquisitions, diversifications and foreign entries (Barkema et al., 1996; Hayward, 2002; Pennings et al., 1994). Further, learning increased customer orientation (Hult et al., 2000) and facilitated innovation (Ahuja & Lampert, 2001; McKee, 1992; Mezias & Glynn, 1993). Researchers also acknowledged that organizational learning facilitated implementation of information systems and business process reengineering (Caron et al., 1999; Robey & Sahay, 1996).

Prior experience is helpful to firms but it could also affect a firm's ability to learn new technologies and improve (Tripsas & Gavetti, 2000). Organizations that rely on excessive exploitation or exploration fall into learning traps that are self-destructive. These traps occur because organizations tend to overlook distant times, distant contexts, and failures (Levinthal & March, 1993). In addition, the benefit of experiential learning too diminishes because the value of knowledge diminishes over time (Darr et al., 1995). Further empirical evidence suggests that the experience of prior acquisitions is helpful only when transferred to similar industrial environment (Finkelstein & Haleblian, 2002).

Experiential learning traps

Organizations fall into three different traps while employing their learning from past experience to guide future behavior: familiarity trap (tendency to employ known solutions), maturity trap (tendency to employ proven solutions) and propinquity traps (tendency to employ solutions closer to the known solutions) (Ahuja & Lampert, 2001). Ahuja and Lampert found that organizations that employ the emerging, novel, and pioneering technologies create breakthrough innovations in the chemical industry (Ahuja & Lampert, 2001). Further empirical evidence points to the presence of learning traps. For example, older firms in high-tech industries build on previous innovations but their new innovations do not influence the technology as much as their younger competitors' innovations (Sorensen & Stuart, 2000).

Maintaining a balance between exploration and exploitation can help a firm to avoid learning traps. Analyzing 1349 events of acquisitions/ greenfields of Dutch firms, Vermeulen and Barkema (2001) found that greenfields (representing exploitation) decrease the survival rate of subsequent expansions while acquisitions (representing exploration) increase it. Greenfields have a significant negative effect on the survival of subsequent expansions while acquisitions have a positive effect. Firms, therefore, alternate between greenfields and acquisitions to maintain the tension between exploitation and exploration (Vermeulen and Barkema, 2001). Similarly, in the pharmaceutical industry profitable firms were found to emphasize both internal and external learning and incremental and radical learning whereas those who depend heavily on internal learning or external learning were found to be unsuccessful (Bierley & Chakrabarti, 1996).

Besides the learning traps, organizations need to guard against exploiting inadequate and inappropriate experience. Organizations that do not have sufficient experience could make inappropriate generalizations and use it in future operations, leading to negative effect on performance (Haleblian & Finkelstein, 1999). Haleblian and Finkelstein found that a U-shaped relationship exists between prior acquisition experience and acquisition performance (Haleblian & Finkelstein, 1999). Further, Ingram and Baum found that a U-shaped relationship existed between a hotel's organizational experience and its performance (Baum

& Ingram, 1998; Ingram & Baum, 1997). However, the U-shaped relationship between acquisition experience and performance was not found in another study (Zollo et al., 2002).

Yet, other studies point to the limited effect of experiential learning on the performance of a firm. For example, Hayward (2002) found that prior acquisition experience of a firm enhances the performance of a focal acquisition, particularly when the focal acquisition is neither highly similar nor dissimilar and neither temporally too close nor too distant from prior acquisitions. In the context of international research, it was found that experience with international joint ventures has not contributed to the longevity of international joint ventures but the experience with JVs and international wholly-owned subsidiaries contributed positively to the longevity of international JVs (Barkema et al., 1997). Also, it was found that expansions were more persistent when they were local and fully-owned (Pennings. et al. 1994). Further evidence from the research on the Manhattan hotel industry suggested that when a hotel joins a chain, local experience of the chain grants survival advantage while the non-local experience does not. Also, such advantage decreases over time (Ingram. & Baum. 1997).

Some researchers have argued that the effectiveness of a firm's learning is contingent upon its environment. For example, Pisano (1994) found that learning before doing is an effective strategy when deep theoretical and practical knowledge of the process technology existed in the environment (for example, in the chemical industry). On the other hand, learning by doing is an effective strategy when the knowledge about process technology is weak and requires refinement (for example, in the bio-tech industry) (Pisano, 1994). Other researchers too have hypothesized the role of environment in determining the effect of learning. For example, environmental dynamism was found to be negatively related an organization's learning and gaining expertise (Grewal et al., 2001). Further, Luo and Peng (1999) found that intensity and diversity of experience are positively related to performance. These effects were stronger under greater environmental hostility. Under greater environmental dynamism, only the effect of diversity of experience is stronger on performance whereas under greater environmental complexity, only the effect of intensity of experience was stronger. These findings, however, have not conclusively established the effect of the environmental dimension on learning and performance because the support was only partial (Luo & Peng, 1999).

In summary, the empirical research found that firms learn from their past experience, leading to performance improvement. The positive effect, however, does not appear to be linear but U-shaped. Similarity of the past experience, recency of the experience, relevance to current actions and environment appear to determine the extent to which such learning is useful to an organization for performance improvements. The findings of the learning perspective have significant implications for organizational research.

Implications of the learning perspective

Theories and concepts of OL and the empirical findings from the learning perspective have the potential to raise new questions on some of the established organizational theories. For example, institutional theory (DiMaggio & Powell, 1993) suggests that organizations imitate large and prestigious organizations. Evidence from OL research suggests that organizations do not necessarily imitate large and prestigious competitors (Kraatz and Zajac, 1996). Although there is enough evidence that vicarious learning occurs, the source for such learning

appears to be large organizations (Greve, 2000) in one context and similar organizations (Baum et al., 2000, Kraatz, 1998) in another and institutional linkages in yet another (Goes and Park, 1997). Therefore, mimetic isomorphism appears to be a more complex phenomenon than simple imitation of large competitors.

Network theory suggests that network centrality affects a firm's innovation capacity, learning and performance. However, empirical research on OL shows that network experience and learning affect network centrality of a firm (Powell et al., 1996). Similarly, population ecology theory argues that organizational inertia helps in the survival of an organization (Hannan and Freeman, 1984). However, it was found that organizations can find viable organizational forms through learning to gain selection advantage (Bruderer & Singh, 1996).

Transaction cost economics explains the existence of firms from an efficiency standpoint. However, firms differ in their capability to learn and achieve efficiency (Hodgson, 1998). Therefore, it was argued that combining the elements of competence-based theories and transaction cost economics approaches can help in a further explanation of firm behaviour and strategy (Hodgson, 1998; Madhok, 1996, 2002).

Resource-based view (RBV) suggests that firms that possess valuable, rare, and inimitable assets and organized to exploit them achieve sustainable competitive advantage (Barney, 1991). Accordingly, RBV scholars argued that firms that achieve competitive advantage and develop isolating mechanisms to maintain it will be successful. Findings from the learning perspective suggest otherwise. For example, in a study of banking industry in Illinois, Barnett and Hansen (1996) found that organizations that faced competitive exposure learned from it and derived performance advantages. The effect of competition on learning and subsequent performance advantages was found to be over and above the market and selection advantages (Barnett & Hansen, 1996). Further, Hanssen-Bauer and Snow (1996) found that a group of Norwegian companies formed a network to learn to deal with hyper-competition. In yet another study, Spencer (2003) found that firms that shared knowledge with their innovations systems achieved superior innovative performance. These studies point to the need to revisit some of the prescriptions of RBV concerning achieving and sustaining competitive advantage, such as reliance on internal resources for competitive advantage and the role of isolating mechanisms to sustain it.

In sum, OL progressed from the position of a research stream trying to explain and establish learning phenomenon to a stage where it evolved into a perspective to explain organizational behaviour and strategies. The empirical findings of the learning perspective suggest that a fresh inquiry is needed into some of the existing explanations for firm behaviour and strategies.

Suggestions for future research

Review of the empirical literature suggests that research on organizational learning has focused on understanding the process of learning and its implications for firm behaviour and strategy. In the course of its progress, OL research raised many questions and addressed some of them. The field has made much progress on the issue of measurement and levels of analysis. In this section, we suggest directions for future research based on our review.

Learning levels

Organizational learning research has addressed the question of levels of analysis and explained that learning can occur at individual, group and organizational level. Recent developments in the literature suggest that learning occurs at the levels of inter-firm, network, and industry. For example, it was found that populations of organizations together learned new technology (Attewell, 1992) and successful strategies (McKendrick, 2001). Baum and Ingram (1997, 1998) established that industry learning occurs and argued that it can save the organizations from falling into learning traps (Baum & Ingram, 1998; Ingram & Baum, 1997). Other researchers argued that organizations differ in their capacities to learn from different organizations and learning must be viewed at an inter-organizational level (Lane & Lubatkin, 1998; Zollo et al., 2002).

The empirical studies referred to above point to the need to extend the level of analysis to beyond firm boundaries to explain the learning that occurs at the levels of inter-organization, industry, and population. This extension is necessary because researchers have been increasingly acknowledging the role of networks (Powell et al., 1996; Tsai, 1996), location (DeCarolis & Deeds, 1999), and national and global innovation systems (Spencer, 2003) in organizational learning. Extending the level of analysis to beyond the organization would also help us in understanding the tension between learning from internal sources and external sources, managing which is key to the ultimate performance of a firm (Bierly & Chakrabarti, 1996; Danneels, 2002).

Learning facilitators

Various factors within and outside the organization facilitate and/or inhibit organizational learning. Literature has addressed the role of organizational factors such as support, trust, safety, accountability, and culture. Similarly, the role of environmental factors such as competition, and position in the industry too were addressed. However, a comprehensive model of the internal and external factors that facilitate organizational learning is not yet available. Also, empirical research has largely been confined to longitudinal analysis of archival data. Given the progress the field has made so far on the antecedents and outcomes of learning, it is now possible to conduct large-scale cross-sectional research. Such research would help to further validate the OL research and enhance the generalizability of research findings.

Temporal Issues

The need to research the 'time' dimension in organizational theory is gaining prominence in recent years (Zaheer, Albert & Zaheer, 1999). Organizational learning needs to pay particular attention to the temporal dimension to resolve the theoretical and empirical dilemmas.

The relationship between knowledge, learning and improvisation has been nebulous. Some researchers argue that organizational learning leads to organizational knowledge (Argyris and Schon, 1978; Miller, 1996; Vera and Crossan, 2002) while others posit that knowledge facilitates organizational learning (Fiol & Lyles, 1985; Huber, 1991). Similarly, improvisation is viewed to be learning under resource constraints (Crossan & Sorrenti, 1997). If time is considered as a resource, then improvisation results in learning over a period of time. There is empirical evidence to suggest that this could indeed be the case (Arthur &

Aiman-Smith, 2001; Miner et al., 2001). Therefore, the relationship between learning, improvisation and knowledge should be explored. Considering the temporal aspects of OL may provide insights into these relationships.

Empirical research found that the value of experience diminishes over time (Darr et al., 1995), particularly in high-tech industries (Sorensen & Stuart, 2000). Using some real data and some estimations, Oliva & Sterman (2001) showed through econometric modelling that in response to work pressure, employees decrease the time spent on an activity and learn a new and acceptable performance standard. Over time, they argue, such learning erodes performance (Oliva & Sterman, 2001).

The empirical studies that examined the relationship between time and OL have produced mixed results so far. For example, the positive effect of age-based experience on learning was found to diminish with time (Grewal et al., 2001). However, the assertions that time since last alliance will be positively associated with formation of a new alliance did not find empirical support (Gulati, 1999). Similarly, the assertion that the positive effect of learning on performance would diminish with time did not find support in another study (Luo & Peng, 1999). The mixed support found in the empirical research warrants further research.

Conclusion

Our review revealed several interesting developments in the OL literature: first, the growth of empirical research; second, its transition to a learning perspective; third, the need to extend the levels of analysis to include inter-organizational, network, and population; and fourth, the potential questions a learning perspective has raised about the existing organization theories. Exploiting these developments will facilitate the further progress of the field.

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