Knowledge creation and competitive advantage in turbulent environments: a process model of organizational learning

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Abstract

This qualitative longitudinal study observed the strategy process of several Spanish banks at the turn of the century, where the industry was undergoing a structural transformation due to the threat of Internet banking. We develop a model of organizational learning informed by an integration of findings from a qualitative study with theoretical perspectives from the strategy, knowledge creation, and learning literatures. The model is then used to compare and contrast the different learning processes that led these banks to the development and implementation of diverse Internet banking strategies, and to draw preliminary conclusions regarding the potential relationships between the learning processes used, the strategies chosen, and their performance outcomes.
Knowledge Management Research & Practice (2013) **11,** 374–388.
doi:10.1057/kmrp.2012.33; published online 20 August 2012

Keywords: case study/studies; knowledge creation; organizational learning

Introduction

Macro-economic forces such as globalization, deregulation, and technological innovation, among others, create opportunities and threats to firms operating in different countries, and have the potential to erode their competitive advantage (D'Aveni, 1994; Prahalad & Hamel, 1994; Illinitch *et al*, 1996). What can firms do to mitigate threats and take advantage of opportunities in such a context? Nonaka (1991) argues that, in an environment where the only certainty is uncertainty, the only real source of sustainable competitive advantage is knowledge creation.

In this paper we take advantage of a natural experiment, the development of Internet banking in Spain at the turn of the century, to gain a better understanding of the learning process that goes on inside organizations responding to the three external threats outlined above (globalization, deregulation, and technological innovation). To guide us in a process of inductive theory building (Eisenhardt, 1989), we rely on prior research in strategy and organizational knowledge creation (Von Krogh *et al*, 1994).

By integrating the knowledge creation lens with findings from the qualitative study, we develop a process model of organizational learning. Using this model as our classification tool, we then analyse the learning processes and strategies adopted by banks in our sample. Through a follow-up study of performance outcomes, we discuss the potential relationships between learning process, strategic choice and firm performance.

The qualitative analysis indicates that performance appears to be unrelated to the learning processes and strategies chosen, and that larger

organizations following a proactive real options reasoning approach to reduce uncertainty (Sanchez, 1993; Trigeorgis, 1996; McGrath, 1997) tended to perform less well than those that were slower to respond and committed to a single strategy. An unexpected result was that banks in the sample, regardless of the learning process adopted, misjudged the strategic significance of Internet banking. Internet banking became a strategic disadvantage for those that did not pursue it, but did not afford a sustainable competitive advantage to those that did implement it.

According to the logic of induction and following the structure of inductive works such as Bourgeois & Eisenhardt's (1988) and Eisenhardt's (1989), we organize the paper as follows. We begin by summarizing the theoretical lenses chosen for their contributions to learning theory. We then present the methodology and describe the data and insights drawn from our qualitative analysis. Finally, we draw on these insights to develop our proposed model and depict the main contributions and limitations of our study, as well as suggestions for future research.

Theoretical framework
Several theories informed this research throughout our longitudinal study. In this section, we introduce their key concepts.

Organizational knowledge creation theory
The theoretical foundation in this area lies in the various organizational knowledge theories that identify and recognize two major types of knowledge: explicit and tacit (Polanyi, 1966). Explicit knowledge refers to knowledge that can be translated into formal, systematic language. It is knowledge that can be written, documented and widely distributed. Tacit knowledge is considered to be that which you know, but have difficulty explaining. It is often called 'hidden knowledge', because it is difficult to explicate, such as explaining to someone how to ride a bicycle. Tacit knowledge has a personalized quality that makes it hard to formalize. Therefore, it is deeply rooted in action and commitment in a very specific context. Several theories of organizational knowledge build on the interaction between tacit and explicit knowledge that occurs at the individual, the group, the organization, and the inter-organization level.

Four knowledge conversion modes are identified which describe how tacit knowledge is converted into explicit knowledge and vice versa, as well as how each of these two types of knowledge generate more of the same kind of knowledge. These four conversion modes are: socialization (tacit-to-tacit knowledge conversion), externalization (tacit-to-explicit knowledge conversion), internalization (explicit-to-tacit knowledge conversion) and combination (explicit-to-explicit knowledge conversion) (Nonaka, 1991). The argument is made that innovation is largely based upon the continuous dynamic exchange between tacit and explicit knowledge (Nonaka & Takeuchi, 1995).

Autopoietic theory
The autopoietic view of organizations, derived from neurobiology, has been developed in the management field by several researchers (Nonaka, 1991; Von Krogh & Vicari, 1993; Von Krogh et al, 1994; Nonaka & Takeuchi, 1995; Vicari & Troilo, 2000; Maula, 2000a). In neurobiology, autopoietic systems are those that continuously recreate themselves. This theory argues that living biological creatures are simultaneously open and closed organizational systems. They are open to interact with their environment and they are closed in that the necessary changes to adapt to a dynamic environment occur in their internal structure. These living organisms use their sensory function to perceive the environment and learn about it, and their memory mechanism to recall their experience and knowledge, a mechanism known as self-reference (Maula, 2000a).

Complexity theory
Models of complexity theory developed mainly for analysing biological evolution have also found an application in the evolution of organizations (Anderson, 1999). As Prahalad & Hamel (1994) suggest, the strategy field is characterized by complexity. For example, the understanding of organizations as complex, adaptive associations of individuals with different interests and different perceptions (Burgelman, 1983), whose interactions when making strategy give rise to an emergent process (Mintzberg & Quinn, 1991), has received conceptual reinforcement from complexity theory. In a similar vein, Pascale's (1999) arguments in favour of strategy-making as an organic, unsystematic, informal process have their theoretical basis in a complexity perspective, and offer valuable implications for organizational strategy. Burgelman's (2002) research on Intel's strategy-making process as vector and the inertia of co-evolutionary lock-in is also very representative. Brown & Eisenhardt (1997) and Eisenhardt & Sull (2001) link complexity theory and time-paced evolution in relentlessly shifting organizations, highlighting the use of simple guiding principles in strategy formulation. Grant's (2003) study of eight leading oil and gas-oil firms highlights the process of 'planned emergence' evident in the companies' strategic planning, and is consistent with management principles derived from complexity theory.

Strategy process literature
Over the last decades, the primary theories regarding the strategy-formation process have been organized into two categories: the design school and the learning school (Mintzberg, 1990, 1991; Ansoff, 1991). From a knowledge perspective, the former focuses on the role of formal analysis, planning, and strategic choice as essential activities that provide strategy-makers with the data essential for their task, highlighting the role of explicit knowledge. The latter emphasizes the role of the gathering of experience. This school has long since adopted an implicit-knowledge and -learning perspective in describing how strategies are formed (e.g., Quinn, 1980; Mintzberg & McHugh, 1985; Burgelman, 1988; Noda & Bower, 1996),

stressing the importance of tacit knowledge. Grant's (2003) research informs the long-running debate between the 'design' and 'process' schools of strategic management and suggests a possible reconciliation of the two. Moreover, the postmodern strategy perspective is concerned with 'how to develop adequate strategic schemas that enable the firm to create or adapt to change' (Volberda, 2004). This perspective is more focused on cognitive, tacit knowledge (Polanyi, 1966), centring in what Johnson-Laird (1983) calls 'mental models'.

Real options theory

Firms make investments in exploration to create new capabilities and to generate future opportunities (Kogut & Kulatilaka, 2001). Real options reasoning theory proposes managing technological uncertainty through small investments in alternative technologies under development, and only committing to a particular solution if and when conditions are favourable (McGrath, 1997). This process, generally a sequence of investments in emergent technologies, does not end with the adoption of the 'winning' solution. Such an approach would assume that technological uncertainty all of a sudden disappears and no more technology development is expected from the moment the option is 'exercised'. In fact, technologies continue to evolve, so managers following a real options strategy need to continuously search and invest in real options to stay abreast of the competition. This process economizes on the costs associated with committing resources to uncertain technologies and enables technology positioning to take advantage of future developments (McGrath, 1997; Folta, 1998). The 'compounding' of real options investments has been found to be critical to maintaining competitive advantage in one's core technology (Trigeorgis, 1996).

These concepts and theoretical insights are discussed later in the paper, as we present our model. The next section presents the context, sample and methods used.

Internet banking in Spain: a natural experiment

Eisenhardt & Bourgeois (1988) identify banking as an example of high-velocity environments. In high-velocity environments there is continuous 'dynamism' (Dess & Beard, 1984) and 'volatility' (Bourgeois, 1985), overlaid by sharp and discontinuous change (Meyer, 1982; Sutton *et al*, 1986). Deregulation, mergers, new products, and new forms of competition have created both continuous and sharp, discontinuous change in the banking industry world-wide (Wooldridge & Floyd, 1990). All of these characteristics of radical change were present in the Spanish banking industry at the time of our study (1999–2004). The deregulation resulting from Spain's acceptance into the European Union opened the market to foreign competitors. Adding to this uncertainty, the advent of Internet banking in the US and leading European countries made it very easy for foreign banks to penetrate the Spanish market with minor investments. For example, at the time of this study, ING was penetrating the Spanish banking market with a purely online offering while none of the local banks were ready to compete in that arena. Bank A, one of the largest banks in the country, viewed the threat in these terms:

> We are in a complex process, not because of the complexity itself, but because of its potential for rupture. The first thing you need to do is to erase many of the things that were part of your traditional systems.

On the other hand, Bank B, a midsize bank, sees both opportunities and threats in the radical change ahead:

> Internet can change our business, it can attract new values that may generate new competition and can open up opportunities for us to go to new places where we are not present. We think that the type of customer could be different.

Bank E, the smallest bank in our sample, viewed the Internet as an opportunity and took a proactive approach:

> This (the high level of efficiency brought about by the Internet) has had sociological implications in customer behavior, as well as changes in entry barriers and in organizing models within our bank.
> The business model also changes…. We see that the way we have traditionally organized our business by customer segment or by product will not work anymore. We see that the (organizational) structure of operations, risk, marketing, as independent entities will not work either, and so we create the concept of projects or services tailored to individual customers.

Most banks in our sample, as well as industry publications of the time, coincide in viewing the Internet as an external threat factor that would change the industry. Their reactions, both in terms of learning processes and strategies chosen, provide insights into why and how banks responded differently to essentially the same external threat.

Methods

We used a case-study approach, particularly suitable for answering 'how' and 'why' questions (Yin, 1984). The approach enables researchers to use 'controlled opportunism' to respond flexibly to new discoveries made while collecting new data (Eisenhardt, 1989). By making this choice, we addressed the major challenge of ensuring that data collection and analysis met tests of construct validity, reliability, and internal and external validity by carefully considering Yin's (1984) tactics. Specifically, we addressed construct validity by using the multiple sources of evidence described in the 'Data sources' section and by establishing a chain of evidence as we concluded the interviews. Reliability was enhanced by: (1) Using a case-study protocol in which all firms and all informants were subject to the same entry and exit procedures and interview questions (see 'Data sources' in this section), and (2) by creating similarly organized case data bases for each firm we visited. External validity was assured by the multiple-case research design itself, whereby all cases were firms from the same industry. Finally, we addressed internal validity by the pattern-matching data-analysis

method described (see 'Data analysis procedure' in this section).

The case-study approach provided a real-time study of different strategic processes in their natural field setting (Van de Ven, 1992) by investigating, in depth, seven Spanish banks in the process of developing and implementing their Internet strategies. All firms were publicly owned, multi-business banking firms. The sample was not random, but reflected a representative selection of banks in the Spanish market, from the largest with 188 million euros in assets to the smallest one considering an Internet strategy, with 23 million in assets. Subjects were selected based on their willingness to participate in the study. They collectively held about 70% market share. At the time of our first interviews, some banks not only had intentions, but were actually taking innovative actions to test, learn, and figure out the best strategic response. Others were observing and analysing.

The comparison of case studies within the same industrial context enabled 'analytic generalization' through the replication of results, either literally (when similar responses emerged) or theoretically (when contrary results emerged for predictable reasons) (Yin, 1984), thus ensuring that the evidence in one well-described setting was not wholly idiosyncratic (Miles & Huberman, 1984). Although space prevents our providing 'thick descriptions' of each case (McClintock *et al*, 1979), Table 1 briefly describes the firms studied at the time of our analysis.

Data sources
As is typical in inductive case-study research (Eisenhardt, 1989) we used several data-collection methods. We collected data through interviews, observations, and secondary sources. The rationale is similar to hypothesis-testing research, that is, the 'triangulation' (Webb *et al*, 1996) made possible by multiple data sources provides stronger substantiation of constructs and hypotheses. The initial data-collection process took place in 1999–2000 with follow-up interviews and performance metrics collected in 2004. A case-study protocol (Table 2) was developed pursuing reliability in the findings, and a pilot study was carried out in order to refine our data-collection plan with respect to both the content of the data and the procedures followed.

Interviews
The primary source of initial data collection came from semi-structured interviews with 2–4 top management informants. At each site, we conducted from two to three sessions of 2 h each, on average per case, with the CEOs or the person or persons assigned by them.

We began the interviews by asking the respondents to describe the competitive strategy of their firm and its position within the industry. We then asked them to describe the distinctive competencies of their Internet banking strategy and key success factors. Finally, we asked them about the actions and interactions when formulating and implementing their strategies. As Chakravarthy & Doz (1992)

state, strategy research is concerned with how effective strategies are shaped within the firm and then validated and implemented. According to Schendel (1994), 'shaped' can mean the manner in which an organization develops or, in terms of extant literature, formulates strategy. We were concerned with both formulation and implementation. The questions in the interviews concentrated on facts and events, rather than on respondents' interpretations, using standard courtroom interrogation (What did you do? When? Who said what to whom?).

In the first stages of the research, the interviews helped us develop an understanding of the learning process at each bank. In the latter stages, little new information was obtained, and the interviews gradually became a way of increasing the construct validity of the conclusions we were developing. Following Eisenhardt's (1989) recommendations, the interviews were conducted in tandem by two researchers. All interviews were recorded and were transcribed immediately afterward. In the transcriptions, we included all data, regardless of its apparent importance in the interview. We then cross-checked facts and ended the transcription notes with our lingering impressions, trying to sharpen them by asking ourselves questions (e.g., What did I learn? How does this interview compare to prior interviews?). We completed the interview notes and impressions within a day of the interview (Yin, 1984).

Observations and secondary sources
During the site visits, we kept a daily record of impressions and recorded informal observations we made as we participated in activities such as lunches and coffee breaks. In addition, whenever possible, we attended meetings as passive note-takers. These observations provided real-time data.

We also used secondary sources to collect background information about the cases. Such sources included annual reports, internal documents provided by the interviewees, agendas for meetings, minutes of past meetings, internal newsletters and intranets, industry reports, websites, and various articles in magazines and newspapers about the situation and evolution of the Internet banks in general and of the different cases in particular, including rankings by private institutions specializing in website evaluation.

Data analysis procedure
For data analysis, we used a highly iterative approach (Glaser and Strauss, 1967) and included the following steps (Eisenhardt, 1989): (1) analysis of within-case data; (2) search for cross-case patterns; (3) shape of propositions; and (4) comparison of the emergent hypothesis with the extant literature.

Analysis of within-case data
Within-case analysis involved detailed, case-study write-ups for each site, central to the generation of insights (Gersick, 1988). The objective was to become intimately familiar with each case as a stand-alone entity (Eisenhardt, 1989). In each site, we categorized all the data

Table 1   Case descriptions

Bank A is one of the largest financial groups, a holder of a solid position in the Spanish market and a leading franchise in Latin America. It was formed from the merger of several financial institutions created since the mid-19th century and that have, over time, united to increase their business potential. Its way of approaching the Internet has been to create an independent Internet bank, in association with a major telecommunications company. The bank has launched some innovative products, for example, the first to offer support online for persons seeking a house for different purposes (to buy, to rent, for living, for holidays, etc.). The support included photos and a virtual tour, information on the services of the area (hospitals, schools, transportation), arrangement of details for visiting it, and more.

Bank B's origins date back to the 19th century. However, in the late 1980s, it had a major restructuring due to poor financial performance. As a consequence, it was the target of several acquisition attempts that resulted in it being controlled by one of the largest banks in Spain. Nevertheless, the bank operates as an independent entity. Its reaction to the Internet threat was to wait and see, resulting in a late entrance and using an efficiency approach, as an additional distribution channel for its services.

Founded at the beginning of the 20th century, *Bank C* is the third-largest banking group in Spain, comprising a national bank, five regional banks and a mortgage bank. It also has a presence in neighbouring countries through a bank in France and one in Portugal. It approached the Internet by creating a separate Internet bank that provided, *inter alia,* a personalized Web for enterprises with real-time data on marketing research, suppliers and customers, evolution and new tendencies, etc.

Bank D is one of the leading financial institutions in Spain. It models its identity, its present, and its future on the history of four Spanish banks that have played a major role in the country's financial and economic history (banks that themselves were built over time by absorbing and acquiring many other smaller institutions). Its strategy is to be an international benchmark bank, specializing in commercial banking. Its presence in Europe and Latin America is strong. Bank D combines geographical diversification with a thorough knowledge of the markets in which it works. This involvement in the markets where the firm operates makes it a multi-local group. The approach toward the Internet has been through the creation of an independent bank in the group. This independent bank is, for example, a pioneer in the creation of the concept of the mini-office with access to Internet in underground stations, shopping centres, etc., open from 10 a.m. to 10 p.m. Also, they give customers the possibility of receiving alerts and real-time information on the stock market via their mobile telephones.

Bank E is a young institution, founded in the 1960s. The history of the firm has been characterized by growth and the ability to capitalize on regulatory changes, new opportunities, and new market niches. Thus the bank, which was ranked 107th when it was founded, is currently among the top 10 Spanish banks. The 1990s saw the emergence of various alternative channels to the traditional branches, which at the time of the study formed an essential part of the firm's multi-channel network. Among the alternative channels were telephone banking, virtual banking, the agent network, and the Internet, the latter intended to become the main one. As a consequence, the way of approaching the Internet was through the transformation of the whole bank. The bank's employees are young, highly trained, dynamic, flexible and capable of adapting rapidly to technological and market changes. Also, almost all employees are shareholders of the bank, ensuring staff commitment to the bank's strategy. Bank E's intent was to reinvent the banking industry through the Internet by taking some innovative steps, for instance, launching auctions on the Internet allowing customers to transfer mortgages from other financial entities to the bank. They also facilitate simulators online that allow customers themselves to evaluate the different alternatives.

Bank F is one of the oldest financial institutions in Spain, spanning three centuries. Its strategic focus has been the lower income brackets, providing savings and credit services through specially designed programmes with government support. A key competitive advantage for this bank has been its widespread location across the country, with an emphasis in personal service. As a consequence, the Internet threat was particularly serious for this organization, given that geographical location would no longer be as important for the bank's survival. Its reaction was to adopt an Internet strategy, early on, with an innovative posture, putting together a special team to integrate the strategy into the bank's main operations.

Similar to Bank F, *Bank G* is a savings bank with focus on lower income brackets and an extensive network of local offices across the country. Its reaction to the Internet threat, however, was very different. This bank adopted a wait and see strategy, followed by a very aggressive entry into the Internet space, through its existing structure, and a focus on developing an additional distribution channel with an efficiency perspective. In three years it has attained complete leadership, with 30% of Internet bank users in the country using their Internet channel.

for each variable. Table 3 exemplifies the type of evidence used to reach our classifications.

Search for cross-case patterns
Coupled with within-case analysis, we pursued cross-case searches for patterns. In an attempt to improve the likelihood of accurate and reliable theory, this search was assisted by the following tactics suggested by Eisenhardt (1989):

- Comparison of pairs of firms. We then induced tentative relationships between each pair.

- Division of the data by data source with the aim of exploiting the unique insights possible from different types of data collection. One researcher was in charge of the analysis of the qualitative data, another of the quantitative data. We then shifted tasks.

Shape of propositions
From both the within-case and cross-case analysis, tentative impressions, concepts, and relationships began to emerge. First, we compared systematically the emergent frame with the evidence from each case in order to assess

Table 2   Case-study protocol

Questions related to the strategy formation process in 1999–2000

Technology Adoption Scale: Innovator, Early Adopter, Early Majority, Late Majority, Laggard
Strategy Process: TopDown *vs* BottomUp, and Selection *vs* Co-evolution
Strategic Posture: Defensive *vs* Offensive
Organizational Learning Process: Self-referentiality, Externalization, Combination, Internalization
Strategic Objective: Whether the main objective is efficiency (i.e., just another channel) or innovation (new business lines outside banking)
Strategic Planning Process: Whether they describe a lot of bureaucracy in the decision-making process
Stage in the Implementation Process: What was implemented at the time of the interview? E-banking *vs* E-business (non-banking services)
Implementation Structure: Whether they created a 'skunkworks' type of structure and with or without outsiders
Alliance Strategy: Do they state that alliances are being made or needed as a key aspect of the strategy
Real Options Theory: Are they pursuing several alternative strategies to see which one works?
Bank-Wide Change: Do they state that the Internet strategy will change the way the whole bank operates
Major Threat: Do they state what is the major challenge or threat
Environmental Assessment: How is Internet banking considered and how they think it needs to be addressed
Environment/Strategy Fit: How appropriately the overall strategy seems to address radical change

Metrics collected in 2004
No. of Employees in Internet banking 2003
Performance metrics on efforts in Internet banking: Nielsen 2003 Internet Banking Mkt Share # of e-users (%);
Total Sales Market Share 2003; 12/2003 Assets; No. of Employees 2003; Assets to Internet Mkt. Share Ratio

how it fitted with case data. This constant comparison between constructs and data allowed us to sharpen the constructs of our study by means of a two-part process: (1) refinements of the definition of the constructs, and (2) building the evidence that measures the construct in each case. We eventually developed definitions and measures for several constructs, both regarding the learning process and regarding the Internet banking strategies that emerged from that learning. Second, we verified that the emergent processes fitted with the evidence in each case. At this point, we focused on discovering the underlying theoretical reasons for the existence of the relationships. This led to the selection of knowledge creation theories as the most likely to inform the uncovered relationships.

Comparison of the emergent propositions with the extant literature
We then tied the emergent theory to the extant literature. The aim was to establish 'stronger internal validity, wider generalizability, and higher conceptual level' of the findings (Eisenhardt, 1989, p. 544). In the following section we present the knowledge-based theoretical lens used in this project's design and analysis, followed by a description of the induced theoretical model that emerged from integrating theoretical perspectives with insight and evidence from the qualitative analysis.

A learning process model of knowledge creation
Knowledge creation has been discussed by researchers from two dominant perspectives: the epistemological and the ontological. From an epistemological perspective (Nonaka, 1991; Nohria & Eccles, 1992; Nonaka & Takeuchi, 1995; Von Krogh & Roos, 1995), knowledge can be explicit or tacit. Explicit knowledge is easy to articulate and verbalize, systematic and objective, rational and logical, digital, sequential, comes from the past, and free of context. By contrast, tacit knowledge is difficult to articulate and verbalize, subjective, linked to experience and emotions, analogue, simultaneous, refers to the present and context-dependent. Therefore, tacit knowledge is deeply rooted in action, procedures, routines, commitments, ideals, values and emotions. From this assertion it follows that tacit knowledge includes technical-expert elements as well as cognitive ones (Nonaka & Takeuchi, 1995). In other words, it involves skills, experience and capabilities, mental models and precepts (Hedlund, 1994).

From an ontological perspective, knowledge is classified as individual or social. Several authors have studied the behaviour of organizations and tried to build a bridge between individual cognition and the social cognition of the organization (Argyris & Schon, 1978; Prahalad & Bettis, 1986; Von Krogh et al, 1994). According to this viewpoint, individual knowledge is not abstract but rather embodied in the person. Therefore, in a strict sense only individuals create knowledge. Thus, in the epistemology of Nonaka and Takeuchi (Nonaka & Takeuchi, 1995) and Grant (1996), the individual is of vital importance. Nevertheless, individuals have experience that can serve as the basis for collective knowledge when the latter is transmitted via oral, written or body language (Von Krogh et al, 1994). Collective knowledge, which is not simply the sum of individual knowledge but rather something greater and different (Fiol & Lyles, 1985; Vicari & Troilo, 2000), is particularly important to an organization's long-term survival (Spender, 1996).

Following the epistemological and ontological definitions of knowledge, we begin the development of a

Table 3   Evidence on speed of technology adoption and strategic objective

Variable	Case study	Categorization	Selected evidence for illustrative purposes
Speed of technology adoption	Bank A	Early adopter	'Internet projects were initiated prior to the merger'.
	Bank B	Late majority	'Our Internet banking strategy is characterized by commercial caution…. We know it is important. We know that we need to be in the game. Being in this could be a mistake, not doing it could be suicidal'. 'In Internet they will not leave us behind. We may not be in front but neither behind'.
	Bank C	Early adopter	'It has been about 3 years since we developed our electronic banking… Later, about a year ago, the Internet banking project arises, which is a different world: it is Internet as a business, not just as a distribution channel… a virtual financial concern'.
	Bank D	Early adopter	'…. A firm with leadership objectives such as this one, realizes the importance of the Internet, although no one knew what it meant at the time, but that it is serious and it will change the world, one has to be there'. ' We started making serious decisions about 3 years ago… at the Top Management meetings of 1999, when Internet is defined as one of the priority areas of the future, without much detail, but it appears as such'.
	Bank E	Early adopter	'Internet banking is born almost by chance, in 1995…. we did a market analysis and went to the U.S.A., we see in Silicon Valley…startups,… a series of initiatives that drew our attention'.
	Bank F	Early majority	'Internet banking has been around for about two years through our virtual office. And recently, about six months ago, we develop a larger project around the e-business model to develop new business opportunities'.
	Bank G	Late majority	'The social phenomenon is pushing. This Internet thing is being moved by the press and you reach a moment where you have no choice. The outside pressure can push the bank into doing certain things. You can't be outside. Sometimes you can't go against the current. This does not mean that there may be some good opportunities. We do it with prudence, without advertising it'.
Strategic Objective (Efficiency/ Innovation)	Bank A	Efficiency	'Our goal is to be one of the most efficient banks in the world….' 'We create a new business line outside banking'.
	Bank B	Efficiency	'At this moment we have an Internet solution for traditional banking'.
	Bank C	Innovation	'The Internet banking unit has its own leaders with autonomy. They currently have about 30 employees, they generate their own change, encouraged by the CEO'.
	Bank D	Innovation	They actually follow a dual strategy, efficiency use of the Internet for the traditional bank and innovative for the independent Internet bank. 'There are things that the dynamics of a large bank would stop in the Internet development efforts. Things that the Internet bank can do, that the bank would never do as a traditional bank'.
	Bank E	Innovation	'Several new systems are tried out in the marketplace, such as: flat fee for service, call back'.
	Bank F	Innovation	'It is better to invent new ways and to be leaders at that…'
	Bank G	Efficiency	Although they aspire to e-business, most of what they are doing is for efficiency purposes. 'Similar to some years back with automatic tellers integrating to our offices, now Internet must be used by the offices as a natural medium to develop relationships with those customers that want to us it…. The strategy that I have been following for a long time, that is, to eliminate tasks of little value added from the tellers'.

knowledge-based learning process model by integrating the two perspectives into a simplified model along two dimensions: type of knowledge (tacit/explicit) and location of knowledge (individual/group). This model, depicted in Figure 1, first evolved from the field observations for this study in terms of its basic structure. It was then refined through our theory review process summarized in the following sections. Finally, the refined model became the foundation of our qualitative analysis and discussion that conclude this paper.

Learning process: the autopoietic organization

Self-referentiality
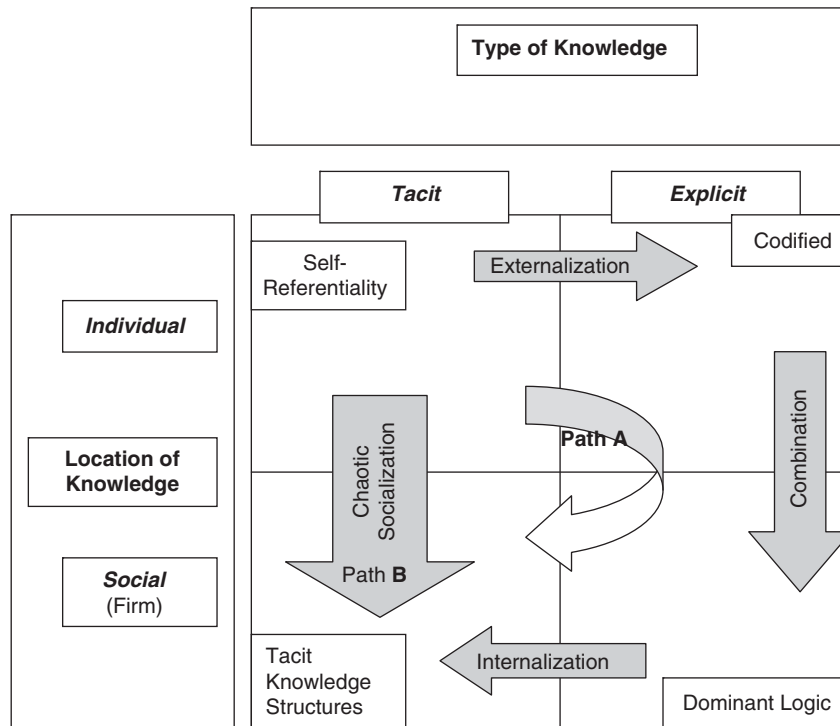The autopoietic lens has been used in the management field to understand the evolution of knowledge within

Figure 1   Organizational learning processes. Path A: The autopoietic organization. Path B: Chaotic socialization.

organizations (Becker, 1991; Maturana, 1991), to explain evolutionary organizational change (Morgan, 1986; Weathly, 1992), and to propose how management can guide knowledge development processes in organizations (Von Krogh *et al*, 1994). At the individual level of analysis, Von Krogh *et al* (1994) argue that knowledge is embedded in individuals within organizations and that individual knowledge depends on the 'point of observation' of the manager: 'Where you stand or what you know determines what you see or what you choose to be relevant' (p. 58). Taking this concept a step further, an individual's role in a learning organization begins with a sensory role by identifying opportunities and threats. Furthermore, each individual's ability to identify what seems to be imporant for the organization depends not only from the person's position in the organization but also on the person's prior knowledge and experience. This learning perspective, called self-referentiality, further argues that new knowledge originates not only from past knowledge but also refers to potential future knowledge (Luhmann, 1990). Thus learning is a highly dynamic process where individuals, based on what they have experienced and learnt in the past and on what they envision in terms of future scenarios, search the environment for relevant data and information to develop new mental models (Von Krogh *et al*, 1994).

Self-referentiality helps explain why competitors within an industry may react differently to common environmental threats. The following quote from an interview at Bank A as they were developing their Internet strategy reflects this process:

> Internet banking is born almost by chance, in 1995…. we did a market analysis and went to the US. We saw in Silicon Valley…startups,… a series of initiatives that drew our attention.

This organization proactively sensed the environment in other ways as well. For example:

> We have meetings where we invite external people related with the world of Internet and the New Economy, such as people that are managing important Web sites, to come and share their points of view and challenges with us.

At Bank G, a late entrant into Internet banking, self-referentiality led individuals to react to the same phenomenon in a very different way:

> The social phenomenon is pushing. This Internet thing is being moved by the press and you reach a moment where you have no choice. The outside pressure can push the bank into doing certain things. You can't be left outside.

Externalization, combination, internalization
The next step in the process of organizational learning is how the knowledge held by individuals gets transformed into knowledge at the organizational level. Research in strategic management suggests that this is a two-step process. Knowledge structures at the organizational level

evolve and change as members of the organization first make explicit their view of the environment and then agree, or disagree, in their interpretations of how the environment is changing (Lyles & Schwenk, 1992; Weick, 1995), developing a dominant logic on how to respond to opportunities and threats (Prahalad & Bettis, 1986). Extending the autopoietic perspective, Von Krogh et al (Von Krogh et al, 1994) argue that as 'organizational members observe events and situations, and as they engage in "languaging," that is, apply and invent distinctions, phrases, sentences, etc., they participate in developing organizational knowledge' (p. 62).

Thus, the autopoietic perspective provides a valuable lens to understand the evolution of knowledge in organizations. Individuals in the periphery of business organizations interpret the data available to them about the context in which they operate. This information, when classified into the individual's frameworks, results in new individual knowledge. An autopoietic social system occurs when distinct individuals within an organizational structure interact and communicate in a specific context and according to specific behavioural rules of conduct and interaction. These agents interact within dynamic networks that are continuously renewed, generating new ideas and concepts and regenerating organizing principles (Zeleny, 1997). A coordinated social process inside the organization ensues, where groups of individuals with 'sensory' roles engage in the process of externalizing, codifying, and combining their perceptions into a new or modified dominant logic, which is then internalized into new organizational level knowledge structures. Thus firms can be viewed as autopoietic systems that continuously reproduce themselves. They possess a sensory function to help them understand the changing environment and a memory function that helps them interpret, learn, and adapt to dynamic environments (Maula, 2000a). At Bank D, this process is quite proactive:

> Many people in the company have the role of monitoring. They act as radars or as tentacles that capture knowledge and experiences. This is then transferred internally. For example, we have a very important project going on in New York. They are exploring what products we need to deliver in Latin America. In Madrid we learn from their experiences.

Nonaka and Takeuchi (Nonaka & Takeuchi, 1995) refer to these processes as externalization, combination, and internalization. Externalization is the process of converting tacit knowledge into explicit knowledge. In our model, we propose that this process is done at the individual level. Combination is the process of converting explicit knowledge at the individual level to explicit knowledge at the group level. At Bank E, this process is depicted as follows:

> We work by projects, we value autonomy of work, we use assembly-type meetings, everybody's opinion counts, the boss disappears.
> The ideas are evaluated by an 'Evaluation Committee' composed of 80 members. The ideas are also submitted to

a 'popular vote', i.e. the opinion of any employee who wishes to evaluate and comment on the contribution. An 'area evaluation' is also made of the ideas to indicate, inter alia, their viability. The author always receives a reply from the area so that he or she is informed of whether the idea is going to be put into practice.

On the other hand, this is how Bank C describes their learning process in their main Bank:

> Strategic decisions within the firm are discussed in periodical meetings. Most of the time, we reach consensus. When not, the role of our CEO is decisive.

A different, more structured approach is at work at Bank D:

> We have a department that is in charge of channeling, analyzing and systematizing the different experiences that are being continuously transferred.
> We have also established formal and informal groups that are proposing and exchanging ideas.

Finally, internalization is the process of converting knowledge from the explicit group level to the implicit firm level through structures and systems. In the case of Internet banking, this final process resulted in two distinct implementation strategies. Two out of seven banks started purely Internet banks in addition to the implementation of Internet banking as a new channel within their main bank. This dual strategy reflected an options theory reasoning approach where the banks pursued competing alternatives to reduce uncertainty (Sanchez, 1993; Trigeorgis, 1996; McGrath, 1997). The others chose the second strategy only, committing to a single strategy.

We propose an integration of the epistemological and ontological perspectives of knowledge into a single learning process within the firm. We depict this learning process in Figure 1, path A. Nonaka and Takeuchi discuss a fourth dimension, socialization, which is introduced next and presented here as an alternate learning process that firms engage in.

Socialization as chaotic learning (Path B)
Recent research on organizational learning has suggested that groups can learn through chaotic, unstructured processes. In a study of knowledge-intensive firms, Maula (2000b) finds that advances in information and communication technology (the Internet) help express previously tacit knowledge at the individual level in an explicit digital form that can be instantly shared by like-minded individuals. Communities of practice have been developed within organizations, as well as within disciplines, to take advantage of this new learning process for large, physically dispersed groups.

At the organizational level, this practice is not new. The 'skunk works' groups used by Apple Computers and others in the 1980s and 1990s, where groups of individuals are co-located away from the firm with very few rules and an objective of developing path breaking innovations (Covi et al, 1998), were early versions of chaotic social

learning processes. These unstructured learning processes have been re-defined by Nonaka & Takeuchi (1995) as the socialization process of knowledge creation, which converts tacit knowledge at the individual level to tacit knowledge at the firm level through a process of open and unstructured interaction. In Figure 1, path B, we propose this chaotic 'socialization' as an alternative learning process path. We propose this as a competing model of organization learning and strategy making, derived from complexity theory. Here is how the chaotic socialization process played out at Bank F:

> In e-business the objective is not to do the same but better, rather to do something new. And in this sense, the strategic process will not resemble that of the main bank.
> Ideas arrive in the most chaotic way…. We continue to analyze all kinds of opportunities through a specific group for all e-business related themes.

When it comes to their e-bank channel, Bank C described the process in this way:

> There is no strategic plan, since the process evolves in real time.

And at Bank D:

> We are witnessing a technological revolution of uncertain outcome, not because one may fail, but because one does not know how to get there…. We follow the most promising paths and continuously modify them. It is a chaotic process.

To summarize, we conclude from our qualitative analysis that three banks, C, D, and F pursued chaotic socialization paths to develop and implement their Internet strategies. We find in practice that Banks C and D used both learning processes simultaneously and in parallel. Thus we further propose that the chaotic socialization learning process (path B on Figure 1) can coexist within organizations with the autopoietic approach, path A, discussed earlier. These organizations created skunk works type organizations to aggressively pursue their Internet strategy. However, while Bank C implemented a single, distribution channel type strategy, Bank D simultaneously implemented an Internet strategy within the traditional bank structure as an additional channel of distribution and a pure Internet play by creating an independent e-bank that competes with their main bank. Both strategies eventually converged into an 'integrated knowledge advantage' attempting to secure a prominent position in the Internet banking space. Similar to Bank D, Bank A created a separate Internet bank, but within the existing organizational structure and following the autopoietic path for their learning process (path A on Figure 1).

Strategies pursued and performance outcomes

In this section we relate the learning process paths implemented by each of our case study banks to the Internet strategies they pursued and their subsequent performance in the marketplace. With respect to strategies pursued, the following classifications directly emerged from an analysis of the interviews performed at the initiation of the study in 1999–2000. With respect to strategies implemented and performance outcomes, these data emerged from interviews, independent expert observations, and third-party industry level measures collected in 2004.

Innovative posture and speed of adoption of Internet strategy

Since our interviews were conducted at a time when the banking industry was trying to comprehend the potential impact of the Internet in their business, it is useful to understand the informant's perceptions as to their firm's attitude toward technology adoption. The following statements reflect the differing strategic postures and their corresponding stages in the implementation process. The authors independently classified each bank into a two-dimensional space in terms of speed of adoption and strategic objective, based on these and other statements obtained during the interviews as well as actual actions taken by each bank at the time of the initial interviews. Discrepancies were then discussed and further analysis made to reach consensus. Subjects were classified as early adopters if they had already implemented some form of Internet action or experiment. They were classified as innovators if they stated that their Internet strategy afforded them the opportunity to enter into new services or markets. On the other hand, they were classified as efficiency oriented if their goal was to provide a lower cost option to their customers. The following quotes extracted from the interviews performed in 2000 illustrate some of the statements used to support our classifications for each bank.

Bank A (Early Adopter, Efficiency):

> We launch products to the market, and then we are very attentive to the feedback we may get.
> We establish joint projects with current customers. Potential customers are also very interesting to us because of the great potential of this emerging market.
> Interacting with other financial entities is really valuable to us. We have some joint projects in this respect.

Bank B (Late Entrant, Efficiency):

> Our Internet banking strategy is characterized by commercial caution…. We know it is important. We know that we need to be in the game. Being in this could be a mistake, not doing it could be suicidal.
> In Internet they will not leave us behind. We may not be in front but neither behind.

Bank C (Early Adopter, Innovator):

> Its been about 3 years since we developed our electronic banking… Later, about a year ago, the Internet banking project arises, which is a different world: it is Internet as a business, not just as a distribution channel… a virtual financial concern'. *Similarly, experimentation is done continuously in this way*:
> We are exploring new possibilities, new ways of doing things, better ways of satisfying our current and potential

customers. In facing this challenge, we propose products to them and see how they like them.

We learn from and with our customers. Working in projects with them is very satisfying and fruitful.

Bank D (Early Adopter, Innovator):

> …. A firm with leadership objectives such as this one, realizes the importance of the Internet, although no one knew what it meant at the time, but that it (the Internet) is a serious event and it will change the world, one has to be there.
> We started making serious decisions about 3 years ago… at the Top Management meetings of 1999, when Internet is defined as one of the priority areas of the future, without much detail, but it appears as such. *As for experimentation*:
> We invite our customers to play with our products. We try to get them involved, for example, by means of contests where we learn together and they may win a nice prize.

Bank E (Early Adopter, Innovator):

> Internet banking was born almost by chance, in 1995….. we did a market analysis and went to the U.S.A., we saw in Silicon Valley…startups,… a series of initiatives that drew our attention. *With respect to experimentation*:
> We created a first prototype of software and distributed it for free to our customers.
> We designed a small platform and gave access to our clients. With the aim of promoting transactions, we adapted our telephone banking model to the Internet to see what would happen …

Bank F (Early Adopter, Innovator):

> Internet banking has been around for about two years through our virtual office. And recently, about six months ago, we developed a larger project around the e-business model to develop new business opportunities.

Bank G (Late Entrant, Efficiency) still developing traditional services and no major commitment to Internet in 2000:

> Four years ago we went from basic banking services to more complex offerings. About a year and a half ago we started to do more things in traditional banking.

Follow-up interviews and analysis of implemented strategies support these classifications. For example, a follow-up interview to Bank F in 2004 yielded the following:

> Although we used technologies already implemented abroad, at Bank F they were integrated and developed in innovative ways to support our business lines. For example, our solutions to content management, CRM, or personalized online banking have set the standard for our industry, both in terms of functionality and in terms of integration and evolution.
> At this time (2004) we have a fully integrated platform, with high service levels in terms of reliability and availability, and in terms of response speed. In the past year we have implemented important technology innovation projects that afford us a competitive advantage, for example, electronic billing and payments, a service of financial consolidation, and a virtual intelligence assistant.

Implementation structure

This measure looks at whether banks implemented their e-bank strategy through their normal structure or created an independent team to work on it. Banks B, C, E, and G used their existing structure to create their Internet strategy as an additional distribution channel. Bank A used its existing structure but created an independent e-bank. Bank F created a new team of outsiders within its traditional structure, and Bank D created a separate entity mostly with outsiders to start up the new e-bank. This is how Bank D describes it:

> The Internet team is composed of newcomers of different ages and backgrounds. The big advantage is that we are foreigners to the internal culture of the established bank, so we can do and say things that someone coming from the established bank wouldn't. This fact prevents peculiarities, susceptibilities, and any kind of politics that may arise otherwise. Our presentation to the world, the language we use, our people, are totally different to those of the established bank.

As previously discussed, Banks A and D followed a dual strategy of simultaneously creating an e-bank as an independent entity and pursuing an Internet strategy through their main bank as an additional distribution channel. This approach follows a real options reasoning strategy (McGrath, 1997), where the banks sought to reduce uncertainty about the future by simultaneously pursuing two competing strategies instead of committing to one and running the risk of pursuing the wrong one.

Performance measures

Publicly available 2003 Nielsen market share information regarding the number of Internet banking users for each bank was used for this analysis due to its reliability and extensive use in the industry. Given the early stage of development of Internet banking in Spain, gaining market share was the banks' main objective. This is further supported by industry publications and interviews performed in 2004 that indicated the fact that, rather than the competitive advantage sought at the outset of the process, banks now believe Internet banking to be an industry standard, and a competitive disadvantage for those that do not have it. The original expectation was, however, that Internet banking would allow them to gain competitive advantage by reducing costs, gaining new customers, and/or increasing market share in overall banking services. Four years later bank executives state that not having a competitive Internet banking service would result in losing market share to the competition, but having the service offering does not provide a competitive advantage *per se*.

It is important to control for size when one compares market share obtained in Internet banking amongst banks with relatively large differences in customer base. Thus, we compute the ratio of total assets to total Internet market share obtained for each bank. This ratio provides an interesting look at performance. While larger

Table 4 Learning processes, strategies, and outcomes

	Bank A	Bank B	Bank C	Bank D	Bank E	Bank F	Bank G
Learning Process (Figure 1)	Path A	Path A	Path A(bank) B(e-bank)	Path A (bank) B (e-bank)	Path A	Path B	Path A
Speed of Adoption	Early Adopter	Late Entrant	Early Adopter	Early Adopter	Early Adopter	Early Adopter	Late Entrant
Strategic Objective	Efficiency	Efficiency	Innovation	Innovation	Innovation	Innovation	Efficiency
Implementation Structure	Existing Structure/e-bank	Existing Structure	Existing Structure	Indep. E-business (Outsiders)	Existing Structure	Existing Structure/ New Team	Existing Structure
Nielsen 2003 Internet Banking	15% Bank 1.8 e-bank	8.1%	4.4%	8.7% Bank 3.3 e-bank	8.7 %	13%	30.5%
Mkt Share No. of e-users (%)	23%	3%	5%	32%	1.3%	3%	4%
Total Sales Mkt Share 2003	188	50	31	180	23	70	103
12/2003 Assets Million Euros	86,000	9800	13,000	103,000	5000	10,900	18,600
No. of Employees 2003	11.05	6.17	7.04	15.0	2.64	5.38	3.37
Assets to Internet Mkt. Share Ratio							

banks would be expected to rapidly gain Internet market share by converting their much larger customer base, some banks were a lot more efficient than others in gaining that market share. This analysis shows that smaller banks were much more effective when controlling for size. Furthermore, Bank G, the latest entrant of the three largest banks, has garnered a dominant position in the industry with a 30% market share, approximately 1.5 million users, and a very low asset/share ratio. Table 4 summarizes learning process used, strategies chosen, and performance outcomes for all banks in the sample, and provides additional descriptive information.

Discussion

In this study we approached seven leading banks in Spain at the turn of the century to gain an understanding of their learning processes as they reacted to the external factor of Internet banking brought about by deregulation and global competition. An open-ended approach to the interviews with broad questions about strategy and learning led to the inductive development of a process model of organizational learning. This model was then used to help understand the outcomes of the strategies pursued over time as a result of the knowledge developed from their learning processes.

Our sample of seven Spanish banks yielded a broad spectrum of organizational sizes, learning processes used, strategies pursued, and performance outcomes. A comparison by pairs of banks provides various learning opportunities. First, the two largest banks followed a real options reasoning approach by creating independent, pure Internet plays in addition to developing their Internet offering within the larger bank. Four years on, it appeared that a pure Internet play was not paying out for them. They both had the lowest market share of the seven Internet offerings under study. However, the fact that they continued to support these initiatives is of great interest for future studies. For example, are they continuing on this path because of inertia or because they see a future shift in consumer preferences that is taking longer to gain acceptance? Or perhaps there may be other benefits derived from them, for example, by using these venues for testing initiatives and learning from them before implementation at the larger bank.

In terms of differences, although both banks are of very similar size, Bank A, an early adopter and innovator, obtained the second largest market share after Bank G, a late entrant, both pursuing an efficiency-based strategy. Also looking at differences between the two largest banks, Bank D, which used a chaotic socialization path for their e-bank unit, obtained a larger market share for that unit compared with that of Bank A's e-bank. On the other hand, Bank A's main bank attained double the market share of e-banking than Bank D. These differences point to a strategic choice that these two large banks made early on. In this particular comparison, it appears that choosing the autopoietic path to learning as a single

approach was more effective in terms of market share gains.

Looking at the five banks that committed to a single distribution channel strategy, the assets/market share ratio measure seems to favour those banks that followed an autopoietic process. Using this measure, the overall leader was Bank E, a small, early adopter, that viewed Internet banking as an opportunity, committed all its resources to an Internet-based strategy for the whole bank and attained a disproportionately high market share. These results were particularly impressive given its position as the bank with the smallest share of the overall banking market and the smallest bank in terms of number of employees and assets in our sample. Also looking at the assets/market share ratio, Bank G, having used a late entry strategy, was as efficient as the small banks in terms of its results, achieving a very low asset/market share ratio and an undisputed leadership in the e-banking space with a 30.5% share of the market.

If we were to separate the banks into two groups based on size, it is clear from the analysis that Bank G, following an autopoietic learning process, a late entry strategy, and a focus on efficiency as the driver for e-bank implementation, was by far the most successful and effective of the larger banks. For the smaller banks, and controlling for size, Bank E, equally following an autopoietic approach, but an early adoption and innovation strategy proved to be the best combination for success. However, close in its path, Bank F, a bank of double the size in terms of employees and three times in terms of assets achieved the third best share of the market using a chaotic socialization approach.

Based on our observations of the industry and the processes our banks went through, it is apparent that different learning paths can be equally successful or unsuccessful, independently of the strategies pursued. Similarly, it appears that strategic choices can equally lead to success or failure in turbulent environments. The answer to this apparent lack of relationship between learning and performance may be explained at a more micro level. The model developed here could guide future research in a much more fine-grained analysis of the learning process within organizations by focusing on each of the learning steps within it.

Overall, the findings of this study give us reasons to consider the potential of the main theoretical constructs reviewed. In particular, knowledge creation and complexity theory appear as having much to recommend to the study of the strategy formation and learning processes in complex environments. Considering the relationship between the strategy process and the knowledge-based view of the firm, our research adds to the reconciliation suggested by Grant (2003) in his research in the oil industry about the long-running debate between the 'design' and 'process' schools of strategic management (Mintzberg, 1990, 1991; Ansoff, 1991). The former focuses on the role of formal analysis, planning and formal strategic choice as essential activities that prepare strategy-makers with the data essential for their task. The latter emphasizes the role of the gathering of experience, and adopting an implicit knowledge and learning perspective in describing how strategies are formed (e.g., Quinn, 1980; Mintzberg & McHugh, 1985; Burgelman, 1988; Noda & Bower, 1996). Moreover, our findings contribute to widening this reconciliation by including the emerging research effort related to the development of the science and practice of imagination as a source of strategy creation (e.g. Roos & Victor, 1999); where Scharmer (2000) highlights the importance of organizing around not-yet-embodied knowledge. In relation to the connection between strategy-making and complexity, our findings on how complexity theory contributes to improving our understanding of the social and knowledge dynamics in the strategy formation process reinforce and expand previous findings. Our research corroborates the importance of emergence (Mintzberg & Quinn, 1991) and simple guiding principles (Brown & Eisenhardt, 1997; Eisenhardt & Sull, 2001), and includes the concept of critical state in the strategy formation process.

Conclusion

The present paper develops grounded theory about strategy-making based on intensive case studies by investigating, in depth, seven Spanish banks in the process of developing and implementing their Internet strategies. This qualitative longitudinal study observed the strategy process of several Spanish banks at the turn of the century, where the industry was undergoing a structural transformation due to the threat of Internet banking. We develop a model of organizational learning informed by an integration of findings from a qualitative study with theoretical perspectives from the strategy, knowledge creation, complexity, and learning literatures. The model is then used to compare and contrast the different learning processes that led these banks to the development and implementation of diverse Internet banking strategies and to draw some preliminary conclusions regarding the potential relationships between the learning processes used, the strategies chosen, and their performance outcomes. Finally, we present the main conclusions of the research.

This paper contributes to practice in two ways. First, managers could readily apply the process model of learning proposed to analyse their own organizations and understand how they learn, identifying potential areas of improvement in the ways they gather information and transform it into organizational level knowledge. Second, an unexpected outcome from this study that warrants future research was the discovery of the potentially ephemeral nature of the competitive advantage of knowledge in industries undergoing structural change. In particular, we learn that strategies intended to gain sustainable competitive advantage through innovation can quickly become industry standards during turbulent environments, and as such lose their advantage attributes. Thus knowledge in itself is not a source of sustainable competitive advantage. Rather, the sustainability of competitive

advantage derives from continuous learning and knowledge creating.

Nevertheless, the conceptual perspective proposed in this research should be viewed with some caution, because of methodological limitations of the present study. Because the purpose of the present study was to build, rather than test, theory, we drew on detailed descriptions of a small number of organizations. The extent to which the local explanation of the process model on organizational learning proposed develops into a more general theory depends on how well it, or its descendents, explains the 'phenomena' in other settings.

Yet these limitations raise opportunities for further research. Among them, we may highlight the following. First, a question for future work on knowledge creation and learning is whether or not the local model proposed resembles the process in other settings or is idiosyncratic to the firms that we studied. Second, this study focuses on similarities in the learning process. Theories about organizations can be divided into those emphasizing variables and those focusing on constants (Udy, 1965). Our focus on constants facilitated building a theory that captures the basic structure of organizational learning, and provides initial support for the pervasiveness of these phenomena. As Harris & Sutton (1986) suggest, it is 'difficult to examine features that differ across settings without an idea of how the settings are similar'. Thus, the theory presented may help guide research on the differences among forms of knowledge creation and organizational learning in turbulent environments.

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