

INNOVATION
Perspectives for the 21st Century

BBVA

For this third book in the BBVA series, we have chosen innovation as the central theme. It was chosen for two fundamental reasons: the first was the decisive importance of innovation as the most powerful tool for stimulating economic growth and improving human standards of living in the long term. This has been the case throughout history, but in these modern times, when science and technology are advancing at a mind-boggling speed, the possibilities for innovation are truly infinite. Moreover, the great challenges facing the human race today—inequality and poverty, education and health care, climate change and the environment—have made innovation more necessary than ever. Our economy and our society require massive doses of innovation in order to make a generalised improvement in the standards of living of nearly 7 billion people (the number continues to grow) compatible with the preservation of the natural environment for future generations.

The second reason for choosing this theme is that it is consistent with BBVA's corporate culture. Our group's commitment to the creation and dissemination of knowledge ties in directly with the vision that guides every aspect of our activity: "BBVA, working towards a better future for people." People are the most important pillar of our work, and the work we do for and on behalf of people is supported by two other pillars of our culture and strategy: principles and innovation.

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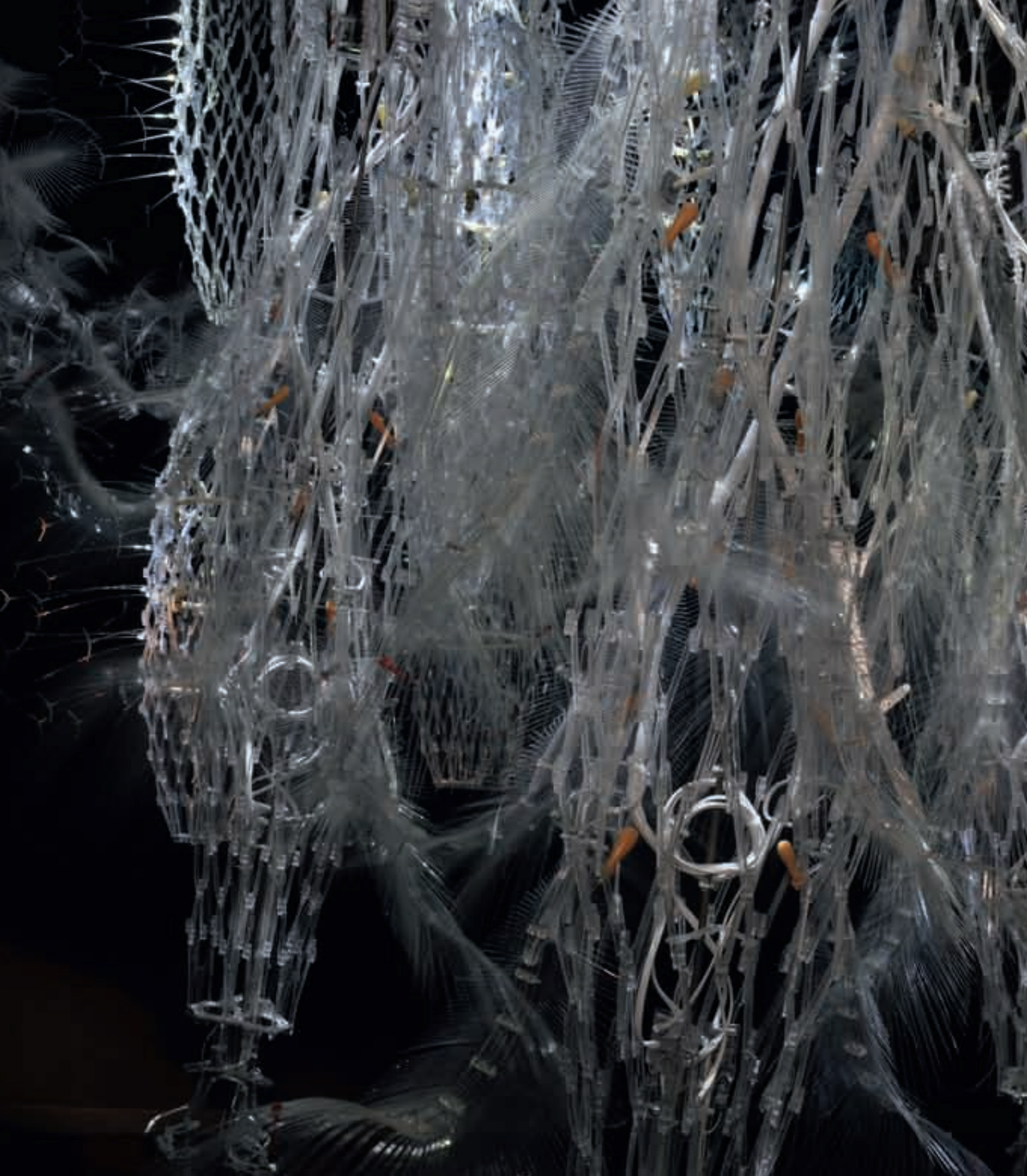
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Innovative Organizations: Structure, Learning and Adaptation

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1. INTRODUCTION

Innovation is an important source of growth and a key determinant of competitive advantage for many organizations. Achieving innovation requires the coordinated efforts of many different actors and the integration of activities across specialist functions, knowledge domains and contexts of application. Thus, organizational creation is fundamental to the process of innovation (Van de Ven et al 1999). The ability of an organization to innovate is a pre-condition for the successful utilization of inventive resources and new technologies. Conversely, the introduction of new technology often presents complex opportunities and challenges for organizations, leading to changes in managerial practices and the emergence of new organizational forms. Organizational and technological innovations are intertwined. Schumpeter (1950) saw organizational changes, alongside new products and processes, as well as new markets as factors of 'creative destruction'.

Extant literature on organizational innovation is very diverse and can be broadly classified into three streams. Organizational design theories focus predominantly on

the link between structural forms and the propensity of an organization to innovate (e.g. Burns and Stalker, 1961; Lawrence and Lorsch, 1967; Mintzberg, 1979). The unit of analysis is the organization and the main research aim is to identify the structural characteristics of an innovative organization, or to determine the effects of organizational structural variables on product and process innovation. Theories of organizational cognition and learning (Glynn, 1996; Bartel and Garud, 2009), by contrast, emphasise the cognitive foundations of organizational innovation which is seen to relate to the learning and organizational knowledge creation process (Agyris and Schon, 1978; Nonaka and Takeuchi, 1995; Nonaka and von Krogh, 2009). This strand of work provides a micro-lens for understanding the capacity of organizations to create and exploit new knowledge necessary for innovative activities. A third strand of research concerns organizational change and adaptation, and the processes underlying the creation of new organizational forms (Lewin and Volberda, 1999). Its main focus is to understand whether organizations can adapt in the face of radical environmental

shifts and technological change. In this context, innovation is considered as a capacity to respond to changes in the external environment, and to influence and shape it (Burgelman, 1991; 2002; Child, 1997; Teece, 2007).

This chapter examines the nature of innovative organizations and the relationship between organizing and innovating from these three perspectives. Section two will draw on organizational design theories and work in the field of strategy to examine the relationship between organizational structure and innovativeness. The third section looks at the micro-level process of organizational learning and knowledge creation. It argues that organizations with different structural forms vary in their patterns of learning and knowledge creation, engendering different types of innovative capabilities. This will be followed by an analysis of organizational adaptation and the contemporary challenges facing firms in pursuing 'organizational ambidexterity' for sustaining innovation. The final section draws some general conclusions from the analysis and highlights the gaps in the existing literature and areas for future research.

2. ORGANIZATIONAL STRUCTURE AND INNOVATION

2.1. *Structural archetypes and innovativeness*

The classical theory of organizational design was marked by a preoccupation with universal forms and the idea of 'one best way to organise'. The work of Weber (1947) on the bureaucracy and of Chandler (1962) on the multidivisional form, was most influential. The assumption of 'one best way' was, however, challenged by research carried out during the 1960s and 1970s under the rubric of contingency theory which explains the diversity of organizational forms and their variations with reference

to the demands of context. Contingency theory argues that the most 'appropriate structure' for an organization is the one that best fits a given operating contingency, such as scale of operation (Blau, 1970), technology (Woodward, 1965; Perrow, 1970) or environment (Burns and Stalker, 1961; Lawrence and Lorsch, 1967). This strand of research and theory underpins our understanding of the relationships between the nature of the task and technological environments, structure and performance. Some of the studies deal specifically with the question of how structure is related to innovation.

Burns and Stalker's (1961) polar typologies of 'mechanistic' and 'organic' organizations (see Box 1) demonstrate how the differences in technological and market environment, in terms of their rate of change and complexity, affect organizational structures and innovation management. Their study found that firms could be grouped into one of the two main types: the former more rigid and hierarchical, suited to stable conditions; and the latter, a more fluid set of arrangements, adapting to conditions of rapid change and innovation. Neither type is inherently right or wrong, but the firm's environment is the contingency that prompts a structural response. Related is the work of Lawrence and Lorsch (1967) on principles of organizational differentiation and integration and how they adapt to different environmental conditions, including the market -- technical-economic and the scientific sub-environments, of different industries. Whereas Burns and Stalker treat an organization as an undifferentiated whole that is either mechanistic or organic, Lawrence and Lorsch recognize that mechanistic and organic structures can co-exist in different parts of the same

organization owing to the different demands of the functional sub-environments. The work of these earlier authors had a profound impact on organizational theory and provided useful design guidelines for innovation management. Burns and Stalker's model remains highly relevant for our understanding of the contemporary challenges facing many organizations in their attempts to move away from the mechanistic towards the organic form of organizing, as innovation becomes more important and the pace of environmental change accelerates. Lawrence and Lorsch's suggestion that mechanistic and organic structures can coexist is reflected in the contemporary debate about the importance of developing hybrid modes of organizations—'ambidextrous

organizations'—that are capable of coping with both evolutionary and revolutionary technological changes (O'Reilly and Tushman, 2004; 2008; Tushman *et al.*, 2010; see section 4).

Another important early contribution is the work of Mintzberg (1979) who synthesised much of the work on organizational structure and proposed a series of archetypes that provide the basic structural configurations of firms operating in different environments. In line with contingency theory, he argues that the successful organization designs its structure to match its situation. Moreover, it develops a logical configuration of the design parameters. In other words, effective structuring requires consistency of design parameters and contingency factors. The

Table 1. Burns and Stalker: Mechanistic and Organic Structures

Burns and Stalker set out to explore whether differences in the technological and market environments affect the structure and management processes in firms. They investigated twenty manufacturing firms in depth, and classified environments into 'stable and predictable' and 'unstable and unpredictable'. They found that firms could be grouped into one of the two main types, mechanistic and organic forms, with management practices and structures that Burns and Stalker considered to be logical responses to environmental conditions.

The *Mechanistic Organization* has a more rigid structure and is typically found where the environment is stable and predictable. Its characteristics are:

- a. tasks required by the organization are broken down into specialised, functionally differentiated duties and individual tasks are pursued in an abstract way, that is more or less distinct from the organization as a whole;
- b. the precise definition of rights, obligations and technical methods is attached to roles, and these are translated into the responsibilities of a functional position; there is also a hierarchical structure of control, authority and communication;
- c. knowledge of the whole organization is located exclusively at the top of the hierarchy, with greater importance and prestige being attached to internal and local knowledge, experience and skill rather than that which is general to the whole organization;
- d. there is a tendency for interactions between members of the organization to be vertical, i.e. between superior and subordinate.

The *Organic Organization* has a much more fluid set of arrangements and is an appropriate form for changing environmental conditions which require emergent and innovative responses. Its characteristics are:

- a. individuals contribute to the common task of the organization and there is continual adjustment and re-definition of individual tasks through interaction with others;
- b. there is spread of commitment to the organization beyond any technical definition, a network structure of control authority and communication, and the direction of communication is lateral rather than vertical;
- c. knowledge may be located anywhere in the network, with this ad hoc location becoming the centre of authority and communication;
- d. importance and prestige attach to affiliations and expertise valid in industrial, technical and commercial milieus external to the firm.

Mechanistic and organic forms are polar types at the opposite ends of a continuum and, in some organizations, a mixture of both types can be found.

Source: Burns and Stalker (1961).

'configurational hypothesis' suggests that firms are likely to be dominated by one of the five pure archetypes identified by Mintzberg, each with different innovative potential: simple structure, machine bureaucracy, professional bureaucracy, divisionalised form and adhocracy. Two of these archetypes can be classified as organic organizations with a high capacity for innovation and adaptation: the simple structure and the adhocracy. The former relies on direct supervision by one person, as in the case of entrepreneurial start-ups, which continuously searches high-risk environments. The latter is a highly flexible project-based organization relying on the mutual adjustment of problem-solving teams. It is capable of radical innovation in a volatile environment. The other three remaining archetypes, machine bureaucracy, professional bureaucracy and the divisionalized form are more inhibited in their innovative capabilities and less able to cope with novelty and change. The characteristic features of the archetypes and their innovative implications are shown in Table 1.

Contingency theories account for the diversity of organizational forms in different technological and task environments. They assume that as technology and product markets become more complex and uncertain, and task activities more heterogeneous and unpredictable, organizations will adopt more adaptive and flexible structures, and they will do so by moving away from bureaucratic to organic forms of organizing. The underlying difficulties in achieving the 'match', however, are not addressed in this strand of research.

2.2. Strategy, structure and the innovative firm

The work of micro-economists in the field of strategy considers organizational structure as both cause and effect of

managerial strategic choice in response to market opportunities. Organizational forms are constructed from the two variables of 'strategy' and 'structure'. The central argument is that certain organizational types or attributes are more likely to yield superior innovative performance in a given environment because they are more suited to reduce transaction costs and cope with potential capital market failures. The multi-divisional, or M-form, for example, has emerged in response to increasing scale and complexity of enterprises and is associated with a strategy of diversification into related product and technological areas (Chandler, 1962). It can be an efficient innovator within certain specific product markets, but may be limited in its ability to develop new competencies.

Lazonick's theory of 'the innovative enterprise' (Lazonick, 2005; 2010) is rooted in the Chandlerian framework, inasmuch as it focuses on how strategy and structure determine the competitive advantage of the business enterprise. It also builds on Lawrence and Lorsch's (1967) conceptualisation of organizational design problems as differentiation and integration. The theory distinguishes the 'optimizing firm' from the 'innovative firm'. While the former seeks to maximize profits within given technological capabilities and market constraints, the latter seeks to transform technological and markets constraints through the development of distinctive organizational capabilities which cannot be easily imitated by competitors. Lazonick identifies three social conditions that support the development of the innovative firm. The first condition is 'strategic control' which refers to the set of relations that gives key decision-makers the power, knowledge and incentives to allocate the firm's resources to confront market threats and opportunities.

Table 2. Mintzberg's structural archetypes and their innovative potentials

Organization archetype	Key features	Innovative potential
Simple structure	An organic type centrally controlled by one person, which can respond quickly to changes in the environment, e.g. small start-ups in high-technology.	Entrepreneurial and often highly innovative, continually searching for high-risk environments. Weaknesses are the vulnerability to individual misjudgement and resource limits on growth.
Machine bureaucracy	A mechanistic organization characterized by a high level of specialization, standardization and centralized control. A continuous effort to routinize tasks through formalization of worker skills and experiences, e.g. mass production firms.	Designed for efficiency and stability. Good at dealing with routine problems, but highly rigid and unable to cope with novelty and change.
Professional bureaucracy	A decentralised mechanistic form which accords a high degree of autonomy to individual professionals. Characterized by individual and functional specialization, with a concentration of power and status in the 'authorized experts'. Universities, hospitals, law and accounting firms are typical examples.	The individual experts may be highly innovative within a specialist domain, but the difficulties of coordination across functions and disciplines impose severe limits on the innovative capability of the organization as a whole.
Divisionalized form	A decentralized organic form in which quasi-autonomous entities are loosely coupled together by a central administrative structure. Typically associated with larger organizations designed to meet local environmental challenges.	An ability to concentrate on developing competency in specific niches. Weaknesses include the 'centrifugal pull' away from central R&D towards local efforts, and competition between divisions which inhibit knowledge sharing.
Adhocracy	A highly flexible project-based organization designed to deal with instability and complexity. Problem-solving teams can be rapidly reconfigured in response to external changes and market demands. Typical examples are professional partnerships and software engineering firms.	Capable of fast learning and unlearning; highly adaptive and innovative. However, the unstable structure is prone to short life, and may be driven over time toward bureaucracy (see also section 3.2).

Sources: Mintzberg (1979); Tidd et al. (1997: 313-314); Lam (2000).

The second condition is 'organizational integration' -- that is the horizontal and vertical integration of skills and knowledge to support cumulative learning over time. And the third condition is 'financial commitment' to ensure that sufficient funds are allocated for competence development to sustain the cumulative innovation process. The essence of the innovative enterprise, according to Lazonick (2005: 34), "is the organizational integration of a skill base that can engage in collective and cumulative learning". The critical importance of skills and knowledge integration as the social foundations of

innovation is also stressed by several other authors (Lam, 2000; Lam and Lundvall, 2006).

Because the conditions that underpin the innovative firm are social, the type of organisational integrative capability and the nature of the innovative firm tend to vary across institutional contexts and over time (Whitley, 2000; Lazonick, 2005). Drawing on comparative historical evidence, Lazonick (2005) has illustrated the rise and fall of different national models of innovative firms characterised by different types of organizational capabilities. For example, the growth of the US industrial corporation

during the first half of the twentieth century was energised by a powerful managerial organization for deploying new technology and using unskilled and semi-skilled workers in mass production. The US managerial corporation was confronted by the Japanese model of the innovative firm in the 1970s which outperformed the US in many industrial sectors such as consumer electronics, machine tools and automobiles. Japanese firms have been able to gain a competitive advantage in these industries because of their superior organizational capacity for integrating shop-floor skills and enterprise networks, enabling them to plan and coordinate specialised divisions of labour and innovative investment strategies. The late 1990s saw the resurgence of the US high-technology sectors spearheaded by what Lazonick (2005; 2010) refers to as 'new economy companies' in Silicon Valley which drew their innovative capabilities from the dynamic integration of technical and entrepreneurial skills within highly flexible, open network organizations.

The theory of the innovative firm propounded by Lazonick, alongside other researchers in the field of strategy (e.g. Teece *et al.*, 1997; Teece, 2007) stresses the importance of organizational and managerial processes—integrating, learning and reconfiguration—as core elements that underpin firms' innovative performance. However, this strand of work devotes little attention to the micro-dynamics of learning within organizations.

3. THE COGNITIVE FOUNDATIONS OF ORGANIZATIONAL INNOVATION

3.1. *Organizational learning and knowledge creation*

The structural perspectives discussed above treat innovation as an output of certain

structural features. Some organizational researchers regard innovation as a process of bringing new, problem-solving, ideas into use (Amabile, 1988; Kanter, 1983). Mexias and Glynn (1993: 78) define innovation as "non-routine, significant, and discontinuous organizational change that embodies a new idea that is not consistent with the current concept of the organization's business". This approach defines an innovative organization as one that is intelligent and creative (Glynn, 1996; Woodman *et al.*, 1993), capable of learning effectively (Argote, 1999; Senge, 1990; Agyris and Schon, 1978) and creating new knowledge (Nonaka, 1994; Nonaka and Takeuchi, 1995; Nonaka and von Krogh, 2009). Cohen and Levinthal (1990) argue that innovative outputs depend on the prior accumulation of knowledge that enables innovators to assimilate and exploit new knowledge. From this perspective, understanding the role of organizational learning in fostering or inhibiting innovation becomes crucially important.

Central to theories of organizational learning and knowledge creation is the question of how organizations translate individual insights and knowledge into collective knowledge and organizational capability. While some researchers argue that learning is essentially an individual activity (Simon, 1991; Grant, 1996), most theories of organizational learning stress the importance of collective knowledge as a source of organizational capability. Collective knowledge is the accumulated knowledge of the organization stored in its rules, procedures, routines and shared norms which guide the problem-solving activities and patterns of interaction among its members. Collective knowledge resembles the 'memory' or 'collective mind' of the organization (Walsh and Ungson, 1991). It

can either be a 'stock' of knowledge stored as hard data, or represent knowledge in a state of 'flow' emerging from interaction. Collective knowledge exists between rather than within individuals. It can be more, or less, than the sum of the individuals' knowledge, depending on the mechanisms that translate individual into collective knowledge (Glynn, 1996). Both individuals and organizations are learning entities. All learning activities, however, take place in a social context, and it is the nature and boundaries of the context that make a difference to learning outcomes.

Much of the literature on organizational learning points to the importance of social interaction, context and shared cognitive schemes for learning and knowledge creation (Argyris and Schon, 1978; Lave and Wenger, 1991; Brown and Duguid, 1991, 1998; Bartel and Garud, 2009). This builds on Polanyi's (1966) idea that a large part of human knowledge is subjective and tacit, and cannot be easily codified and transmitted independently of the knowing subject. Hence its transfer requires social interaction and the development of shared understanding and common interpretive schemes.

Nonaka's theory of organizational knowledge creation is rooted in the idea that shared cognition and collective learning constitute the foundation of organizational knowledge creation (Nonaka, 1994; Nonaka and Takeuchi, 1995; Nonaka and von Krogh, 2009). At the heart of the theory is the idea that tacit knowing constitutes the origin of all human knowledge, and organizational knowledge creation is a process of mobilising individual tacit knowledge and fostering its interaction with the explicit knowledge base of the firm. Nonaka argues that knowledge needs a context to be created. He uses the Japanese word 'ba', which literally means 'place', to describe such a context. 'Ba'

provides a shared social and mental space for the interpretation of information, interaction and emerging relationships that serves as a foundation for knowledge creation. Participating in a 'ba' means transcending one's limited cognitive perspective or social boundary to engage in a dynamic process of knowledge sharing and creation. In a similar vein, the notion of 'community of practice' (Lave and Wenger, 1991; Wenger, 1998; Brown and Duguid, 1991; 1998) suggests that organizational members construct their shared identities and perspectives through 'practice', that is shared work experiences. Practice provides a social activity in which shared perspectives and cognitive repertoires develop to facilitate knowledge sharing and transfer. Hence, the work group provides an important site where intense learning and knowledge creation may develop. The group, placed at the intersection of horizontal and vertical flows of knowledge within the organization, serves as a bridge between the individual and organization in the knowledge creation process. Much of the recent literature on new and innovative forms of organization also focuses on the use of decentralised, group-based structure as a key organizing principle.

Many organizational and management researchers regard the firm as a critical social context where collective learning and knowledge creation take place. Nonaka and Takeuchi (1995) talk about the 'knowledge-creating company'. Argyris and Schon (1978) suggest that an organization is, at its root, a cognitive enterprise that learns and develops knowledge. 'Organizational knowledge' essentially refers to the shared cognitive schemes and distributed common understanding within the firm that facilitate knowledge sharing and transfer. It is similar to Nelson and Winter's (1982) concept of

'organizational routines': a kind of collective knowledge rooted in shared norms and beliefs that aids joint-problem solving and is capable of supporting complex patterns of action in the absence of written rules. The notion of 'core competence' (Prahalad and Hamel, 1990) implies that the learning and knowledge creation activities of firms tend to be cumulative and path-dependent. Firms tend to persist in what they do because learning and knowledge are embedded in social relationships, shared cognition and existing ways of doing things (Kogut and Zander, 1992). Several authors have analysed how collective learning in technology depends on firms' cumulative competences and evolves along specific trajectories (Dosi, 1988; Pavitt, 1991). Thus, the shared context and social identity associated with strong group-level learning and knowledge accumulation processes may constrain the evolution of collective knowledge. Firms may find it difficult to unlearn past practices and explore alternative ways of doing things. Levinthal and March (1993) argue that organizations often suffer from 'learning myopia', and have a tendency to sustain their current focus and accentuate their distinctive competence: what they call falling into a 'competency trap'. The empirical research by Leonardo-Barton (1992) illustrates how firms' 'core capabilities' can turn into 'core rigidities' in new product development.

An inherent difficulty in organizational learning is the need to maintain an external boundary and identity while at the same time keeping the boundary sufficiently open to allow the flow of new knowledge and ideas from outside. March (1991) points out that a fundamental tension in organizational learning is balancing the competing goals of 'the exploitation of old certainties' and the 'exploration of new possibilities'.

Whereas knowledge creation is often a product of an organization's capability to recombine existing knowledge and generate new applications from its existing knowledge base, radically new learning tends to arise from contacts with those outside the organization who are in a better position to challenge existing perspectives and paradigms. Empirical research has suggested that sources of innovation often lie outside an organization (von Hippel, 1988; Lundvall, 1992). External business alliances and network relationships, as well as using new personnel to graft new knowledge onto the existing learning systems, are important mechanisms for organizational learning and knowledge renewal in an environment characterised by rapid technological development and disruptive changes (Powell, 1998; Lam, 2007). The 'dynamic capability' perspective argues that the long-term competitive performance of the firm lies in its ability to build and develop firm-specific capability and, simultaneously, to renew and re-configure its competences in response to an environment marked by 'creative destruction' (Teece *et al.*, 1997; Teece 2007). Thus, a fundamental organizational challenge in innovation is not simply the maintenance of a static balance between exploitation and exploration, or stability and change, but a continuous need to balance and coordinate the two dynamically throughout the organization.

3.2. Two alternative models of learning organizations: 'J-Form' vs. 'Adhocracy'

All organizations can learn and create knowledge, but their learning patterns and innovative capabilities vary (Lam, 2000; 2002). During the past two decades, an extensive literature has examined new organizational models and concepts designed to support

organizational learning and innovation. These models include 'high performance work systems' or 'lean production' (Womack *et al.*, 1990), pioneered by Japanese firms in the automobile industry; and the 'N-form corporation' (Hedlund, 1994) and 'hypertext organization' (Nonaka and Takeuchi 1995). More recently, concepts such as 'cellular forms' (Miles *et al.*, 1997); 'modular forms' (Galunic and Eisenhardt, 2001); 'project-based networks' (DeFillippi, 2002) and 'new economy firms' (Lazonick, 2005) reflect the growth of flexible and adaptive forms of organization with a strategic focus on entrepreneurship and radical innovation in knowledge-intensive sectors of the economy. These studies highlight the different ways in which firms seek to create learning organizations capable of continuous problem solving and innovation.

A closer examination of the literature on new forms suggests that the various models of learning organizations can be broadly classified into two polar ideal types, namely, the 'J-form' and 'adhocracy' (Lam, 2000; 2002). The former refers to an organization which is good at exploitative learning and derives its innovative capabilities from the development of organization-specific collective competences and problem-solving routines. The term J-form is used because its archetypal features are best illustrated by the 'Japanese type' of organizations, such as Aoki's (1988) model of the 'J-firm', and Nonaka and Takeuchi's (1995) 'knowledge creating companies'. Adhocracy (Mintzberg, 1979), by contrast, tends to rely more upon individual specialist expertise organized in flexible market-based project teams capable of speedy responses to changes in knowledge and skills, and integrating new kinds of expertise to generate radical new products and processes. It is skilled at explorative

learning. Mintzberg's term is used here to capture the dynamic, entrepreneurial and adaptive character of the kind of organization typified by Silicon-Valley-type companies (Bahrami and Evans, 2000). Both the 'J-form' and 'adhocracy' are learning organizations with strong innovative capabilities, but they differ markedly in their knowledge configurations, patterns of learning and the type of innovative competences generated. These two polar organizational types are facilitated by different institutional characteristics of labour markets and systems of competence building (Lam, 2000; Lam and Lundvall, 2006).

The J-form organization relies on knowledge that is embedded in its operating routines, team relationships and shared culture. It is facilitated by a relatively stable, long-term employment relationship and, a broad-based education and training system for the majority of the workforce. Learning- and knowledge-creation within the J-form takes place within an 'organizational community' that incorporates shopfloor skills in problem solving, and intensive interaction and knowledge sharing across different functional units. The existence of stable organizational careers rooted in an internal labour market provide an incentive for organizational members to commit to organizational goals and to develop firm-specific problem-solving knowledge for continuous product and process improvement. New knowledge is generated through the fusion, synthesis and combination of the existing knowledge base. The J-form tends to develop a strong orientation towards pursuing an incremental innovation strategy and do well in relatively mature technological fields characterised by rich possibilities of combinations and incremental improvements of existing

components and products (e.g. machine-based industries, electronics components and automobiles). But the J-form's focus on nurturing organizationally-embedded, tacit knowledge and its emphasis on continuous improvement in such knowledge can inhibit learning radically new knowledge from external sources. The disappointing performance of Japanese firms in such fields as software and biotechnology in the 1990s may constitute evidence of the difficulties faced by 'J-form firms' in entering and innovating in rapidly developing new technological fields (Whitely, 2003).

An adhocracy is an organic and adaptive form of organization that is able to fuse professional experts with varied skills and knowledge into adhoc project teams for solving complex and often highly uncertain problems. Learning and knowledge creation in an adhocracy occurs within professional teams that often are composed of employees from different organizations. Careers are usually structured around a series of discrete projects rather than advancing within an intra-firm hierarchy. The resulting project-based career system is rooted in a relatively fluid occupational labour market which permits the rapid reconfiguration of human resources to align with shifting market requirements and technological changes. The adhocracy has a much more permeable organizational boundary that allows the insertion of new ideas and knowledge from outside. This occurs through the recruitment of new staff, and the open professional networks of the organizational members that span organizational boundaries. The adhocracy derives its competitive strength from its ability to reconfigure the knowledge base rapidly to deal with high levels of technical uncertainty, and to create new knowledge to produce novel innovations in emerging new industries. It is

a very adaptive form of organization capable of dynamic learning and radical innovation. However, the fluid structure and speed of change may create problems in knowledge accumulation, since the organization's competence is embodied in its members' professional expertise and market-based know-how which are potentially transferable. The adhocracy is subject to knowledge loss when individuals leave the organization. The long-term survival of this loose, permeable organizational form requires the support of a stable social infrastructure rooted in a wider occupational community or localised firm networks

Although firms in the high-technology sectors are under intense pressure to learn faster and organize more flexibly, evidence thus far suggests that complete adhocracies remain rare. Adhocracies are usually confined to organizational subunits engaged in creative work (e.g. 'skunk work' adhocracies) (Quinn, 1992), or knowledge-intensive professional service fields (e.g. law, management consultancies, software engineering design) where the size of the firm is generally relatively small, enabling the whole organization to function as an interdependent network of project teams (DeFillippi, 2002). Attempts by large corporations to adopt the adhocracy mode have proved difficult to sustain in the long-run (Foss, 2003). Elsewhere, the most successful examples of adhocracies are found in regionally based industrial communities, as in the case of Silicon Valley, and other high-technology clusters (Saxenian, 1996; Angels, 2000). There, the agglomeration of firms creates a stable social context and shared cognitive framework to sustain collective learning and reduce uncertainty associated with swift formation of project teams and organizational change.

4. ORGANIZATIONAL CHANGE AND ADAPTATION: TOWARDS 'ORGANIZATIONAL AMBIDEXTERITY'

Can organizations change and survive in the face of major environmental shifts? If so, how do they adapt? There are two broad perspectives in the research on organizational change. Organizational ecology and institutional theorists (Hannan and Freeman, 1984; Barnett and Carroll, 1995; DiMaggio and Powell, 1983; Greenwood and Hinings, 1996) emphasize the powerful forces of organizational inertia and argue that individual organizations seldom succeed in making radical change in strategy and structure in the face of environmental turbulence. This strand of research focuses on the way environments select organizations, and how this selection process creates change in organizational forms as new entrants within an industry display the established organizations that cannot adapt fast enough. One possible way for organizations to adapt, according to the selectionist perspective, is to spin out new business ventures (Barnett and Freeman, 2001; Christensen, 1997). By contrast, theories of strategic organizational adaptation and change focus on the role of managerial action and strategic choice in shaping organizational change (Child, 1997; Burgelman, 2002; Teece, 2007). They view organizational change as a product of an actor's decisions and learning, rather than the outcome of a passive environmental selection process. According to Child (1997), organizational action is bounded by the cognitive, material and relational structures internal and external to the organization, but at the same time it impacts upon those structures. Organizational actors, through their actions and 'enactment' (Weick, 1979), are capable of redefining and modifying structures in ways that will open up new

possibilities for future action. As such, the strategic choice perspective projects the possibility of creativity and innovative change within the organization.

Many strategic adaptation theorists view organizational change as a continuous process encompassing the paradoxical forces of continuity and change. Continuity maintains a sense of identity for organizational learning (Weick, 1996), provides political legitimacy, and increases the acceptability of change among those who have to live with it (Child and Smith, 1987). Burgelman's (1991, 2002) study of Intel corporation illustrates how the company successfully evolved from a memory to a microprocessor company by combining the twin elements of continuity and change for strategic renewal. Burgelman argues that consistently successful organizations use a combination of 'induced' and 'autonomous' processes in strategy-making to bring about organizational renewal. The induced process develops initiatives that are within the scope of the organization's current strategy and build on existing organizational learning (i.e. continuity). In contrast, the autonomous process concerns initiatives that emerge outside the organization and provide the opportunities for new organizational learning (i.e. change). These twin processes are considered vital for successful organizational transformation. In a similar vein, Brown and Eisenhardt (1997) note that continuous organizational change for rapid product innovation is becoming a crucial capability for firms operating in high-velocity industries with short product cycles. Based on case studies of multi-product innovations in the computer industry, the authors conclude that continuous change and product innovations are supported by organizational structures that can be described as 'semi-structures',

a combination of 'mechanistic' and 'organic' features, that balance order and chaos.

The dual search for stability and change constitutes a central paradox in all forms of organizing and poses a major challenge for firms operating in today's business environment (Farjoun, 2010). In the past, many organizational theorists maintained that the structures, processes and practices that support stability and reliability were largely incompatible with those needed for change and flexibility. The tension between 'exploitation' and 'exploration' in organizational learning and innovation is a familiar example (March, 1991). Exploitation builds on existing knowledge and thrives on the kind of organizational cohesiveness found in the 'J-form' whereas exploration requires the creation of new knowledge and novel ideas nurtured in an entrepreneurial mode of organizing such as the adhocracy (Lam, 2000). The contrasting organizing logics underlying the two activities make their effective combination extremely difficult, if not impossible. However, in recent years there have been growing pressures on organizations to develop dual structures and processes for sustaining performance in a fast changing and complex environment. The notion of an 'ambidextrous organization' (O'Reilly and Tushman, 2004, 2008; Tushman *et al.*, 2010) suggests that the key to the long-term success of firms lies in their ability to exploit existing competences while simultaneously exploring new possibilities to compete in both mature and emerging markets. The term 'ambidexterity' means doing both. According to O'Reilly and Tushman (2004; 2008), ambidextrous organizations are ones that can sustain their competitive advantage by operating in multiple modes simultaneously—managing for short-term

efficiency by emphasizing stability and control, and for long-term innovation by taking risks. Organizations that operate in this way develop multiple, internally inconsistent architectures, competences and cultures, with built-in capabilities for efficiency, consistency and reliability needed for exploiting current business on the one hand, and experimentation and improvisation for exploring new opportunities on the other. From a strategic perspective, organizational ambidexterity is seen as a dynamic capability enabling organizations "to maintain ecological fitness and, when necessary, to reconfigure existing assets and develop the new skills needed to address emerging threats and opportunities" (O'Reilly and Tushman, 2008: 189).

The concept of organizational ambidexterity is an attractive one. However, the conditions under which it leads to long-term success and its impact on innovative performance have yet to be verified. The challenge associated with managing the apparent paradox of stability and change remains a formidable task for many organizations.

5. CONCLUSION

Innovation is a process of learning, and learning is a collective process that occurs within an organized setting. This chapter has examined the nature and development of innovative organizations from three different but interdependent perspectives:

1. the relationship between organizational structural forms and innovativeness;
2. innovation as a process of organizational learning and knowledge creation; and
3. organizational capacity for change and adaptation.

The analysis suggests that building innovative organizations entails not only matching structural forms with

technological and market opportunities, but also embedding the capacity for learning and knowledge creation within team processes and social relationships. There are different types of learning and innovative organizations and their dominant features tend to vary over time and across institutional contexts. However, a fundamental characteristic of innovation is that it always consists of a new combination of ideas, knowledge, capabilities and resources. Thus, maintaining the openness of an organization for absorbing new knowledge and ideas from a variety of sources increases the scope for new combinations and enhances the possibility for producing more sophisticated innovations. An enduring challenge facing all innovative organizations is the encapsulation of dual structures, processes and capabilities that reconcile stability and exploitation with change and exploration to ensure current viability and long-term adaptability. The notion of an 'ambidextrous organization' has become a popular expression to denote the paradox of managing innovation in the contemporary business environment.

Organizational innovation is a multifaceted phenomenon. The extensive literature in organization studies has advanced our understanding of the effects of organizational structure on the ability of organizations to learn, create knowledge and generate technological innovation. We know relatively less, however, about how internal organizational dynamics and actor learning interact with technological and environmental forces to shape organizational evolution. It remains unclear how and under what conditions organizations shift from one structural archetype to another, and the role of technological innovation in driving the process of organizational change is also obscure. The bulk of the existing research

has tended to focus on how technology and market forces shape organizational outcomes and treat organizations primarily as a vehicle or facilitator of innovation, rather than focussing on the process of organizational innovation itself. For example, we tend to assume that technological innovation triggers organizational change because it shifts the competitive environment and forces organizations to adapt to the new set of demands. This deterministic view neglects the possibility that differences in organizational interpretations of, and responses to, external stimuli can affect the outcomes of organizational change. Treating the organization as an interpretation and learning system (e.g. Daft and Weick, 1994; Greve and Taylor, 2000) directs our attention to the important role of internal organizational dynamics, actor cognition and behaviour in shaping the external environment and outcomes of organizational change. A promising direction for future research would be to take greater account of endogenous organizational forces such as capacity for learning, values, interests and culture in shaping organizational change and innovation.

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