Chapter 1
Management Innovation and Technological Innovation: Friends or Foes?

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Abstract Understanding of management innovation has been advanced in the last decade, but it is still a relatively under-researched topic, at least in comparison with that of technological innovation. This article introduces this volume on Management Innovation; it reviews critically, the multiple conceptual approaches to the topic, looks at the different research streams related to it, and considers the performance consequences or its occurrence. In the latter respect, the article analyzes the synergistic effects of co-adopting management and technological innovation. It also provides a robust theoretical foundation for addressing co-adoption, using a cross-disciplinary perspective. The article also notes that the literature on joint adoption has three blind spots: (i) the literature is fragmented into different, albeit complementary, frameworks and perspectives; (ii) the literature has mainly focused on technological performance, or other general performance, effects deriving from the introduction of management innovations, giving less attention to specific management innovation effects; and (iii) the literature so far has not looked at the joint adoption of specific pairs of technological and management innovations. Finally, as a general point, the article observes that it is surprising how little empirical research has so far gone into exploring the association between the adoption of management innovation and its performance outcomes.

1.1 Introduction

This article addresses the topic of management innovation, looking at its different research streams, and carrying out an in-depth analysis of its performance effects. More specifically, the article carries out a critical review of the management

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innovation concept, draws up a taxonomy of its different on-going research streams, and theoretically integrates perspectives on the synergistic performance effects of the joint adoption of management and technological innovations. A theoretical integration is achieved by: (i) integrating diverse, but complementary, managerial perspectives addressing the extra benefits of co-adoption, and (ii) dissecting a specific pair of technological and non-technological co-adoption: technological process innovation and organizational innovation. In doing so, this article inserts the topic of management innovation into the mainstream of a diverse set of literatures, and contributes to theory building. This should be of particular value to scholars concerned with understanding the emergent topic of management innovation, and its broad impact on firms.

The article is organized as follows. After this introduction, Section two reviews the management innovation concept; Section three then presents a literature review of different research streams addressing management innovation; Section four describes the extra benefits, or synergistic effects, to be obtained from the co-adoption of management and technological innovation; Section five describes a specific type of joint adoption: technological process innovations together with organizational innovations; finally, in Section six, conclusions and implications are discussed.

1.2 Conceptualizations: A Review

The term *organizational innovation* (Trist and Bamforth 1951) or management innovation (Birkinshaw et al. 2008), encompasses the introduction of new administrative (e.g. Kimberly and Evanisko 1981), organizational (e.g. Armbruster et al. 2008) and managerial (e.g. Birkinshaw et al. 2008) activities. According to Wengel et al. (2000), there are two different kinds of organizational innovation, usually inter-related: *structural* innovations (those that change an organizational arrangement and the division of labour within it), and *managerial* innovations (those relating to the way a firm organizes its activities or its personnel). The notion of management innovation, as distinguished from the technological kind, is rooted in Schumpeter's (1934) concepts of non-technical innovation (such as the opening up of new markets, the development of new sources of supply, and the creation of new market structures). A similar concept is that of administrative or *social innovation* (Damanpour et al. 1989; Trist and Murray 1993), which is said to refer to strategies not directly related to technical innovation, pertaining to policies of recruitment, the allocation of resources, and the structuring of tasks, authority and rewards (Damanpour and Evan 1984; Evan 1966; Kimberly and Evanisko 1981).

Birkinshaw et al. (2008, p. 829) define management innovation as 'the generation and implementation of a management practice, process, structure, or technique that is *new to the state of the art* and is intended to further organizational goals', while Mol and Birkinshaw (2009), and Ganter and Hecker (2013), employ a definition of management innovation which refers to the introduction of management practices that are *new to the firm* and intended to enhance firm performance.

According to Birkinshaw et al. (2008) seminal work, management innovation is formed by *management practices* (that is, what managers do as part of their job on a daily basis); *management processes* (including, for example, strategic planning and performance assessment); and *organizational structure* tasks (such as dealing with communications and re-structuring). The Oslo Manual (2005) distinguishes, within the category of non-technological innovations, between organizational and marketing innovations. An organizational innovation is defined as *the introduction of new-to-the-firm: business practices (such as new forms of quality management); knowledge management systems; organizational methods for the workplace (including those connected to de-centralization, re-structuring, and communication); and management models for external relations (including in respect of outsourcing, alliance formation,* and *inter-firm cooperation).*

In general, the above definitions are rooted in organization theory, and either address practices and policies, or structures and processes. The former relate to the organizational routines mentioned by Simon (1945, p. 46): that is, "*factors that will determine with what skills, values and knowledge the organization member undertakes his work*". The latter address, as stated by Child (1972, p. 2), the "*formal allocation of work roles and the administrative mechanisms to control and integrate work activities*". For the sake of consensus and clarity, we will follow the suggestion of Damanpour and Aravind (2011, p. 35) and view the definitions of administrative, organizational and management innovation as broadly similar, although we recognize that the nuances are quite important. Mol and Birkinshaw (2009), and also Battisti and Stoneman (2010), bring together in their construct of management innovation in the UK, (based on empirical data from the UK CIS), firms' new management practices, new modes of organization, new marketing and new information strategies. However, while the OECD (2005), Mol and Birkinshaw (2009) and Battisti and Stoneman (2010) include in their conceptualizations of management innovation the introduction of new marketing innovations, Armbruster et al. (2008), Camisón and Villar-López (2012), and Damanpour and Aravind (2011) do not. Also, some works only refer to organizational and marketing innovations (from the Oslo Manual) as non-technological innovations. See Table 1.1 for a compilation of definitions and units of measure of the construct. For example, in Table 1.1 it is observed that the construct comprises from occupational roles or compensation, in the early stages, to marketing and strategy in recent works. All in all, the construct is not perfectly delimited.

Occasionally, the innovation literature uses the term "organizational innovation", regardless of the type of innovative outcome developed or introduced in an organization (including technological and non-technological types). In contrast, Lam (2005) defines *organizational innovation* as a precondition for any kind of innovation in organizations. For her, it is necessary to study the relevant and key organizational characteristics which enhance a firm's ability for innovation (e.g. Hall 1992; Hall 1993; Henderson and Cockburn 1994). There is no doubt that one possible barrier to the development of the construct "organizational innovation" is its own *ambiguity and (the) lack of consensus on the definition of the term* (Lam 2004, pp. 31–32).

Table 1.1 Definitions of the management innovation construct and units of measure

Studies	Definitions
Trist and Bamforth (1951)	Organizational innovations: There is no stated definition, but the work addresses firms' social structures (including occupational roles, group organization, people, tasks, compensation issues, skills, and working conditions), rather than technical structures. In general, the authors refer to organizational structure, administrative processes (methods of compensation), and the human resource system. This is the pioneering work
Evan (1966)	Administrative innovation: The concept relates to: policies of recruitment, the allocation of resources, and the structuring of tasks, authority and rewards
Evan and Black (1967)	Administrative innovation: The reference is to aspects such as: human recruitment, jobs allocation, and definition of goals for personnel. The concept covers, basically, administrative and human systems
Damanpour et al. (1989)	Administrative innovation: This refers to new techniques related to an organisation's social system, as defined (see above) in Trist and Bamforth (1951), quoted (1989, p. 588)
OECD (2005)	Non-technological innovation: This is defined as organizational innovation, which in turn is described as the implementation of a new organizational method in a firm's business practices, workplace organization or external relations For example, in the Spanish CIS data questionnaire, organizational innovations are defined as: "…*new business practices in the organization of work or in company procedures (for example, in relation to the management of the supply chain, re-engineering, efficient production, quality management, education or training systems.); new knowledge management systems to improve the use or exchange of information or knowledge within the company, or so as to collect information from outside of the company; new organization methods for workplaces in the company, for the purpose of a better distribution of responsibilities and decision-making (for example, using for the first time a system for distributing responsibilities among employees, or managing working teams, or restructuring departments); new models for managing external relations with other companies or public institutions (for example, creating for the first time alliances, associations, or subcontracting arrangements).*." Marketing innovation: A marketing innovation is defined by the OECD as the implementation of a new marketing method involving significant changes in product design or packaging, product placement, product promotion, or pricing For example, in the Spanish CIS data questionnaire, marketing innovations are defined as: "… *significant modifications in the design of the product or in the packaging of the goods or services;*….(This definition excludes changes that affect the functionality of a product or the characteristics of the user. The said changes in the functionality of the product would in fact be considered to be product innovation)..... *new techniques or channels for the promotion of the product;*.. (For example, use for the first time of a new advertising channel, or the employment of new trademarks)…. *new methods for the positioning of the product in the market or sales channels;* (For example, use for the first time of franchises or distribution licences, or the introduction of direct sale techniques, or the making of exclusive retail agreements) *and, methods for establishing the prices of goods or services.* (For example, use for the first time of a system where prices vary according to demand, or the introduction of price discounts)"

(continued)

Table 1.1 (continued)

Studies	Definitions
Birkinshaw et al. (2008)	Management innovation: This is defined as: 'the generation and implementation of a management practice, process, structure, or technique that is *new to the state of the art* and is intended to further organizational goals'. More specifically, this definition refers to novel or disruptive managerial innovation (such as the M-form invention)
Armbruster et al. (2008)	Organizational innovation: No single definition is provided. The authors carry out a review of studies that have attempted to measure the concept, and find the following terms variously referred to: "team work"; "task integration"; "decentralisation"; continuous improvement processes"; "segmentation of production"; "changes in structures and processes of an organization due to new managerial and working practices such as the introduction of teamwork in production or new supply chain management"; "delegation of responsibility"; "cross-occupational working groups"; "quality circles"; "integration of functions"; and "job rotation"
Battisti and Stoneman (2010)	Organizational innovation: The authors refer to: new management practices, new organization, new marketing and new corporate strategies (They draw on CIS data from UK)
Damanpour and Aravind (2011)	Managerial innovation: The concept relates to management functions which change strategies, structures, systems and administrative procedures
Vaccaro et al. (2012)	Management innovation: The definition is one of new managerial processes, practices, or structures that change the nature of managerial work (such as rules and procedures, employee's tasks and functions, management systems, compensation systems, and communication structures) The authors' identify management innovation by offering respondents the following questions: *1. Rules and procedures within our organization are regularly renewed?* *2. We regularly make changes to our employees' tasks and functions?* *3. Our organization regularly implements new management systems?* *4. The policy with regard to compensation has been changed in the last three years?* *5. The intra- and inter-departmental communication structure within our organization is regularly restructured?* *6. We continuously alter certain elements of the organizational structure?* All responses were measured on a 7-point scale, for which 1 indicated 'strongly disagree' and 7 'strongly agree'
Mol and Birkinshaw (2009) and Ganter and Hecker (2013)	Management innovation: For these authors, management innovation refers to the introduction of management practices that are *new to the firm* and which are intended to enhance firm performance. This definition is based on that of Birkinshaw et al. (2008), drawing on CIS data from the UK. Ganter and Hecker followed German CIS based on Oslo Manual. Mol and Birkinshaw included, from the UK CIS questionnaire: (a) Implementation of new or significantly changed corporate strategies e.g. mission statement, market share, (b) Implementation of advanced management techniques within your firm e.g. knowledge management, quality circles, (c) Implementation of new or significantly changed organizational structures e.g. Investors in people, diversification, and (d) Changing significantly your firm's marketing concepts/strategies e.g. marketing methods

Source: Own

As Larraza (2013, p. 184) states, it is crucial to distinguish clearly between organisational innovation and organisational change. She pointed out that in respect of the Oslo Manual, "*As important for its framework as the standard definition, are also the two characteristics that the Oslo Manual* (OECD 2005) *attributed to organizational innovation: the novelty of the organizational method implemented and the strategic reasons for its deployment. These two features help to differentiate organizational innovation from mere organizational change. Thus, for an organizational change to be considered organizational innovation, it must be completely new to the organization. Furthermore, the mere formulation of management strategies in a document cannot be considered organizational innovation, and its implementation on the firm's activity is a basic requirement. More recent studies have introduced new criteria of differentiation, specifying that the strategic motivation is needed to be considered innovation, orienting it to a considerable improvement of competitive advantage and economic performance for the organization* (Som et al. 2012). *However, this differentiation keeps being confusing since organizational and management literature also includes definitions and empirical research that shows strategic motivation on organizational change processes* (Poole and Van de Ven 2004; Van de Ven 1992)".

1.3 What Do We Know So Far?

1.3.1 Taxonomies

Within the management literature addressing management innovation there are different research streams, but mostly there has been a focus on conceptualizing the phenomenon (Birkinshaw et al. 2008), and understanding its antecedents (e.g. Vaccaro et al. 2012). However, despite an increase in recent years in the number of studies addressing management innovation (e.g. Vaccaro et al. 2012), the topic is still under-researched, at least in comparison to the well-researched phenomenon of technological innovation. As a matter of fact, Crossan and Apaydin (2010) found that out of 524 articles published about innovation in organizations in leading management journals over the period 1981–2008, only three were about management innovation, the majority of papers being classified as addressing technological innovations. Similarly, Keupp et al. (2012) show that of 342 articles reviewed for the period covering 1992–2010, only seven concerned organizational innovations.

In our view, studies of the introduction of management innovation follow three main approaches. Firstly, there are works relating to taxonomies, definitions and the theoretical foundations of the construct, and its systemic organizational implications for innovation in organizations (e.g. Birkinshaw et al. 2008; Damanpour 1991; Evan 1966; Hamel 2006; Wolfe 1994). Secondly, there are those works related to the drivers or antecedents of the adoption of management innovation (Damanpour and Evan 1984; Damanpour 1987; Kimberly and Evanisko 1981; Mol and

Birkinshaw 2009; Wolfe 1994). Thirdly, there are studies focused on the performance consequences of management innovation adoption, including consideration of the synergistic effects of, and the (extra) profit generated by, the joint adoption of more than one type of innovation (Camison-Zornoza and Villar-López 2012; Hervas-Oliver et al. 2012; Mol and Birkinshaw 2009) .

In fact, the phenomenon of joint adoption has been studied through a diverse set of perspectives, and been given various names. For instance, in the technology strategy and innovation literature, the phenomenon has been studied under the names of *synchronous adoption* (Ettlie 1988), and *organizational integration* (Ettlie and Reza 1992), where the concern is to address the optimization of jointly adopted social-oriented and technical-oriented practices (Cua et al. 2001; Damanpour et al. 2009). Also, in the "socio-technical" perspective (Trist and Bamforth 1951), the focus is on the effects of technical (that is the production system oriented to an organization's primary work activity) and social (the human and administrative systems that shape and support the technical one) systems, and the advantages of them being jointly adopted.

There is no doubt that the introduction of new management practices constitutes a crucial tool for leveraging innovation (Birkinshaw et al. 2008; Birkinshaw and Mol 2006; Hamel 2006; Mol and Birkinshaw 2009; Vaccaro et al. 2012). Surprisingly, little research has sought to explain the association between the adoption of organizational innovation and its performance consequences (Birkinshaw and Mol 2006), with some exceptions (e.g. Mol and Birkinshaw 2009).

In respect of studies that address the performance consequences of adopting a management innovation (e.g. Walker et al. 2011), the literature basically divides into two types of approaches. A first group follows a lead-lag approach, that is, one where one innovation mode is seen as a precondition for another, and where, in general, organizational (or management) innovation is seen as necessary before technological innovation adoption (e.g. Damanpour and Evan 1984; Damanpour et al. 1989; Gallego et al. 2012). For example, Gallego et al. (2012), adopt a lead-lag approach in which organizational adoption is considered as a precondition, enabler and facilitator for technological innovation performance. They use a sequential method, although employing cross-sectional data.

A second group focuses on the co-adoption of organizational and technological modes of innovation and its impact on performance. For example, Evangelista and Vezzani (2010) state there is a need for firms to co-adopt technical and non-technical modes of innovation simultaneously, and they measure impact on performance in terms of traditional technical criteria (such as by using sales and productivity variables). Similarly, Battisti and Stoneman (2010) also explore the effects of the synergistic combination of technological and management innovations, and look at whether the introduction of new products and processes increase value added. Neither Evangelista and Vezzani (2010), nor Gallego et al. (2012) nor Battisti and Stoneman (2010) evaluate performance in terms of specific management innovation criteria, but, rather, use technological performance measures. This constitutes an area for improvement. Already, the Oslo Manual provides performance scales aimed at avoiding the sole use of technological performance measures when evaluating the introduction of management innovations.

A consideration of the extra business performance to be accrued from co-adoption have hitherto been limited to: an understanding of the effects of introducing new management innovations on the technological ability to improve product, process and firm performance (measured in terms of better economic, financial, and sales performance) (Camison-Zornoza and Villar-López 2012); on the probability to engage in product or process(e.g. Evangelista and Vezzani 2010) innovations (Gallego et al. 2012); and, on productivity, as measured by sales (Evangelista and Vezzani 2010) or the valued added (Battisti and Stoneman 2010). However, not much is known about the joint adoption of technological and organizational innovations, and its synergistic effects on non-technological organizational-related innovative performance.

1.3.2 About Performance

Why is CIS data appropriate for measuring the implementation of organizational innovation (OI), and its effects? In fact, since 2005, the Oslo Manual (OECD 2005) has incorporated questions about management innovation, its adoption and its effects. In the CIS questionnaire, the Spanish version begins by explaining what is meant by organizational innovation: "*An organizational (management) innovation consists of the implementation of new organizational methods in the internal functioning of the company (including knowledge management methods or systems), in the organization of the workplace, or in respect of external relations, that have not previously been used by the company. It must be the result of strategic decisions made by the management of the company. It excludes mergers or acquisitions, although they may imply an organizational innovation for the Company*".

Then, the questionnaire asks about the introduction of OI: *During the period… did your company introduce* OI? This question (Question 1) asks what specific form of OI has been adopted. Options include: *New business practices in the organization of work or in company procedures* (for example, in relation to the management of the supply chain, re-engineering, efficient production, quality management, education or training systems.); *new knowledge management systems to improve the use or exchange of information or knowledge within the company, or so as to collect information from outside of the company; new organization methods for workplaces in the company, for the purpose of a better distribution of responsibilities and decision-making* (for example, using for the first time a system for distributing responsibilities among employees, or for managing working teams, or engaging in the restructuring of departments); *new models for managing external relations with other companies or public institutions* (for example, creating for the first time alliances, associations, or subcontracting arrangements).

Question 1 has two main uses: indicating whether a firm is an organizational innovator (dummy variable), and indicating the *breadth* of the organizational change by capturing the number of specific types of organizational innovations implemented.

Then, a second question, (Question 2) considers the organizational (management) innovation effects or performance, asking respondents to: "*Indicate the degree of importance of the effects of the organizational innovations introduced by the company during the 2004–2006 period on the following dimensions: reduction of the response period as per the needs of a client or supplier; better quality of goods and services; lower cost per unit produced; improvement in the satisfaction of staff, or decrease in the rotation rates of the same; improvement in the exchange of information, or in communication within the firm*. Respondents are asked to score on a scale of 0–3 (0 none; 1 *low,* 2 *medium,* and *3 high*)".[1]

In short, it is clear there are alternatives to the use of just technological indicators when measuring management innovation effects.

1.4 Combining Technical and Management Innovation

1.4.1 Fundamentals of Joint Adoption Effects

In order to optimize organizational outcomes, the technical system of an organization should be harmonized with changes in the administrative system (Cummings and Srivastva 1977; Damanpour and Evan 1984; Damanpour et al. 2009; Roberts and Amit 2003; Trist et al. 1993). In this vein, the management literature demonstrates that the successful introduction of new technological activities in industries depends on making simultaneous changes to the organizational structure and to administrative practices (e.g. Thompson 1967). Empirically, it has been observed that firms undertaking management innovation have carried it out in tandem with the carrying out of technological innovation. For instance, Battisti and Stoneman (2010) reported that firms that had introduced innovations in management, organization, strategy and marketing also made changes to products and manufacturing processes. Similarly, in Germany, about half of innovators adopted simultaneously both technological and management alterations; about a third conducted solely management innovations; and around a fifth performed solely technical innovations (Schmidt and Rammer 2007).

Within the economics, strategy and organization, and innovation theoretical perspectives, there has been a consistent tradition of pointing out the complementary advantages that can be achieved in firms by carrying out management and

[1] It is important to notice that the Spanish CIS questionnaire for 2006 and all the previous ones, included that question as EFFECTS. Nevertheless, since 2008, the Spanish questionnaire was modified and changed the variable in order to capture the idea of *objectives* (similar to "innovation goals", related to technological trajectories in the sense of Dosi, 1982) or *factors* for the decision to innovate. Finally, it is important to notice that, although the CIS is standardized for Europe, each country has some peculiarities. For instance, see Spanish questionnaires here: http://www.ine.es/en/daco/daco42/daco4221/ite_cues_en.htm.

technological innovations in tandem[2]. The *innovation literature* (e.g. Ettlie 1988), on the one hand, has traditionally advocated synchronous adoption, although with no strong theoretical foundation. Organization theories, on the other hand, have deeply analyzed the foundations of these complementarities, especially emphasizing the interrelatedness of the way social and technological subsystems function in a firm. For instance, a socio-technical system perspective is used to address organizations (Trist and Bamforth 1951), covering both the social and technological sides of the firm. Lastly, the idea within the economics perspective of *complementarities* (Milgrom and Roberts 1995), highlights the extra profits to be made from joint adoption.

1.4.2 Perspectives

Within the economics field, *complementarities* are said to be achieved in firms by their adoption of management and technological innovations in tandem. Milgrom and Roberts (1995, p. 81) talked about "complements" in a broader sense, as a *relation among groups of activities*, stating that "*…if the levels of any subset of activities are increased, then the marginal return to increases in any or all of the remaining activities rises*". Similarly, Ichniowski et al. (1997) state that the existence of complementarity among practices implies that the magnitude of the performance effect of the entire system is larger than the sum of the marginal effects of adopting each practice individually. Milgrom and Roberts (1995), and Ichniowski et al. (1997) focus on the notion of complementarities as systemic changes among organizational practices, thereby building on contingency theory (Donaldson 1996), in the sense that complementarities among technologies require an adequate *fit* with key organizational variables.

Similarly, in the *strategic management* literature, *complementarities* and their key influence on a firm's innovation capabilities are also recognized (e.g. Stieglitz and Heine 2007). The organizational perspective based on the Resource Based View (RBV) (e.g. Barney 1991; Peteraf 1993) has stressed that a firm's unique internal resources and capabilities determine a firm's performance. Barney (1991) pointed out that the RBV referred to all types of assets, organizational processes, knowledge capabilities and other potential sources of advantage. RBV refers to the internal repository of resources and capabilities to explain heterogeneity in performance. Thus, the capabilities enable the development, deployment and integration of diverse assets, thereby forming a complex bundle of resources that underpin and configure repositories of knowledge, which in turn confer competitive advantage. As Ennen and Richter (2010) suggest, therefore, competitive advantage not only results from developing resources but also from the capability to integrate them in a unique way. Thus, establishing "entire systems of mutually reinforcing design

[2] We really thank Dr. Fariboz Damanpour from Rutgers University for clarification and theoretical support in the identification of the literature fields related to the topic.

elements" enhances performance, and due to the complexity achieved imitation is prevented (e.g. Rivkin 2000).

Teece (1986) defines *complementary assets* as those resources that must be jointly used with an innovation in order to exploit it. Companies can appropriate returns from their innovations when they possess complementary resources that help to achieve inimitability. Dierickx and Cool (1989) also highlight the sustainable competitive advantage that follows from the existence of interconnected assets that prevent imitation.

Summarizing, the point is to understand that achieving competitive advantage requires building systems where the number of elements and their interactions creates an inimitable system (Rivkin 2000). That is, the implementation of a technological innovation together with organizational innovation will integrate social-based (organizational) and technological-based (technology) capabilities, forming superior and complex systems which can lead to above-normal returns (Peteraf 1993).

The *socio-technical* system(Trist and Bamforth 1951) perspective complements the above theories, emphasizing that organizations are made up of people and technology (Pasmore et al. 1982; Trist 1978). The social system, on the one hand, refers to people who work in the organization and the relationships among them. The technical system, on the other hand, consists of techniques, procedures or knowledge used by the social system to achieve organizational goals (Trist and Bamforth 1951). The socio-technical systems perspective establishes that the relationship between organizational subsystems is a correlative relationship representing a "coupling of dissimilarities", where each change in a subsystem requires alterations in the other subsystems (Trist and Murray 1993).

Finally, the innovation and operations management literature has also recognized the necessity to couple technology and management changes. It has been found that innovation activities introduced by technological process innovators simultaneously involve organizational and technological changes (Gopalakrishnan and Damanpour 1997; Reichstein and Salter 2006) that are somewhat blurred and difficult to separate (Edquist et al. 2001; Ettlie and Reza 1992; Womack et al. 1990).

Thus, there has been a consistent finding that the successful introduction of new technology in industries depends on parallel changes in organizational structure and administrative practices (Ettlie 1988; Nabseth and Ray 1974; Thompson 1967).

1.4.3 Social Capabilities Related to Management Innovation: Extending the Socio-technical Approach

Within the socio-technical perspective, the term *organizational innovation* (Trist and Bamforth 1951) was coined to describe the successful development within firms in the mining industry of new social practices (related to organizational and human resources management), and how their integration with technical systems maximized potential outcomes. As (Trist and Bamforth 1951) pointed out: "*It seems… that a qualitative change will have to be effected in the general character of the*

method, so that a social as well as a technological whole can come into existence. Only if this is achieved can the relationships of the cycle work-group be successfully integrated and a new social balance created" (37). In the above, the idea of a socio-technical system, or socio-technical integration, is well described. Thus, the socio-technical argument posits that the social and technical systems have to gel together into a single and integrated system.

In our view, a socio-technical approach to management innovation should also address the specific social-based capabilities which are connected to a management innovation. Thus, the introduction of management innovations depends on the specific capabilities developed by organizations in the administrative, managerial and human resource functions of a company. Organizational capabilities (e.g. Grant 1996) mainly concern the organizational rules, procedures and values that are involved in the coordination of functional capabilities and the cohesion of the members of the organization, and provide a knowledge base and proper organizational context for ensuring innovation (e.g. Hall 1992, 1993; Henderson and Cockburn 1994). Other things being equal, those firms which invest and develop more intensively their organizational competencies referred to as a social system (including human, strategic, managerial, structural and administrative functions) will have a higher likelihood of developing social-based capabilities in the sense of Trist and Bamforth (1951). Conversely, the development of technological capabilities influences a propensity for technological innovation, but, unlike social capabilities, is not expected to directly influence organizational innovation. Recent literature about the antecedents of the adoption of organizational innovation has addressed the fact that, in general, the education of the workforce, measured as the percentage of employees with a degree, is potentially an important attribute of the firm and represents one of its key innovation resources, to the extent that many organizational innovations require a high level of skills and education (e.g. Chandler 1962; Ichniowski et al. 1997). Thus, the development of social-based capabilities linked to human systems will be positively linked to the propensity to introduce management innovation.

1.5 Technological Process Innovation and Organizational Innovation Concurrence: Extra Business Performance

Despite a recognition of the performance benefits deriving from co-adoption, the literature has not yet provided empirical evidence about which *specific* technological innovation should be jointly adopted with organizational innovation if extra profits are to occur. In fact, despite the recognition of the value of the joint adoption, or integrative, approach (e.g. Evangelista and Vezzani 2010), deeper analysis has suggested that not all technological innovations will exist in synergy with organizational innovation to the benefit of firm performance. In fact, in the technological strategy and innovation literature (Ettlie 1988; Ettlie and Reza 1992),

it is reported that the synergy effects of co-adoption come mainly from the integration of technological *process* innovations and organizational innovations.

What specific form does the integration of technological and organizational innovations take? Innovation activities introduced by process innovators simultaneously involve organizational and technological changes (Gopalakrishnan and Damanpour 1997; Reichstein and Salter 2006) that are somewhat blurred and difficult to separate (Edquist et al. 2001; Ettlie and Reza 1992; Womack et al. 1990). Edquist et al. (2001) include two distinct, but related, activities within the category of process innovation: technological process innovation and organizational process innovation. *Technological process innovations* are new elements that are used in the process of production and include investment goods and intermediate goods such as processing machines, industrial robots and IT equipment. O*rganizational process innovations* are new ways to organize business activities and have no technological elements but rather function via the co-ordination of human resources and work practices, as occurs, for example, in just-in-time production, total quality management or lean production.

The systematic overlap of organizational and technological process innovation is also commonly stressed in the operations management literature (e.g. Duguay et al. 1997; White and Ruch 1990), although most of this literature is based on case studies or specific industries (Ettlie 1988; Womack et al. 1990). Ettlie (1988) finds that better performing organizations synchronise the adaptation of administrative policies with the introduction of technology. Fleck (1994) also recognizes the need to adapt management procedures to the new technology being implemented. Also, Voss (1988) explicitly addresses the complementary effects of integrating new technology with organizational aspects in order to successfully adopt new technology for process innovation. Technology represents an opportunity for re-structuring, and actual outcomes will depend on how the new processes deriving from new technology are integrated with the organization (Barley 1986; Cohen and Zysman 1987; Damanpour 1991; Ettlie and Reza 1992). Therefore, it is expected that the co-adoption of new technological processes and organizational innovations will improve performance. Thus, the more process innovations implemented, then the greater the number of organizational innovations required if new technology is to be properly integrated into the organization.

1.6 Conclusions

This article has focused on the concept of management innovation, its different research streams, and the theoretical foundations of the synergistic effects perceived to occur from joint adoption with technological innovations. Our focus on co-adoption has: (i) aimed to integrate diverse managerial perspectives which address the phenomenon of the extra profits that may ensue from co-adoption, and (ii) addressed the analysis of specific pairs of technological and non-technological

co-adoption: technological process and organizational innovations. In doing so, this article inserts the management innovation concept into the mainstream of a diverse set of literatures, contributing to theory building, of particular value to scholars concerned with gaining a better understanding of the complementary resources and capabilities formed when technological and management innovations are jointly adopted.

Through this study we have contributed to the management innovation phenomenon in several ways. Firstly, this work has dissected the management innovation concept, and its associated research streams, by identifying and setting out the body of theoretical knowledge connected to it, and by critically reviewing past and current empirical evidence.

Secondly, an integrated technological and organizational innovation framework has been constructed by bringing together, or "cross-fertilizing", diverse, but complementary, managerial and organizational perspectives, which embraces and describes the positive and synergistic advantages of implementing management innovation jointly with technological innovations. As a matter of fact, in the management literature, evidence has already been produced of the positive gain from simultaneous concurrence (Battisti and Stoneman 2010; Damanpour et al. 2009). Similarly, the innovation perspective (e.g. Ettlie 1988), and specifically the *organizational integration* approach (Ettlie and Reza 1992), has also claimed positive results from *complementarities,* in line with those suggested in the economics field of writings (Milgrom and Roberts 1995). Additionally, the occurrence of a congruence of technological and organizational (or social-based) capabilities in firms is also reflected in the literature about socio-technical systems(Trist and Bamforth 1951), which emphasizes that organizations are made up of technological systems and human systems (Pasmore et al. 1982; Trist 1978), which need to be integrated. Then, in the strategic management perspective, the identification of *complementary assets or resources and capabilities* (Teece 1986) also provides a robust theoretical foundation for the perceived synergistic effects of joint adoption.

Thirdly, this article has shown that the specific introduction of technological process innovation frequently occurs concurrently with the introduction of organizational (as a particular type of management) innovation, creating synergistic effects, or complementarities, which are positively related to performance. Therefore, the co-adoption of technological process innovations and organizational innovations is beneficial for a firm's performance, due to the fact that this integrated pair of innovations forms a superior combination of assets, a "coupling of dissimilarities", satisfying the need that each change in a subsystem requires alterations in other subsystems (Trist and Murray 1993).

There is no doubt that the occurrence, or not, of management innovation is crucial for the understanding of firms' strategy and the creation of competitive advantage. This latter task, however, is ours.

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References

Armbruster H, Bikfalvi A, Kinkel S, Lay G (2008) Organizational innovation: the challenge of measuring non-technical innovation in large-scale surveys. Technovation 28(10):644–657

Barley SR (1986) Technology as an occasion for structuring: evidence from observations of CT scanners and the social order of radiology departments. Adm Sci Q 31:78–108

Barney J (1991) Firm resources and sustained competitive advantage. J Manage 17(1):99–120

Battisti G, Stoneman P (2010) How innovative are UK firms? Evidence from the fourth UK community innovation survey on synergies between technological and organizational innovations. Br J Manage 21(1):187–206

Birkinshaw JM, Mol MJ (2006) How management innovation happens. MIT Sloan Manage Rev 47(4):81–88

Birkinshaw J, Hamel G, Mol M (2008) Management innovation. Acad Manage Rev 33(4): 825–845

Camison-Zornoza C, Villar-López A (2012) On how firms located in an industrial district profit from knowledge spillovers: adoption of an organic structure and innovation capabilities. Br J Manage 23(3):361–382

Chandler AD (1962) Strategy and structure: chapters in the history of the American industrial enterprise. MIT Press, Cambridge

Child J (1972) Organizational structure, environment and performance: the role of strategic choice. Sociology 6(1):1–22

Cohen S, Zysman J (1987) Manufacturing matters: the myth of the post-industrial economy. Basic Books, New York

Crossan M, Apaydin M (2010) A multi-dimensional framework of organizational innovation: a systematic review of the literature. J Manage Stud 47(6):1154–1191

Cua KO, McKone KE, Schroeder RG (2001) Relationships between implementation of TQM, JIT, and TPM and manufacturing performance. J Oper Manage 19(6):675–694

Cummings TG, Srivastva S (1977) Management of work: a socio-technical systems approach. Comparative Administration Research Institute, Kent: distributed by Kent State University Press. Translation of: (Kent, Ohio)

Damanpour F (1987) The adoption of technological, administrative, and ancillary innovations: impact of organizational factors. J Manage 13(4):675

Damanpour F (1991) Organizational innovation – a metaanalysis of effects of determinants and moderators. Acad Manage J 34(3):555–590

Damanpour F, Aravind D (2011) Managerial innovation: conceptions, processes, and antecedents. Manage Organ Rev 8(2):423–454

Damanpour F, Evan WM (1984) Organizational innovation and performance: the problem of organizational lag. Adm Sci Q 29(3):392–409

Damanpour F, Szabat KA, Evan WM (1989) The relationship between types of innovation and organizational performance. J Manage Stud 26(6):587–602

Damanpour F, Walker RM, Avellaneda CN (2009) Combinative effects of innovation types and organizational performance: a longitudinal study of service organizations. J Manage Stud 46(4):650–675

Dierickx I, Cool K (1989) Asset stock accumulation and sustainability of competitive advantage. Manage Sci 35(12):1504–1511

Donaldson L (1996) For positivist organization theory: proving the hard core. Sage, London

Duguay CR, Landry S, Pasin F (1997) From mass production to flexible/agile production. Int J Oper Prod Manage 17(12):1183–1195

Edquist C, Hommen L, McKelvey MD (2001) Innovation and employment: process versus product innovation. European socio-economic research Conference, Edward Elgar Publishing, Brussels

Ennen E, Richter A (2010) The whole is more than the sum of its parts or is it? A review of the empirical literature on complementarities in organizations. J Manage 36(1):207–233

Ettlie JE (1988) Taking charge of manufacturing: how companies are combining technological and organizational innovations to compete. Jossey-Bass, San Francisco, p 643
Ettlie JE, Reza EM (1992) Organizational integration and process innovation. Acad Manage J 35(4):795–827
Evan WM (1966) The organization set: toward a theory of interorganizational relations. In: Thompson JD (ed) Approaches to organizational design. University of Pittsburgh Press, Pittsburgh
Evan WM, Black G (1967) Innovation in business organizations: some factors associated with success or failure of staff proposals. J Bus 40(4):519–530
Evangelista R, Vezzani A (2010) The economic impact of technological and organizational innovations a firm-level analysis. Res Policy 39(10):1253–1263
Fleck J (1994) Learning by trying: the implementation of configurational technology. Res Policy 23(6):637–652
Gallego J, Rubalcaba L, Hipp C (2012) Organizational innovation in small European firms: a multidimensional approach. Int Small Bus J 31(5):563–579
Ganter A, Hecker A (2013) Deciphering antecedents of organizational innovation. J Bus Res 66(5):575–584
Gopalakrishnan S, Damanpour F (1997) A review of innovation research in economics, sociology and technology management. Omega 25(1):15–28
Grant RM (1996) Toward a knowledge-based theory of the firm. Strateg Manage J 17:109–122
Hall R (1992) The strategic analysis of intangible resources. Strateg Manage J 13(2):135–144
Hall R (1993) A framework linking intangible resources and capabilities to sustainable competitive advantage. Strateg Manage J 14(8):607–618
Hamel G (2006) The why, what, and how of management innovation. Harv Bus Rev 84(2):72–84
Henderson R, Cockburn I (1994) Measuring competence? Exploring firm effects in pharmaceutical research. Strateg Manage J 15(S1):63–84
Hervas-Oliver JL, Sempere-Ripoll F, Boronat-Moll C (2012) Process innovation objectives and management complementarities: patterns, drivers, co-adoption and performance effects, UNU-MERIT Working Paper, 2012–51 http://www.merit.unu.edu/publications/wppdf/2012/wp2012-051.pdf. Accesed 8 Oct 2013
Ichniowski C, Shaw K, Prennushi G (1997) The effects of human resource practices on manufacturing performance: a study of steel finishing lines. Am Econ Rev 87(3):291–313
Keupp M, Palmié M, Gassmann O (2012) The strategic management of innovation: a systematic review and paths for future research. Int J Manage Rev 14(4):367–390
Kimberly JR, Evanisko MJ (1981) Organizational innovation: the influence of individual, organizational, and contextual factors on hospital adoption of technological and administrative innovations. Acad Manage J 24:689–713
Lam A (2004) Organizational innovation. Brunel Business School, Brunel
Lam A (2005) Organizational innovation. In: Fagerberg J, Mowery DC, Nelson RR (eds) The Oxford Handbook of Innovation. Oxford University Press, Oxford 115–147
Larraza M (2013) Understanding organizational innovation from its practice. The organizational innovation workshop. February 2013. Valencia
Milgrom P, Roberts J (1995) Complementarities and fit strategy, structure, and organizational change in manufacturing. J Account Econ 19(2):179–208
Mol M, Birkinshaw J (2009) The sources of management innovation: when firms introduce new management practices. J Bus Res 62(12):1269–1280
Nabseth L, Ray GF (1974) The diffusion of new industrial processes: an international study. Cambridge University Press, New York/London
OECD (2005) Oslo manual: guidelines for collecting and interpreting innovation data. OECD, Paris
Pasmore W, Francis C, Haldeman J, Shani A (1982) Sociotechnical systems: a north American reflection on empirical studies of the seventies. Hum Relat 35(12):1179–1204
Peteraf M (1993) The cornerstones of competitive advantage: a resource-based view. Strateg Manag J 14(3):179–191

Poole MS, Van de Ven AH (2004) Central issues in the study of change and innovation. In: Poole MS, Van de Ven AH (eds) Handbook of organizational change and innovation. Oxford University Press, New York, p 3
Reichstein T, Salter A (2006) Investigating the sources of process innovation among UK manufacturing firms. Ind Corp Change 15(4):653–682
Rivkin JW (2000) Imitation of complex strategies. Manage Sci 46(6):824–844
Roberts PW, Amit R (2003) The dynamics of innovative activity and competitive advantage: the case of Australian retail banking, 1981 to 1995. Organ Sci 14(2):107–122
Schmidt T, Rammer C (2007) Non-technological and technological innovation: strange bedfellows? ZEW Discussion Papers 07-052
Schumpeter JA (1934) The theory of economic development: an inquiry into profits, capital, credit, interest, and the business cycle. Transaction Publishers, Cambridge, MA
Simon HA (1945) Administrative behaviour. The Macmillan Company, New York
Som O, Diekmann J, Solberg E, Schricke E, Schubert T, Jung-Erceg P, Stehnken T, Daimer S (2012) Organisational and marketing innovation – promises and pitfalls? PRO INNO Europe: INNO-Grips II report, Brussels: European Commission, DG Enterprise and Industry. http://ec.europa.eu/enterprise/policies/innovation/files/proinno/innovation-intelligence-study-5_en.pdf. Accessed 8 Oct 2013
Stieglitz N, Heine K (2007) Innovations and the role of complementarities in a strategic theory of the firm. Strateg Manage J 28(1):1–15
Teece DJ (1986) Profiting from technological innovation: implications for integration, collaboration, licensing and public policy. Res Policy 15(6):285–305
Thompson JD (1967) Organizations in action. McGraw Hill, New York
Trist EL (1978) On socio-technical systems. In: Sociotechnical systems: a sourcebook. University Associates, San Diego
Trist EL, Bamforth KW (1951) Some social and psychological consequences of the longwall method: an examination of psychological situation and defences of a work group in relation to the social structure and technological content of the work system. Hum Relat 4(3)
Trist E, Murray H (1993) In: Trist E, Murray H (eds) The socio-technical perspective. University of Pennsylvania Press, Pennsylvania
Trist E, Murray H (eds) (1993) The social engagement of social science: a tavistock anthology, vol. II: the socio-technical perspective. University of Pennsylvania Press, Philadelphia, PA
Vaccaro IG, Jansen JJP, Van Den Bosch FAJ, Volberda HW (2012) Management innovation and leadership: the moderating role of organizational size. J Manage Stud 49(1):28–51
Van de Ven AH (1992) Suggestions for studying strategy process: a research note. Strateg Manage J 13(5):169–188
Voss CA (1988) Implementation: a key issue in manufacturing technology: the need for a field of study. Res Policy 17(2):55–63
Walker RM, Damanpour F, Devece CA (2011) Management innovation and organizational performance: the mediating effect of performance management. J Public Adm Res Theory 21(2):367
Wengel J, Lay G, Nylund A, Bager-Sjögren L, Stoneman P, Bellini N, Bonaccorsi A, Shapira P (2000) Analysis of empirical surveys on organisational innovation and lessons for future community innovation surveys. Scientific Follow-Up of the Community Innovation Survey (CIS) Project CIS 98(191), p 483
White RE, Ruch WA (1990) The composition and scope of JIT. Oper Manage Rev 7(3/4):9–18
Wolfe RA (1994) Organizational innovation – review, critique and suggested research directions. J Manage Stud 31(3):405–431
Womack JP, Jones DT, Roos D (1990) The machine that changed the world: the story of lean production. Rawson Associates, New York