To my family

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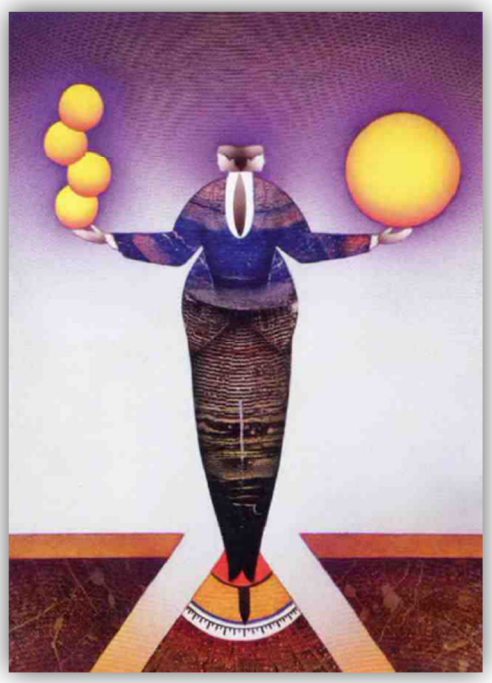
SUMMARY

Organizational Ambidexterity (OA) is the ability of virtuous companies to pursue simultaneous incremental innovation (exploitation) and radical innovation (exploration). Incremental innovation involves minor improvements in terms of efficiency, such as extension of a line of products, updating of a production process, reorganization of work, and leads to significant performance improvements. By means of new technologies or innovative ideas, radical innovation leads to profound changes, such as design of a new process or creation of a brand-new product, whose attributes and components differ from predecessors. Innovation is crucial for a company to survive in the competitive arena. Through exploitation activities companies can maximize the result of today, but to try to secure their survival tomorrow they have to resort to explorative practices. Reconciling these two requirements is not easy, and the firms that manage to do it right at the same time are called “ambidextrous”, and they usually perform better.

This master’s thesis is mainly divided into two parts: First, a qualitative analysis is presented, where the author updated a literature review on the theme of OA (i.e., from June 2011 to March 2012). The research study described continues a previous work started in January 2010 and continuously updated until June 2011 by Filippini, Nosella, and Cantarello, from Dipartimento di Tecnica e Gestione dei Sistemi Industriali (DTG), Università degli Studi di Padova, Vicenza, Italy. Second, comes a quantitative research, where a survey on innovation previously carried out in 85 medium- and high-tech Italian companies has been extended to 100 medium- and high- tech Austrian companies, thanks to a collaboration with Institut für Human Resource und Change Management, Johannes Kepler Universität, Linz, Austria. Performing factor and simple regression analyses on some items which made up the survey, the aim of this confirmatory research is to show that structural ambidexterity in a company is linked to better innovation performance as well as to investigate whether social support context and performance management context mediate the relationship between structural ambidexterity and innovation performance.

Moreover, the recent literature review was the subject of a paper published in the “Austrian Management Review” (see Appendix 4), while the complete literature review

was accepted to be showed to the “First International Conference on Competence-Based Strategic Management” in Copenhagen, Denmark (see Appendix 5).
The whole research work has been held in Linz (Austria) between February and August 2012, where the author studied thanks to an Erasmus grant.



(Source: Birkinshaw & Gibson, 2004, p. 47)

INTRODUCTION

Ambidexterity as a way to let companies survive

Meeting the change: The boiling frog story

The well-known story of the boiling frog says that if you put a frog into a pot of boiling water it will leap out to escape the danger. But if the water is pleasant and then you gradually heat the pot until it starts boiling, the frog will not become aware of the heat until it is too late and it dies. Companies need to react vigilantly to changes in the business environment or as in the boiling frog anecdote they will slowly perish.

They can meet the change basically through incremental innovation (i.e., exploitation) as well as radical innovation (i.e., exploration). To put it in a nutshell, exploitation deals with efficiency, increasing productivity, control, certainty, and variance reduction while exploration is about search, discovery, autonomy, innovation, and embracing variation. Ambidexterity is about doing both activities at the same time (O'Reilly III & Tushman, 2008). Through ambidexterity an organization can become successful in a dynamic environment (Gibson & Birkinshaw, 2004).

The idea behind the value of Organizational Ambidexterity (OA) is that in an organization there are always tensions to be faced (e.g., investment in current vs. future projects, differentiation vs. low-cost production). Ambidextrous companies reconcile them, and in doing so they become successful firms (Gibson & Birkinshaw, 2004).

Ambidexterity forces managers to think in a paradoxical way. As Smith, Binns, & al. (2010) observed, “traditionally, managers have responded to strategic tensions between A and B by asking, ‘Should we implement A or B?’ or ‘Under what conditions should we choose to implement A or B?’. But paradoxical strategies change the managerial focus towards asking: ‘How can we implement both A and B?’” (Smith, Binns, & al., 2010, p. 10). In reality, the concept of ambidexterity is something more than the simple reconciliation between two tensions. Generally, the paradoxical ambidextrous approach succeeds in obtaining both poles at high level.

The thesis is divided into three main chapters.

Chapter 1 introduces some main remarks on Organizational Ambidexterity; it is a general introduction to the theme.

In Chapter 2, starting from the recent literature on the theme, the author goes back in time to review the whole literature on the topic (i.e., from 1996 to March 2012), in order to show some useful trends. Over the last 16 years, 79 meaningful papers published in Impact Factor provided journals were found. This research study continues and broadens out the PhD thesis entitled "Analysis of ambidexterity in the search phase of innovation process: a practice-based approach" by Silvia Cantarello (2011).
Chapter 3 presents the empirical findings using data from 185 medium- and high-tech Italian and Austrian companies with at least 50 employees. The confirmatory survey performed tested the following three hypotheses: (1) A structural ambidexterity solution in the innovation process is positively associated with innovation performance. (2) Social support context mediates the relationship between structural ambidexterity solution in the innovation process and innovation performance. (3) Performance management context mediates the relationship between structural ambidexterity solution in the innovation process and innovation performance. The factor and simple regression analyses required have been performed using the software *IBM SPSS Statistics*. They fully support Hypothesis 1, partially support Hypothesis 2, while Hypothesis 3 is not verified.
In the end, ample room is given to conclusions, implications and issues for further research, bibliography, and appendices.

Thanks to an Erasmus grant, the work was held in Linz (Austria) between February and August 2012, at "Institut für Human Resource und Change Management", Johannes Kepler Universität. The author wants to thank the thesis supervisors, Professors Roberto Filippini[1], Anna Nosella[2], and Wolfgang H. Güttel[3], together with the Austrian colleagues.

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CHAPTER 1

Why ambidexterity in companies?

1.1.Living in today's hyper-competitive arena

A McKinsey study of the life expectancy of firms in the S&P 500[4] showed that in 1935 the average expectancy was 90 years. In 1975 that number dropped to 30 years and in 2005 it was estimated to be only 15 years (Foster & Kaplan, 2001; O'Reilly III & Tushman, 2008).

More recently O'Reilly III and Tushman (2011, p. 5) pointed out that "the life span of the average American is 79. Japanese can expect to live to age 83, Liberians to only 46. The average age of a large company is much less than any of these. Research has shown that only a tiny fraction of firms founded in the U.S. are likely to make it to age 40, probably less than 0.1 percent".

Being successful at one point in time is no guarantee of continued survival (O'Reilly III & Tushman, 2008). Probst, Raisch and Tushman (2011, p. 326) wrote that "large firms are prone to failure in the face of changing industry landscapes. New entrants frequently capture new growth opportunities, rather than incumbents that dominated industries historically. Examples are legion: IBM lost the software business to Microsoft and Microsoft the Internet business to Google. Eastman Kodak lost its edge in the camera business, General Motors in car production, and Kmart in retail. Ironically, incumbents' difficulties with capturing new growth opportunities arise from their strengths. Relentless dedication to making their existing businesses stronger diverts their attention from new growth opportunities that help write tomorrow's success stories. To overcome these challenges, organization theory scholars suggest that companies become ambidextrous". This means that firms should become able to manage both exploration and exploitation activities simultaneously. In fact ambidexterity enables a firm to adapt over time (O'Reilly III & Tushman, 2008).

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[4] Standard & Poor's 500 is a basket of 500 stocks that are considered to be widely held. The S&P 500 index is weighted by market value, and its performance is thought to be representative of the stock market as a whole. Most experts consider the S&P 500 one of the best benchmarks available to judge overall U.S. market performance. (Source: http://www.investorwords.com/ - retrieved May 2, 2012)

Again, Filippini, Güttel and Nosella (2012, p. 317) underlined that "competitive pressure, rapidly changing and disruptive environments, and the shortening of product life cycles are some of the factors that require firms being able to realize both exploration and exploitation in order to survive and achieve successful performances (Benner and Tushman, 2003; Raish and Birkinshaw, 2008; O'Reilly and Tushman, 2008)".

Many years ago the English naturalist and author of the theory of evolution by natural selection Charles Darwin said that "it is not the strongest of the species that survive, nor the most intelligent, but the one that is most responsive to change" (quoted by O'Reilly III and Tushman, 2008, p. 186). In the 1850s Darwin obviously did not think about companies, but surprisingly the sentence fits well also to them nowadays. As stated above, it seems that firms which focus only either on exploration or exploitation activities cannot live long in a hyper-competitive environment like the current one.

However, in spite of the high failure rates stated above, some firms survive and prosper over long periods of time. Table 1 shows a list of six long-lived firms that have adapted to change; each began in an industry or technology different from the one they compete in today (O'Reilly III & Tushman, 2008). The average age of the companies cited is more than 120 years.

Table 1: Long-lived firms that have changed industries
(Adapted from O'Reilly III & Tushman, 2008)

COMPANY	FOUNDED	ORIGINAL PRODUCT	CURRENT BUSINESS
American Express	1850	Express Delivery	Financial Services
Nokia	1865	Lumber	Mobile Phones
Goodrich	1870	Fire Hose	Aerospace
Xerox	1906	Photog. Paper	Business Equip.
Black & Decker	1910	Bottle Cap Mach.	Power Tools
Hasbro	1923	Carpet Remnants	Toys

Is the success of these firms rooted in anything more than luck? Are there systematic patterns that discriminate those companies able to change and survive versus those

that fail? To try to give an answer to these questions originally posed by O'Reilly III and Tushman (2008) let us take a step back on the evolution of the tension on exploitation-exploration and the development of the ambidexterity perspective as a way to manage it.

1.2.The exploitation-exploration dilemma and the role of organizational ambidexterity in resolving it

The seminal study on the exploitation-exploration dilemma in organizations and its consequence is due to March (1991). According to March, exploration and exploitation are two very different ways of searching and learning, which bring about different consequences. “Exploration includes things captured by terms such as search, variation, risk taking, experimentation, play, flexibility, discovery, innovation. Exploitation includes such things as refinement, choice, production, efficiency, selection, implementation, execution. […] The essence of exploitation is the refinement and extension of existing competences, technologies, and paradigms. Its returns are positive, proximate, and predictable. The essence of exploration is experimentation with new alternatives. Its returns are uncertain, distant, and often negative. Thus, the distance in time and space between the locus of learning and the locus for the realization of returns is generally greater in the case of exploration than in the case of exploitation, as is the uncertainty” (March, 1991, pp. 71-85). “According to March, carrying out both activities in a correct and balanced way is a basic and fundamental factor in a system’s survival and its prosperity” (Moreno Luzon & Valls Pasola, 2011, p. 929).

The problem is, it is difficult to find the right balance between exploitation and exploration. Focus too much on exploitation and the short-term results will look good, but changes in the industry will blindside you sooner or later. Similarly, too much attention to exploration means building tomorrow's business at the expense of today's (Birkinshaw & Gibson, 2004).

About stressing one dimension over the other Moreno Luzon and Valls Pasola (2011, p. 929) wrote: “Organizations that are involved in exploitation and neglect exploration will no doubt see visible improvements in effectiveness over the short-term but this direction will prove to be self-destructive over the long term (March, 1991)”. In other words, firms pursuing this situation could enter what is called “success trap” (Levinthal & March, 1993). “Sometimes exploitation drives out exploration. The returns to exploitation are ordinarily more certain, closer in time, and closer in space than are the returns to exploration. Exploratory experiments with new procedures or forms are likely to lead to poorer results in the short run, and the returns to exploration are likely to be

greater for the organizations, or a population of organizations, than for an individual. Particularly with rapid rates of turnover of decision makers, the uncertain and distant returns associated with exploration are likely to have a high discount rate associated with them. Furthermore, past exploitation in a given domain makes future exploitation in the same domain more efficient" (Levinthal & March, 1993, p. 106). Abernathy and Wayne (1974) provided a well-known example of this myopia in describing Ford's pursuit of efficient production of the Model T. While his company was able to decrease the cost of that model, the transition to the Model A was extremely difficult and required shutting down the production for a considerable period of time.

"On the other hand, organizations that concentrate on exploration at the expense of exploitation, find that they bear the costs of exploration without capitalizing on many of the potential benefits that could be available to them. These organizations tend to suffer from a lack of efficiency, which can hinder their competitiveness. A sustained strategy of being the first to move also carries serious risks" (Moreno Luzon & Valls Pasola, 2011, p. 930). This is what Levinthal and March (1993) named "failure trap". "Sometimes exploration drives out exploitation. Organizations are turned into frenzies of experimentation, change, and innovation by a dynamic of failure. Failure leads to search and change which leads to failure which leads to more search, and so on. New ideas and technologies fail and are replaced by other new ideas and technology, which fail in turn" (Levinthal & March, 1993, pp. 105-106).

Thus, there are some problems in maintaining a balance between exploration and exploitation practices.

"Exploration and exploitation have fundamentally different qualities. Exploitation is characterized by short-term time horizons, efficiency, reliability and refinement, while exploration involves long-term time horizons, search, experimentation, innovation and adaptability" (McCarty & Gordon, 2011, p. 241).

So, how do organizations survive in the face of change? Is it possible to manage both exploitation and exploration? Is it possible to explore and exploit at the same time? And if so, how?

Duncan (1976) was the first who used the term "organizational ambidexterity" even if the literature on the topic started in 1996, when Tushman and O'Reilly III wrote: "To remain successful over long periods, managers and organizations must be ambidextrous - able to implement both incremental and revolutionary change" (Tushman & O'Reilly III, 1996, p. 8).

The Oxford Advanced Learner's Dictionary of Current English (2005, p. 45) defines "ambidextrous" as "able to use the left hand or the right hand equally well". According

to Moreno Luzon and Valls Pasola (2011), the etymological root of the word "ambidexterity" derived from the Latin word "ambidexter" (right on both sides), a word which comprises the preposition ambi- (both sides) and dexter (right). "Ambidexterity is a metaphor – the ability to use both hands with equal skill – which is used to highlight organizations that are capable of exploitation (activities and learning through a specific search, a fine-tuning and improvement of what already exists) and exploration (learning through completely new processes, planned experimentation and play) or, in other words, being aligned with current activities and being efficient enough to meet the demands while, simultaneously, adapting to and anticipating future change. In short, it implies achieving opposing objectives: Efficiency versus flexibility, stability versus adaptation, short term profits as opposed to long-term growth" (Moreno Luzon & Valls Pasola, 2011, pp. 927-928).

"Explanations on how organizations manage exploration–exploitation tensions can be broadly categorized into two streams: Ambidexterity and punctuated equilibrium (Gupta & al., 2006). Punctuated equilibrium argues that organizations mitigate these tensions by temporally separating these activities (Victor & al., 2000; Adler & al., 2009). That is, exploration follows exploitation or vice versa. In contrast, the ambidexterity literature argues that organizations can do both of these learning activities simultaneously (Jansen & al., 2009; O'Reilly & Tushman, 2004). For high-tech organizations, ambidexterity becomes more relevant since these organizations cannot temporally separate exploration and exploitation to remain competitive. In fact, recent studies find that ambidexterity leads to higher performance for high-tech organizations (Auh & Menac, 2005)" (Chandrasekaran, Linderman, & Schroeder, 2012, p. 135).

Ambidexterity in organizations can be achieved by structural ambidexterity, which involves ambidextrous design (i.e., certain units are responsible for exploration, and others for exploitation, integrated strategically by high-level governance) or by contextual ambidexterity (i.e., business-units encourage, discipline, and trust individuals to make their own choices in dividing between explorative- and exploitative-oriented activities) (Liu, Luo, & Huang, 2011).

The point of view assumed in this master's thesis is that an ambidextrous firm can develop exploration and exploitation practices simultaneously. Thus, ambidexterity is the ability to pursue both exploration and exploitation at the same time in a strong way by a company (see Figure 1).

So, the author thinks that punctuated equilibrium is not a way to build ambidexterity into a company. In fact, punctuated equilibrium involves "temporal cycling between long periods of exploitation and short bursts of exploration" (Liu, Luo, & Huang, 2011, p. 537), and thus not the development of both simultaneously.

		Exploration: Strong	Exploration: Weak
Exploitation	Strong	AMBIDEXTROUS ORIENTATION	Exploitative Orientation
	Weak	Exploratory Orientation	Lack of Orientation

Figure 1: Strategic orientation with respect to type of opportunities
(Adapted from Gedajlovic, Cao, & Zhang, 2012)

1.3.Ways to create ambidexterity in a company

In literature there are basically two main forms of ambidexterity at company level.
The traditional view is what scholars called “Structural Ambidexterity” (Figure 2) and it was originally suggested by Duncan in 1976, when he argued that organizations manage trade-offs between conflicting demands by putting in place “dual structures”. Thus, Duncan claimed the concept of structural separation between different types of activities. In a company, certain units are responsible for exploration activities, while others deal with exploitation. Anyway, separation between opposing goals sometimes can lead to isolation, and many R&D (Research and Development) and business-development groups have failed to get their ideas accepted because of their lack of linkages to the core businesses (Birkinshaw & Gibson, 2004). This first organizational solution was also adopted by Tushman and O’Reilly III (1996) in their seminal work on the topic. They described structural mechanisms to enable ambidexterity.

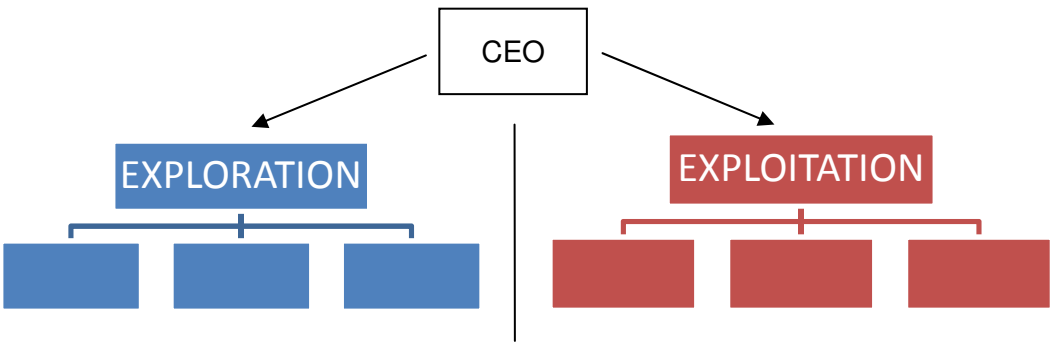

Figure 2: Structural ambidexterity
(Adapted from Raisch, 2008)

In 2004 Gibson and Birkinshaw argued that a context characterized by a combination of stretch, discipline, support, and trust facilitates what they called “Contextual Ambidexterity” (Figure 3). It is called in this way “because it arises from features of its organizational context” (Gibson & Birkinshaw, 2004, p. 209). In doing so they developed a different perspective, suggesting that ambidexterity is best achieved by building a business unit context that encourages individuals to make their own judgments as to how best divide their time between the conflicting demands for exploitation and exploration. “This is potentially a more sustainable model than structural separation because it facilitates the adaptation of an entire business unit, not just the separate units or functions responsible for new business development” (Gibson & Birkinshaw, 2004, p. 211).

Figure 3: Contextual ambidexterity

They developed the concept of contextual ambidexterity starting from the works by Ghoshal and Bartlett (1994, 1997), in which four sets of attributes (i.e., stretch, discipline, support, and trust) interact to define an organization's context (see Figure 4). According to Gibson and Birkinshaw (2004), “stretch” is an attribute of context that induces members to voluntarily strive for more ambitious objectives, “discipline” induces members to voluntarily strive to meet all expectations generated by their explicit or implicit commitments, “support” induces members to lend assistance and countenance to others, while “trust” is an attribute of context that induces members to rely on the commitments of each other.

Ghoshal and Bartlett (1994) conceptualized these four attributes as interdependent. In their view (1997), organization context can be conceptualized as a balance between a pair of hard elements (performance management: Discipline and Stretch) and a pair of soft elements (social support: Support and Trust). Ghoshal and Bartlett (1994) did not argue explicitly that these contextual features will develop the capacity for contextual ambidexterity. “Thus, we extend their framework by arguing that when a supportive organization context is created, individuals engage in both exploitation-oriented actions

(geared toward alignment) and exploration-oriented actions (geared toward adaptability), and this results in contextual ambidexterity, which subsequently enhances performance" (Gibson & Birkinshaw, 2004, p. 213).

The strong presence of social support and performance management creates a high-performance organizational context that gives rise to an ambidextrous organization, while, if there is an imbalance in these organizational characteristics, or a lack of both, a less than optimal organizational context appears (Birkinshaw & Gibson, 2004).

"For example, a demanding, results-driven orientation that lacks social support will create a burnout context. Many people will perform well for a limited time in such a scenario, but its depersonalized, individualistic and authority-driven nature typically results in a high level of employee turnover, making ambidexterity difficult to achieve. Conversely, strong social support without high-performance expectations will engender a country-club context in which employees benefit from and enjoy a collegial environment but rarely produce up to their potential. Companies in this position also have low ambidexterity and produce satisfactory but lackluster results. An absence of both a high-performance ethic and social support will, of course, produce a low-performance organizational context. Employees are unlikely to be either aligned or adaptive, let alone ambidextrous" (Birkinshaw & Gibson, 2004, p. 51).

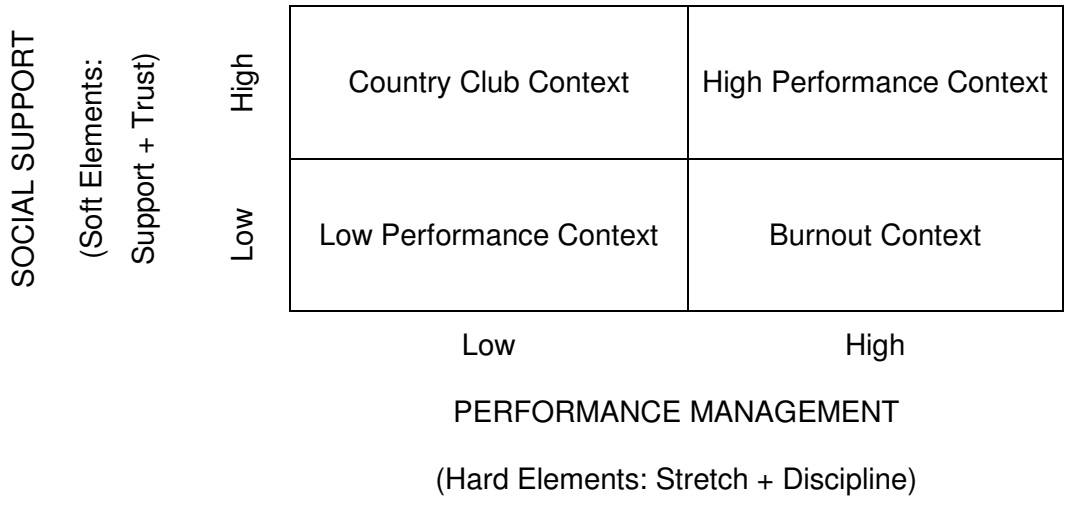

Figure 4: Four types of organizational context
(Adapted from Birkinshaw & Gibson, 2004)

Contextual ambidexterity differs markedly from structural ambidexterity (see Table 2), but they are best viewed as complementary (Birkinshaw & Gibson, 2004). In fact, many successful companies, like Hewlett-Packard, 3M and Intel, use a combination of both approaches to simultaneously explore and exploit (Birkinshaw & Gibson, 2004).

Furthermore, the notion of contextual ambidexterity manifests on an individual level (Birkinshaw & Gibson, 2004).

Structural ambidexterity focuses the complexity in the senior team, leaving middle managers free to focus on an aligned business, whereas contextual ambidexterity provides a culture-set that can support the tensions both among middle managers and throughout the whole organization (Smith, Binns, & al., 2010).

Table 2: Structural vs. Contextual ambidexterity
(Adapted from Birkinshaw & Gibson, 2004)

	STRUCTURAL AMBIDEXTERITY	CONTEXTUAL AMBIDEXTERITY
Author(s), Year	Duncan, 1976 Tushman & O'Reilly III, 1996	Gibson & Birkinshaw, 2004
Level	Initiatives and activities	Individual
How is ambidexterity achieved?	Alignment-focused and adaptability-focused activities are done in separate units or teams	Individual employees divide their time between alignment-focused and adaptability-focused activities
Where are decisions made about the split between alignment and adaptability?	At the top of the organization	On the front line – by salespeople, plant supervisors, office workers
Role of top management	To define the structure, to make trade-offs between alignment (i.e., exploitation) and adaptability (i.e., exploration)	To develop the organizational context in which individuals act
Nature of roles	Relatively clearly defined	Relatively flexible
Skills of employees	More specialists	More generalists
	They are best viewed as complementary rather than alternatives	

According to Birkinshaw and Gibson (2004), even if there are various paths to ambidexterity they all share one thing in common: They enable individuals in the organization to exhibit cooperation, initiative, brokering skills, and multitasking abilities.

In a recent work (2011), O'Reilly III and Tushman explored how leaders actually implement ambidexterity within organizations. “We propose that ambidexterity is more likely to be successful in the presence of the following five conditions: (1) A compelling strategic intent that intellectually justifies the importance of both exploration and exploitation. (2) An articulation of a common vision and values that provide for a common identity across the exploitative and exploratory units. (3) A senior team that explicitly owns the unit’s strategy of exploration and exploitation; there is a common-fate reward system; and the strategy is communicated relentlessly. (4) Separate but aligned organizational architectures (business models, structure, incentives, metrics, and cultures) for the exploratory and exploitative units and targeted integration at both senior and tactical levels to properly leverage organizational assets. (5) The ability of the senior leadership to tolerate and resolve the tensions arising from separate alignments” (O'Reilly III & Tushman, 2011, p. 9).

1.4.When is ambidexterity necessary?

Two figures may be useful to illustrate contexts where ambidexterity in companies may be strategically important. They are both adapted from O’Reilly III and Tushman (2008).

Figure 5 is linked to the notion of innovation streams and illustrates how technology and markets evolve over time (Tushman & O’Reilly III, 1997; Tushman & Smith, 2002). The x-axis is based on the type of innovation while the y-axis is based on customers and markets.

Innovation occurs mainly in three ways. “First is incremental innovation in which an existing product or service is made better, faster or cheaper (Nelson & Winter, 1982). Although these improvements may be difficult or expensive, they draw on an existing set of competencies and proceed along a known trajectory. Conventional pharmaceutical development, for example, while expensive and technologically complex, usually is based on existing scientific paradigms. A second way innovation occurs is through major or discontinuous changes in which major improvements are made, typically through a competence-destroying advance in technology (e.g., Tushman & Anderson, 1986). For instance, the development of computer-based word processing obviated the need for mechanical typewriters; the electronic watch eliminated the need for the precision mechanical engineering skills of mechanical watches. These improvements typically require competencies or skills different from what the incumbent has. Finally, innovation also occurs through seemingly minor improvements in which existing technologies or components are integrated to

dramatically enhance the performance of existing products or services (Henderson & Clark, 1990). These architectural innovations, while not based on significant technological advances, often disrupt existing offerings. In Christensen's study of the disk drive industry (1997), smaller disk drives used existing technologies made smaller to open up new classes of storage devices" (O'Reilly III & Tushman, 2008, pp. 194-195).

According to O'Reilly III and Tushman (2008), when firms rely on existing competencies or operational capabilities to sell to existing customers they are exploiting, but in the face of competition and decreasing margins in these markets they often need to move into adjacent markets by either addressing new customer segments or through innovations that enable them to charge customers a higher price or reap higher margins.

Such shifts in strategy may require a different organizational alignment and/or a different set of competencies, and established firms may fail in making these changes.

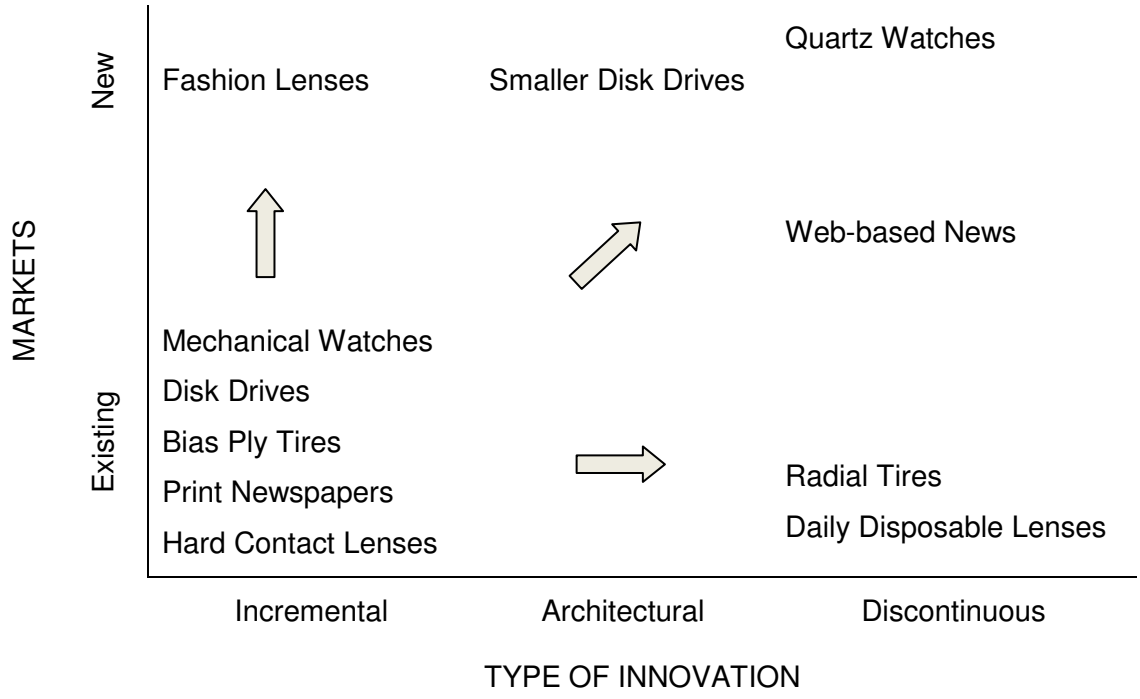

Figure 5: Innovation streams
(Adapted from O'Reilly III & Tushman, 2008)

According to Gottardi (2006, p. 52), incremental innovations (i.e., exploitation) strengthen companies' dominant positions while radical innovations (i.e., exploration) represent threats to incumbent and opportunities for new comer. However, incremental

innovations are the most frequent (Gottardi, 2006, p. 52), especially in small and medium enterprises (SMEs). “As firms grow larger in size, they will have the resources to tolerate occasional unsuccessful innovation projects which are more related to exploratory innovation” (McDermott & Prajogo, 2012, pp. 231-232).

Furthermore, innovation requires adaptability and change. The speed of change request is relatively low for incremental innovations and the more these innovations tend to occur as radical changes the grater the speed of change is (Gottardi, 2006, p. 103).

Figure 6 tries to answer to the question: “Given the difficulty of simultaneously hosting exploration and exploitation, why would an organization bother; under what conditions might ambidexterity be especially important?” (O'Reilly III & Tushman, 2008, p. 195).

One axis is based on strategic importance while the second one is based on the operational leverage.

According to O'Reilly III and Tushman (2008), sometimes companies either develop or are presented with opportunities to move into areas beyond their core. When these new opportunities are unimportant strategically and cannot benefit from a firm’s existing resources or capabilities, there is no reason to pursue them and firms should spin them out. For example, O’Reilly III and Tushman (2004) described how Ciba Vision, a maker of contact lenses, developed a drug that combated a severe eye disease. Nevertheless, since this product was sold through different channels, had different regulatory approvals, involved different technologies, and required a different manufacturing process, the company spun the product out to their parent corporation.

If a product presents low strategic importance but offers operational leverage, it can be either internalized or contracted out. An example is the repair of most personal computers, which is handled by contractors rather than the manufacturer.

When a business is strategically important but cannot benefit from leveraging existing firm assets, companies should operate the new business as an independent unit, because sometimes different competencies and manufacturing processes are required. A typical case is product substitutions, when one technology or process is replaced by another. To manage the transition firms can manufacture both types until, as customer demand grows for the new technology, they can eliminate the former one.

“But what happens if the new opportunity is both strategically important and can benefit from the firm’s existing assets and operational capabilities? This is the set of strategic conditions where ambidextrous designs are most appropriate. In these circumstances, to spin the exploratory unit out is to sacrifice the future or, at minimum, endure the inefficiencies of not using available resources. […] Unlike the harsh discipline of the

market in which new firms must place a life-or-death bet on a single experiment, larger companies can run multiple experiments in which failure does not jeopardize the enterprise and may increase learning. […] Thus, although ambidexterity is a difficult managerial challenge, when executed in the appropriate strategic contexts, these complex designs are associated with sustained competitive advantage. […] The more dynamic the firm's environment, the higher the likelihood of ambidexterity" (O'Reilly III & Tushman, 2008, p. 196).

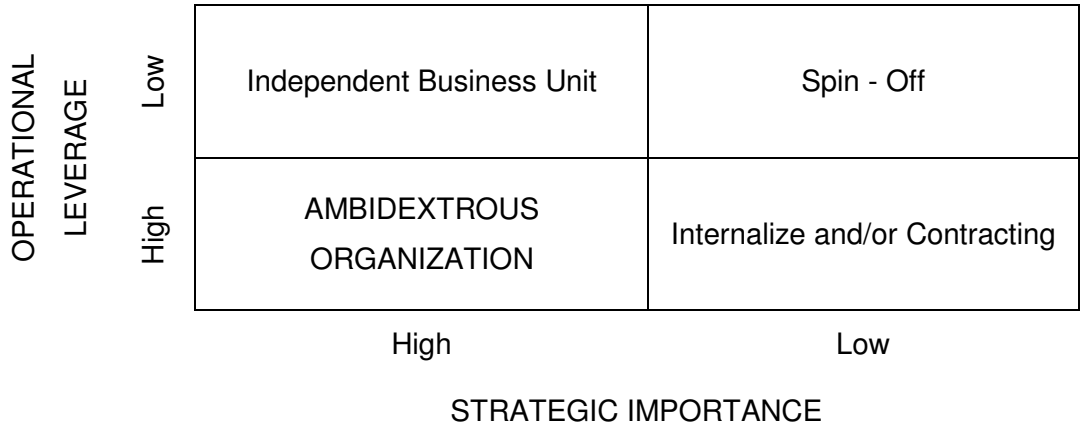

Figure 6: When should ambidexterity be considered?
(Adapted from O'Reilly III & Tushman, 2008)

Anyway, transitions to ambidexterity often occurr in the context of performance shortfalls (Tushman, Smith, & al., 2010). "It appears that managers learned how to employ ambidextrous designs under crisis conditions" (Tushman, Smith, & al., 2010, p. 1356).

CHAPTER 2

Review of the literature on ambidexterity

2.1.Method

2.1.1.Sources of data

From 1996 on, the ambidexterity construct has been used in hundreds and hundreds of managerial and academic papers. In all, research returned more than 2500 papers, published between 1996 and March 2012. This research study continues and broadens out a previous work started in January 2010 and continuously updated until June 2011 by Filippini, Nosella, and Cantarello (Cantarello, 2011; Nosella, Cantarello, & Filippini, 2012). The purpose of the work was the examination of the literature on ambidexterity since 1996, when Tushman and O'Reilly III released their seminal article on the theme. The author updated papers collection, covering the period June 2011 - March 2012. Databases were consulted between the 5th and the 15th March 2012.

According to Ramos-Rodríguez and Ruíz-Navarro (2004), instead of using books, doctoral theses, or scientific congress records as our source of scientific documents for the purposes of this thesis, the author chose to use articles published in social sciences journals, because these can be considered “certified knowledge”. This is the term commonly used to describe knowledge that has been submitted to the critical review of researchers and has succeeded in gaining their approval. The use of citations from articles in research journals is a practice that enhances the reliability of results (Ramos-Rodríguez & Ruíz-Navarro, 2004).

The author consulted the three major social sciences databases (i.e., EBSCO Business Source® Premier, ISI Web of Science®, and ScienceDirect), as shown below in Table 3. The selected databases have major coverage with respect to management issues and papers are available in full-text, thanks to the institutional subscription. Another reason for this choice is due to the fact that scientific journals indexed by ISI Web of Science®, Business Source® Premier, and ScienceDirect databases include the most important and useful publications, with extensive coverage of organizational and managerial topics (Gauthier, 1998).

Table 3: Consulted databases

DATABASES	DESCRIPTION
EBSCO Business Source® Premier	This is the industry's most popular business research database, features the full text for more than 2,100 journals. Full text is provided back to 1965 and searchable cited references back to 1998. Journal ranking studies reveal that Business Source® Premier's full-text coverage outshines its competitors in all business disciplines, including marketing, management, MIS, POM, accounting, finance, and economics. Additional full text, non-journal content includes market research reports, industry reports, country reports, company profiles, and SWOT analyses.[5]
ISI Web of Science®	Web of Science® provides researchers, administrators, faculty, and students with quick, powerful access to the world's leading citation databases. Authoritative, multidisciplinary content covers over 12,000 of the highest impact journals worldwide, including Open Access journals and over 150,000 conference proceedings. You'll find current and retrospective coverage in the sciences, social sciences, arts, and humanities, with coverage to 1900. Overcome information overload and focus on essential data across more than 250 disciplines.[6]
ScienceDirect	ScienceDirect is a leading full-text scientific database offering journal articles and book chapters from more than 2,500 peer-reviewed journals and more than 11,000 books. There are currently more than 9.5 million articles/chapters, a content base that is growing at a rate of almost 0.5 million additions per year. Elsevier has digitized as much of the pre 1995 journal owned-content as possible, bringing articles from as far back as 1823.[7]

[5] Source: EBSCO Publishing website (http://www.ebscohost.com/academic) - retrieved March 25, 2012

[6] Source: Thomson Reuters website (http://thomsonreuters.com/products_services) - retrieved March 25, 2012

2.1.2.Identification of the keywords and search strings

Due to the differences between search engines of these three databases, the author decided to use slightly different search techniques for each database. Table 4 lists the keywords and the search strings adopted. In particular, the author used the keywords "ambidexterity" or "ambidextrous" in the automatic filtering tools provided, on the fields Title, Abstract, Topic, Keywords, Subject Terms, and Full Text, when possible.

Table 4: Keywords and search strings adopted

DATABASES	CODE	KEYWORDS AND SEARCH STRINGS
EBSCO Business Source® Premier	EBSCO 1	Title = (ambidextrous) OR Title = (ambidexterity)
	EBSCO 2	Abstract or Author-Supplied Abstract = (ambidextrous) OR Abstract or Author-Supplied Abstract = (ambidexterity)
	EBSCO 3	Author-Supplied Keywords = (ambidextrous) OR Author-Supplied Keywords = (ambidexterity)
	EBSCO 4	Subject Terms = (ambidextrous) OR Subject Terms = (ambidexterity)
	EBSCO 5	All Text = (ambidextrous) OR All Text = (ambidexterity)
ISI Web of Science®	ISI 1	Title = (ambidextrous) OR Title = (ambidexterity)
	ISI 2	Topic = (ambidextrous) OR Topic = (ambidexterity)
ScienceDirect	SD 1	Title = (ambidextrous) OR Title = (ambidexterity)
	SD 2	Abstract = (ambidextrous) OR Abstract = (ambidexterity)
	SD 3	Keywords = (ambidextrous) OR Keywords = (ambidexterity)
	SD 4	Full Text = (ambidextrous) OR Full Text = (ambidexterity)

2.1.3.Exclusion criteria

Research conducted in selected databases returned more than 500 papers (565 to be precise), published between June 2011 and March 2012. However, only a few of these appear to be relevant. Thus, papers found were screened, establishing criteria for inclusion and exclusion from the review in order to get the interesting ones (see Table 5). The exclusion criteria adopted are: Papers not written in English, papers published

[7] Source: SciVerse website (http://www.info.sciverse.com/sciencedirect) - retrieved March 25, 2012

on journals with no Impact Factor (ISI Journal Citation Reports), papers which not deal with managerial or organizational topics, and duplicates.

Table 5: Exclusion criteria

EXCLUSION CRITERIA
Papers not written in English
Papers on journals with no Impact Factor (IF 2010 JCR Social Science Edition)
No express reference to management or organizational knowledge on the paper
Duplicates

The decision to restrict the sources to works published on journals with Impact Factor (please see Appendix 1 for a description of this bibliometric index) was due to the fact that these can be considered validated knowledge and have a high probability of having the highest impact in the field under investigation (Podsakoff, MacKenzie, Bachrach, & Podsakoff, 2005).

The first output consists of a set of 95 papers out of 565 papers found (16.81%), after the application of all the criteria mentioned above. Please see Table 6 for more information.

Table 6: First retrievals (June 2011 - March 2012)

	CODE	PAPERS FOUND	DUPLICATES	PAPERS ON JOURNALS WITH NO IF	PAPERS ON JOURNALS WITH NO IF (excluding duplicates)	NET NUMBER OF PAPERS FOUND	MANAGEMENT ISSUE
EBSCO Business Source® Premier	EBSCO 1	20	0	7	7	13	13
	EBSCO 2	28	18	9	3	7	7
	EBSCO 3	10	8	1	0	2	2
	EBSCO 4	0	0	0	0	0	0
	EBSCO 5	82	32	44	34	16	15
ISI Web of Science®	ISI 1	22	13	7	4	5	5
	ISI 2	59	33	43	8	18	13
ScienceDirect	SD 1	12	8	5	2	2	2
	SD 2	16	13	8	2	1	1
	SD 3	11	11	4	0	0	0
	SD 4	305[8]	16	22	15	43	37
TOTAL		565	152	150	75	107	95

[8] In this case the research was accelerated thanks to the automatic filtering tools provided by the database ScienceDirect. It was possible in this way to leave out the ones which did not deal for sure with managerial issues, going on considering 74 papers instead of 305.

2.1.4.Intellectual core identification and final output

An important step in discovering the structure of a research field is to identify the intellectual core, i.e., to identify those works that can really be considered an important contribution to the development of the theory (McCain, 1990).

In literature review, scholars often select one or more journals recognized as the most representative of the examined theory, using the citation analysis to identify the central intellectual core underneath the construct, assuming that counting citations is a good measure of its importance and influence (Ramos Rodríguez & Ruiz-Navarro, 2004). "Citation analysis is based on the premise that authors cite documents they consider to be important in the development of their research" (Ramos Rodríguez & Ruiz-Navarro, 2004, p. 981).

This procedure, however, has at least two drawbacks. First, the use of the criterion of relevance fosters older papers at the expense of the newer ones. This implies a static vision of the theory, which does not catch new trends of research. This is a problem specially in analyzing recent literature streams, including ambidexterity. Second, the journals selection presents problems as well: In fact, selected journals also publish articles related to other issues and, vice versa, other scientific journals may publish some relevant works, which cannot be found and studied.

To avoid these two main problems related to citation analysis, the thesis utilizes a technique suggested by Lane, Koka, and Patack (2006).

Each of the 95 papers found has been read and classified on a 4-point scale according to how central the ambidexterity construct is to the paper's core topic, giving to each paper a value ranging from 1 to 4. The four categories used for this criterion, from the least taken-for-granted to the most, are:

(1) The paper extends the construct's definition;
(2) The paper is centered on the subject and on its dynamics;
(3) The construct is part of the paper's hypotheses and/or model;
(4) The construct is instrumental in developing the logic for the paper's propositions or hypotheses, or the paper uses the construct to explain the results, or the paper uses the construct as a minor citation with little or no discussion.

Merging the results of this research with the 137 papers found by Nosella, Cantarello, and Filippini (2012), 232 papers in total have been reviewed. Almost 66% of the studies (153 papers) uses the construct as instrumental in developing the logic for the paper's propositions/hypotheses, or to explain the results, or as a minor citation with little or no discussion. The construct is part of the paper's hypotheses and/or model in about 13% of the articles found (30 papers), while 39 papers (about 17% of the total set) are

centered on the subject and on its dynamics. Finally, only 10 works (4.31% of the total) extend or refine the construct.

The distribution of the papers is well summarized in Table 7 and in Figure 7.

Table 7: Distributions of papers according to the construct centrality (1996 - 2012)

	CLASS 1	CLASS 2	CLASS 3	CLASS 4
CENTRALITY OF THE CONSTRUCT	The paper extends the construct's definition	The paper is centered on the subject and on its dynamics	The construct is part of the paper's hypotheses and/or model	The construct is instrumental in developing the logic for the paper's propositions or hypotheses or the paper uses the construct to explain the results or the paper uses the construct as a minor citation with little or no discussion
NUMBER OF PAPERS FOUND	10	39	30	153
	4.31%	16.81%	12.93%	65.95%

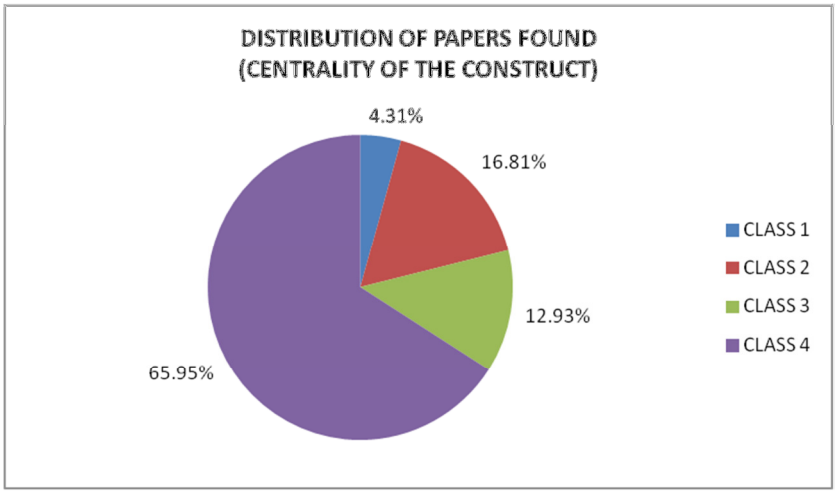

Figure 7: Centrality of the construct of the 232 papers found (1996 - 2012)

2.1.5.Occurrence of the keywords

The author also counted the number of occurrence of the words “ambidexterity” and/or “ambidextrous” in the 95 papers found from June 2011 to March 2012, dividing it in 12 sections: Title of the paper, abstract, keywords, introductions, propositions/hypotheses,

text, results, discussions/conclusions, tables/figures/graphs, appendix, footnotes, and references. No clear relations seem to occur between the number of occurrence of the two terms or their positioning on the paper and the centrality of the construct. Furthermore, they are widely scattered compared to their mean values. As Table 8 shows, Standard Deviation (SD) is even greater than the mean value (Mean) for both classes 3 and 4.

Nevertheless, even if it is quite logic, high occurrences and/or their appearance on the sections “title of the paper”, “abstract”, “keywords”, may indicate that the construct is well-analyzed throughout the paper.

Table 8: Occurrence of the words “ambidexterity” and/or “ambidextrous” in the papers found (June 2011 - March 2012)

	OCCURRENCE OF THE WORDS "AMBIDEXTERITY" AND/OR "AMBIDEXTEROUS"				
CLASS	MEAN	SD	TITLE	ABSTRACT	KEYWORDS
1	116.50	28.85	100.00%	100.00%	75.00%
2	60.73	31.29	90.91%	72.73%	54.55%
3	31.11	33.86	33.33%	55.55%	66.67%
4	4.90	5.15	4.23%	11.27%	7.04%

2.2.Evidence from the literature

2.2.1.Overview

The following analyses are limited to the most influential papers on ambidexterity, from the least taken-for-granted to the most (i.e., classes 1, 2, and 3). At this point, the author identified a total set of 79 papers, published between 1996 and March 2012. This sample is the basis for all subsequent analyses. Appendix 2 only lists the 24 most influential papers found from June 2011 to March 2012. Appendix 3 covers all the 79 papers reviewed, giving for each paper detailed information. Please note that the main distinction is between influential papers (i.e., classes 1, 2, and 3) and non-influential ones (i.e., class 4). Studies in classes 1, 2, and 3 are equally important.

This paragraph is made up of 13 sections. In order of appearance, the analyses deal with: Scientific journals related to OA, study type (empirical or conceptual), type of analysis (quantitative, qualitative, both), time horizon (cross-sectional, longitudinal, retrospective), geographic distribution of the samples used in the surveys, literature streams related to OA, ambidexterity measure, level of analysis, attributes which define

ambidexterity, effects of being ambidextrous, relation between ambidexterity and performance, ways for resolving the tensions discussed, and main limitations of the studies reviewed.

2.2.2.Scientific journals involved

The 79 papers reviewed have been published in 43 different scientific journals (see Figure 9). It seems that the interest for the subject has been increased since 2008 (see Figure 8). Looking at Table 9, from 1996 to 2008 a maximum of 3 significant papers per year have been published. From 2008 onwards, the number has increased, exceeding 10 papers per year (from 12 up to 19, considering the entire years).

The theme has spread like wildfire among the journals, involving Marketing, Research and Development (R&D), Operations Management (OM), and Information Technology (IT). For instance, Moreno Luzon and Valls Pasola (2011) studied whether Total Quality Management (TQM) can encourage ambidexterity or not. In doing so, they opened up a brand-new line of research into ambidexterity. What they found is that "thanks to the synergy between its principles and practices, total quality management can act as a platform in creating an ambidextrous context, in addition to generating ambidextrous management capabilities and ambidextrous organizational skills. However, no relationship has been found between the application of TQM and structural ambidexterity" (Moreno Luzon & Valls Pasola, 2011, p. 927). In the same year, Vorhies, Orr, and Bush (2011) investigated whether ambidexterity in marketing exploitation and exploration exists, finding out that "firms cannot do both at high levels without risking a negative impact on customer-focused marketing capabilities" (Vorhies, Orr, & Bush, 2011, p. 736). Or, again, through a two-year research into a small software organization, Napier, Mathiassen, and Robey (2011) offered principles for how software managers can improve firm-level coordination through contextual ambidetxerity.

Until 2008 the journals which dealt with ambidexterity were only 9 (i.e., "Organization Science", "Academy of Management Journal", "Journal of Management", "Management Science", "Academy of Management Review", "Entrepreneurship Theory & Practice", "International Journal of Human Resource Management", "MIT Sloan Management Review", "California Management Review"). From 2008 on, the theme of ambidexterity began to affect new journals, including "Journal Of Operations Management", "R&D Management", "European Journal Of Information Systems", "Journal Of Marketing", "Journal Of Strategic Information Systems", "Journal Of The Academy Of Marketing Science". In 2011, for the first time appeared Asiatic journals like "Asia Pacific Journal of Management" and "Asian Business & Management". Among the 9 pioneering

journals which published research works on ambidexterity until 2008, only "Organization Science" and "California Management Review" have published significant papers over the past three years (from 2009 until March 2012).

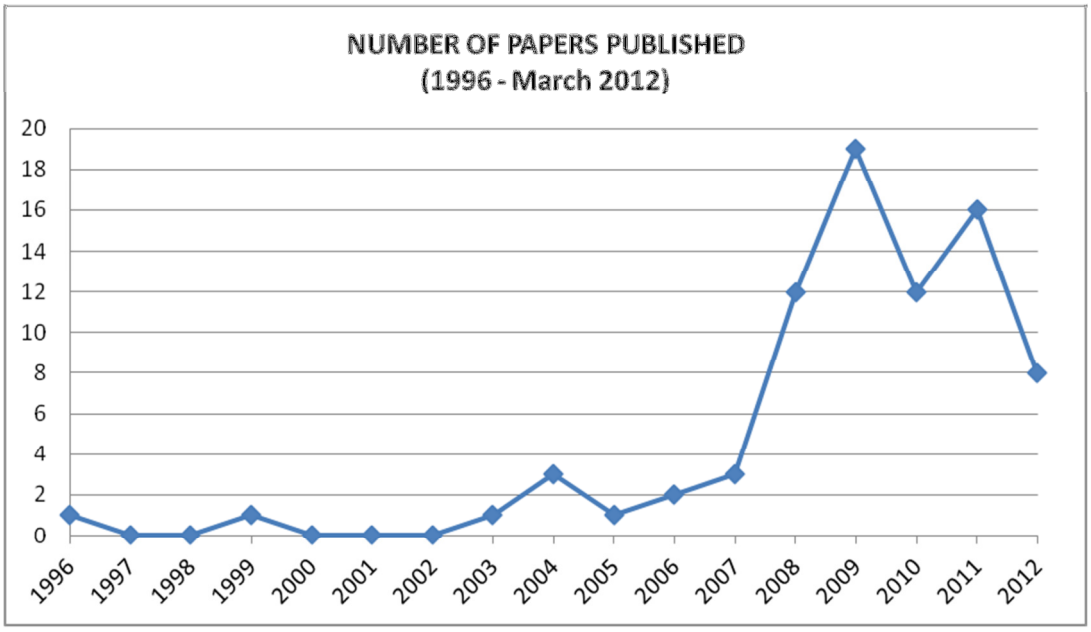

Figure 8: Papers published over time (1996 - 2012)

Table 9: Papers published over time (1996 - 2012)

YEAR	PAPERS PUBLISHED
1996	1
1997	0
1998	0
1999	1
2000	0
2001	0
2002	0
2003	1
2004	3
2005	1
2006	2
2007	3
2008	12
2009	19
2010	12
2011	16
2012 (March)	8
TOTAL	79

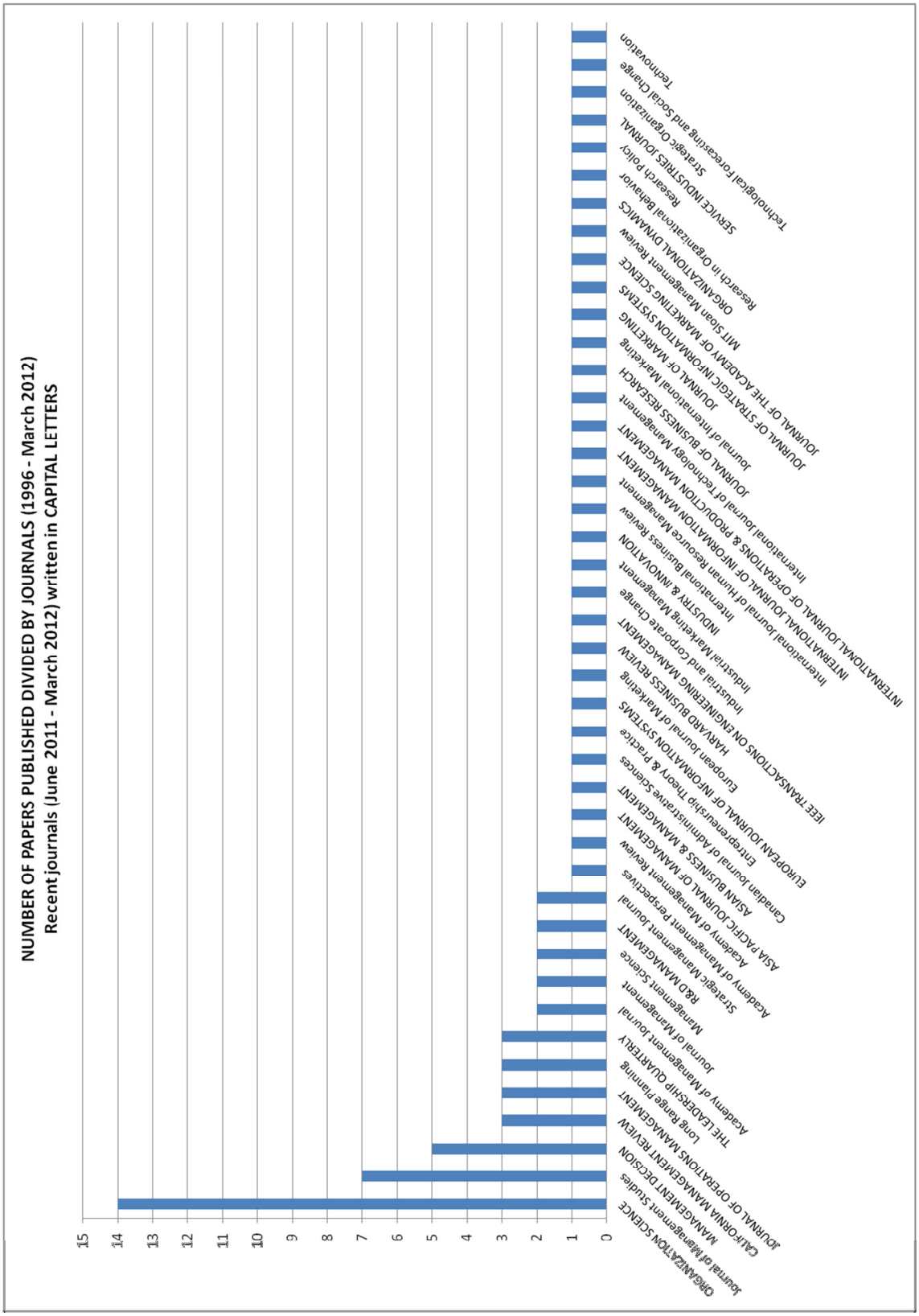

Figure 9: Papers published divided by journals (1996 - 2012)
(journals highlighted in capital letters published at least one significant paper on ambidexterity from June 2011 to March 2012)

2.2.3.Study type

Table 10 and Figure 10 show that 58 papers (73.42%) are empirical, while 21 (26.58%) are conceptual. Empirical studies include some kind of data or data analysis in the study (both statistical and qualitative analyses). Literature reviews, untested theoretical models, and proposed mathematical models are defined as conceptual studies. Studies that both present and test theory with empirical data are counted as empirical studies.

Table 10: Type of search

TYPE OF SEARCH	PAPERS REVIEWED
Empirical Paper	58
Conceptual Paper	21
TOTAL	79

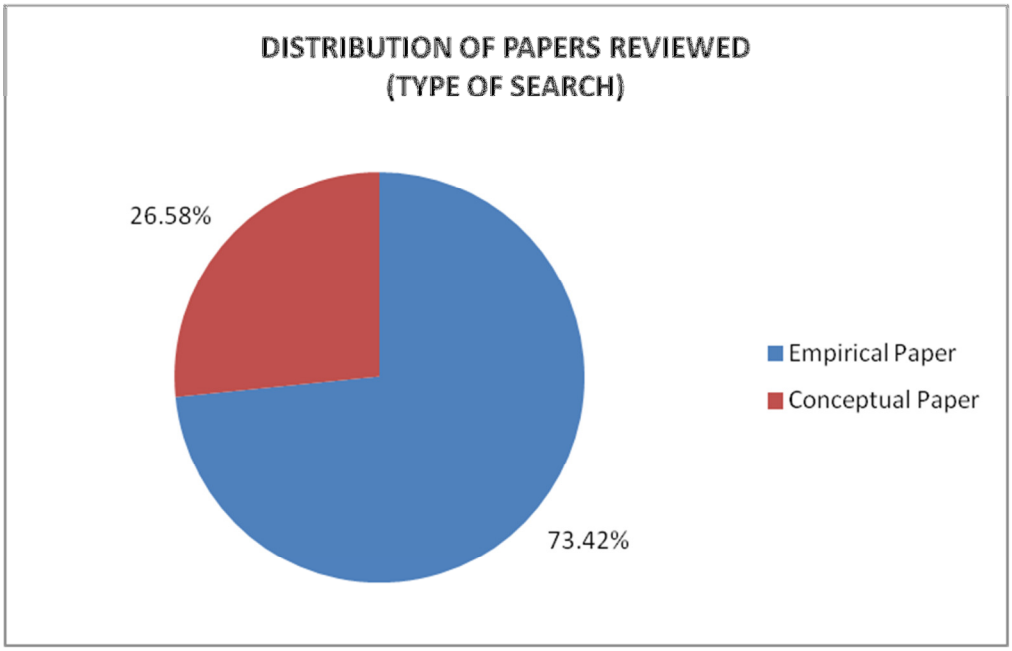

Figure 10: Distribution of papers reviewed (type of search)

2.2.4.Type of analysis (for empirical papers only)

Among the 58 empirical works, 39 papers (67.24%) present quantitative studies, 18 (31.03%) qualitative, and 1 (1.73%) both, as it can be seen in Table 11 and in Figure 11. Quantitative research uses statistical, mathematical or computational techniques to investigate a phenomenon. On the other hand, qualitative research leaves out numeric data. These studies collect word data from participants through asking broad questions.

Table 11: Type of analysis

TYPE OF ANALYSIS	EMPIRICAL PAPERS
Quantitative	39
Qualitative	18
Both	1
TOTAL	58

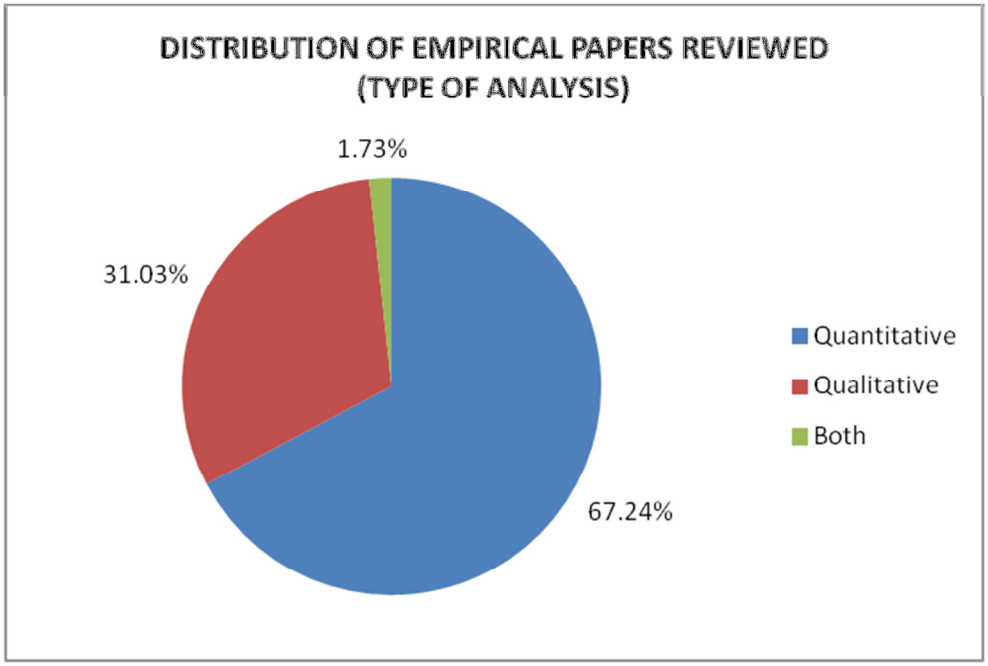

Figure 11: Distribution of papers reviewed (type of analysis)

2.2.5.Time horizon (for empirical papers only)

As Table 12 and Figure 12 show, 41 studies (70.69%) are cross-sectional (quantitative, qualitative, and both) while 5 (8.62%) are longitudinal (quantitative and qualitative), and 5 (8.62%) are retrospective (only qualitative). For 7 papers (12.07%) it is not available or it is unclear. Longitudinal study takes into account individuals/companies over a relatively long period of time. This kind of studies can establish what causes what. In a cross-sectional study survey data are collected at one point in time. This kind of research cannot support a cause and effect relationship. A retrospective study looks at the past, using data that have already been collected (for example as part of another research). Hitherto, studies on OA have mainly adopted a cross-sectional approach which does not catch the evolution of the phenomenon. Longitudinal studies are required in order to shed light on how ambidexterity dynamically coevolves over time, meeting the environment changes (Nosella, Cantarello, & Filippini, 2012).

Table 12: Time horizon

TIME HORIZON	EMPIRICAL PAPERS REVIEWED
Cross-Sectional	41
Longitudinal	5
Retrospective	5
Not Available or Unclear	7
TOTAL	58

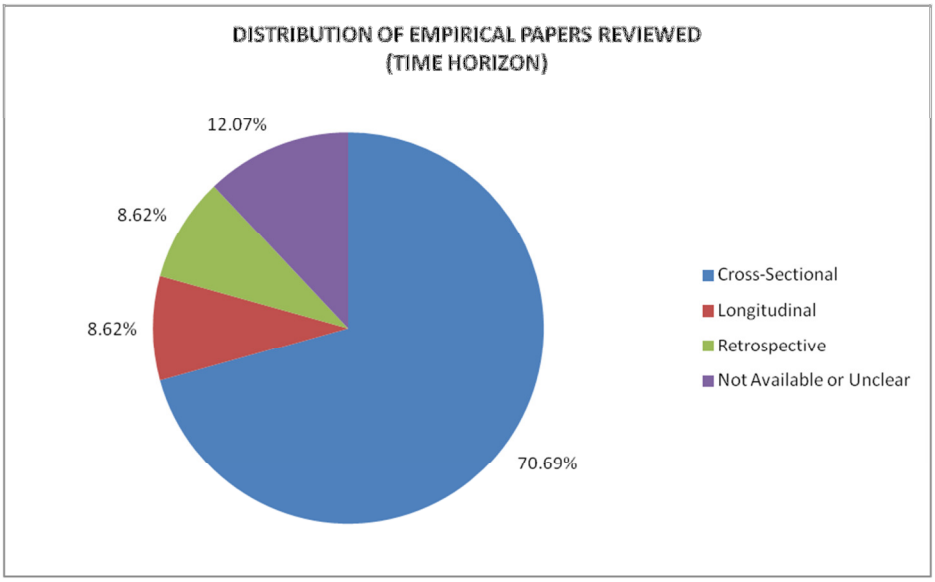

Figure 12: Distribution of papers reviewed (time horizon)

2.2.6.Sample used in the surveys (for empirical papers only)

Figure 13 and Table 13 show the "geography" of the research studies on ambidexterity (i.e., where they took place). Geographic distribution shows that 24 research studies have been held in America (20 in U.S., 2 in Canada, 1 in Brazil, and 1 in Mexico), 10 in Europe (2 in Italy and Spain, 1 in Scotland, UK, Switzerland, Finland, Netherlands, and Germany), 10 in Asia (4 in China as well as in Taiwan, 1 in Korea, 1 in Singapore and Malaysia together), and 2 in Oceania (both in Australia). In 5 papers the sample of companies studied is not limited to a specific geographical area, while in 7 research papers it is unclear. What is notable is that there seems to be a growing interest on the subject from emerging economies (i.e., BRIC countries and Asiatic ones).

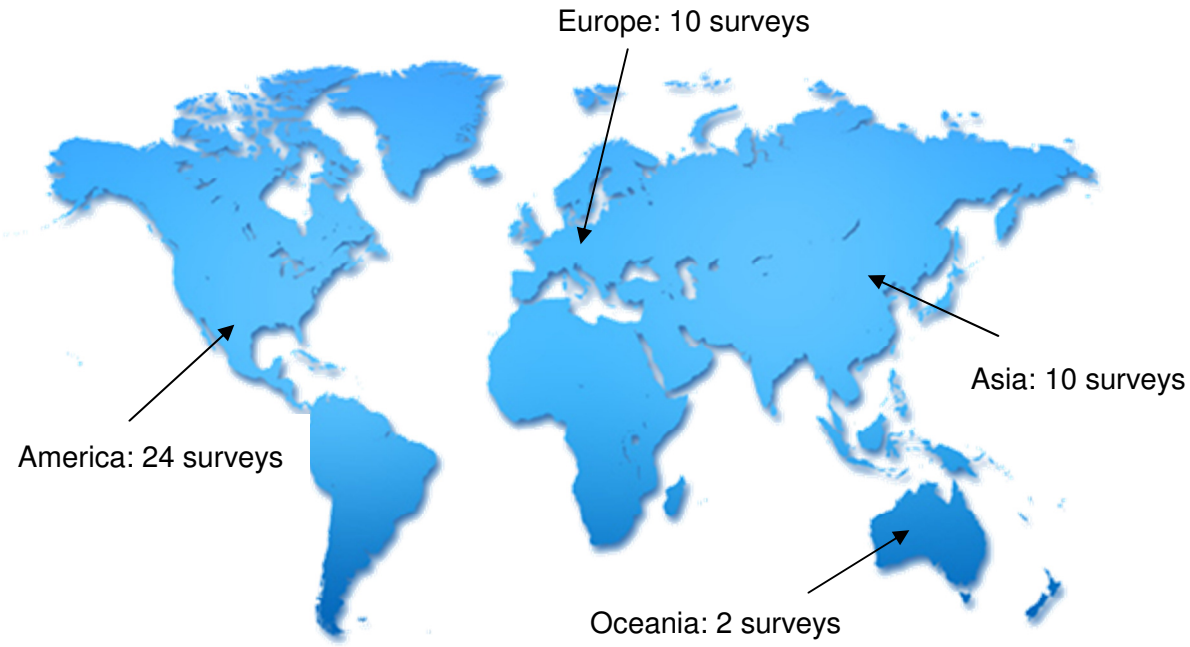

Figure 13: Surveys on ambidexterity in the world

(Image source: www.psdgraphics.com - free JPG file download)

Table 13: Geographic distribution of the sample used in the surveys

GEOGRAPHIC AREA	NUMBER OF PAPERS REVIEWED
AMERICA	**24**
U.S.	20
Canada	2
Brazil	1
Mexico	1
EUROPE	**10**
Italy	2
Spain	2
Scotland	1
UK	1
Switzerland	1
Finland	1
The Netherlands	1
Germany	1
ASIA	**10**
China	4
Taiwan	4
Korea	1
Singapore + Malaysia	1
OCEANIA	**2**
Australia	2
INTERNATIONAL SURVEY	**5**
Not Available	**7**
TOTAL	**58**

2.2.7.Literature streams related to organizational ambidexterity

The ambidexterity construct has been used in many fields, following different theoretical references. Raisch and Birkinshaw (2008) found out five main theoretical streams related to ambidexterity.

(1) *Organizational learning*: "Following March's (1991) article, discussion arose in the learning literature on whether exploitation and exploration should both be associated with learning activities" (Raisch & Birkinshaw, 2008, p. 377).
(2) *Technological innovation*: "One of the central research themes in the literature on technological innovation is the distinction between incremental and radical innovation" (Raisch & Birkinshaw, 2008, p. 378).
(3) *Organizational adaptation*: "Many scholars have suggested that long-term success requires an organizational balance between continuity and change" (Raisch & Birkinshaw, 2008, p. 379).
(4) *Strategic management*: "Burgelman's (1991, 2002) internal ecology model of strategy making distinguishes between variation-reducing, induced strategic processes and variationincreasing, autonomous strategic processes. […] A number of subsequent studies have provided arguments similar to those of Burgelman, albeit using different terms and mostly without referring to one another" (Raisch & Birkinshaw, 2008, p. 379).
(5) *Organizational design*: "Organization theory scholars have long discussed the challenge of using organizational features that make efficiency and flexibility possible. […] From this perspective, ambidexterity can be defined as a firm's ability to operate complex organizational designs that provide for short-term efficiency and long-term innovation" (Raisch & Birkinshaw, 2008, p. 380).

Table 14 tries to link up the theoretical streams with the ambidexterity view (i.e., contextual or structural) followed by the papers reviewed. Sometimes (13 out of 79) it is not clear which theoretical literature streams has been assumed as reference, while for 8 research works it is not unique. For instance, 3 papers follow both organizational learning and organizational adaptation perspectives. More confused seems the ambidexterity view assumed by the studies. Only 25 papers make the assumption explicit whether they follow a structural or a contextual view.

Table 14: Literature streams & ambidexterity view

LITERATURE STREAMS (according to Raisch & Birkinshaw, 2008)	AMBIDEXTERITY VIEW		
	Contextual	**Structural**	Mixed or Unclear
	14	**11**	54
Strategic Management (15)	1	1	13
Technological Innovation (15)	1	4	10
Organizational Learning (13)	4	1	8
Organization Design (12)	4	2	6
Organizational Adaptation (3)	1	2	-
Organizational Learning + Organizational Adaptation (3)	1	-	2
Technological Innovation + Strategic Management (2)	-	-	2
Technological Innovation + Organization Design (1)	1	-	-
Technological Innovation + Organization Adaptation (1)	-	1	-
Organizational Learning + Strategic Management (1)	-	-	1
Unclear (10)	1	-	9
Not Available (3)	-	-	3

2.2.8.Ambidexterity measure

Table 15 displays how ambidexterity is measured. 29 papers measure it explicitly, even if only 20 of them measure it using two "standard" approaches. 12 papers use a multiplicative score between exploration and exploitation (He & Wong, 2004; Gibson & Birkinshaw, 2004). "Studies adopting a multiplicative score interpret ambidexterity as the ability to simultaneously explore and exploit" (Chandrasekaran, Linderman, & Schroeder, 2012, p. 139). 4 papers use absolute difference score between exploration and exploitation (Lubatkin, Simsek, & al., 2006; He & Wong, 2004). "Studies adopting a deviation score interpret ambidexterity as the ability to equally focus on exploration and exploitation" (Chandrasekaran, Linderman, & Schroeder, 2012, p. 139). 4 papers use

both the approaches. This means that ambidexterity competency involves both simultaneous as well as equal focus on exploration and exploitation (Chandrasekaran, Linderman, & Schroeder, 2012).

Table 15: How ambidexterity is measured

STANDARD APPROACHES	EXPRESSION	NUMBER OF PAPERS REVIEWED
Combined OA	Explore × Exploit	12
Balanced OA	|Explore - Exploit|	4
Both	Explore × Exploit & |Explore - Exploit|	4
TOTAL		20

What about the others? They sometimes develop “home-made” approaches. For instance, Lin and McDonough III (2011, p. 502) wrote: “Because there was no existing measure of ambidexterity exactly reflecting our research purpose, we developed a nine item measure that reflected the combination of internal process and incremental and radical product innovation performance”. Cegarra-Navarro and Dewhurst (2007, p. 1724) stated: “Ambidexterity Context (AC) scale consisted of six items adapted from a scale designed by Baker and Sinkula (1999)”. Lin, Yang, & al. (2007, p. 1651) used “a categorical variable based on the exploration index = (total # of new partners for all of a firm’s alliances in year t)/(total # of all partners for a firm’s alliances in year t). If the index is between 0.2 and 0.8, alliance ambidexterity=1; if not, alliance ambidexterity=0”.

Anyway, even if it is not entirely clear how ambidexterity should be measured, Chandrasekaran, Linderman, and Schroeder (2012) suggested that combining both the multiplicative and the absolut deviation approaches is better than using only one. They wrote: “It is interesting to note that both the effect of multiplicative and deviation measures on performance is almost identical. This confirms our reasoning that ambidexterity competency should be measured by both multiplicative and deviation measures rather than just multiplicative or deviation measure as shown in the previous works” (Chandrasekaran, Linderman, & Schroeder, 2012, p. 143).

2.2.9.Level of analysis

Ambidexterity has been studied at different levels over time (e.g., Strategic Business Unit, leaders, group, alliances, process), even if the great majority of the papers reviewed (about 60%) deals with OA at firm/organization level (see Table 16 and Figure 14).

Table 16: Level of analysis

LEVEL OF ANALYSIS	NUMBER OF PAPERS REVIEWED
Firm/Organization	46
Strategic Business Unit (SBU)	7
Individuals, Leaders	5
Group, Team	4
Project, Initiative/Activity	3
Network of firms/Alliances	3
Process	2
Mixed or Unclear	9
TOTAL	79

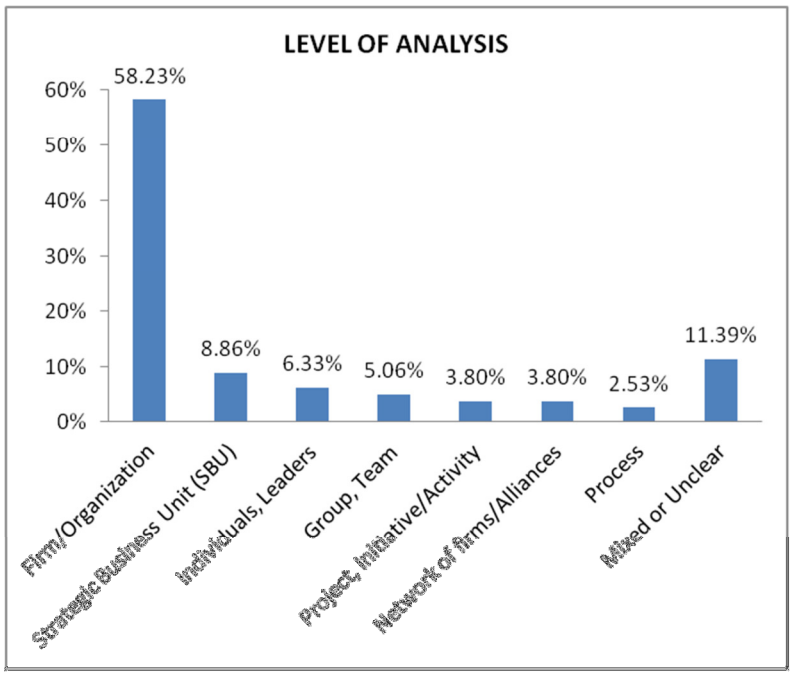

Figure 14: Level of analysis

2.2.10.Attributes which define ambidexterity

"Simultaneity/Both" exploration and exploitation are the most represented attributes (around 50%) present in the definition of OA given in the papers. Thus, *simultaneity* of the tensions is a fundamental attribute in pursuing ambidexterity, unlike punctuated equilibrium. Furthermore, 13 papers out of 79 (16.45%) define ambidexterity as the ability to pursue both exploitation and exploration simultaneously *and* in a balanced way (see Table 17 and Figure 15).

Table 17: Attributes which define ambidexterity

ATTRIBUTES PRESENT IN THE DEFINITION OF AMBIDEXTERITY GIVEN IN PAPERS	NUMBER OF PAPERS REVIEWED
Simultaneity/Both	39
Simultaneity/Both + Balance	13
Balance	6
Excellence	3
Reconciliation	2
Simultaneity/Both + Excellence	1
Simultaneity/Both + Equal Focus	1
Adaptation	1
Not Available	13
TOTAL	79

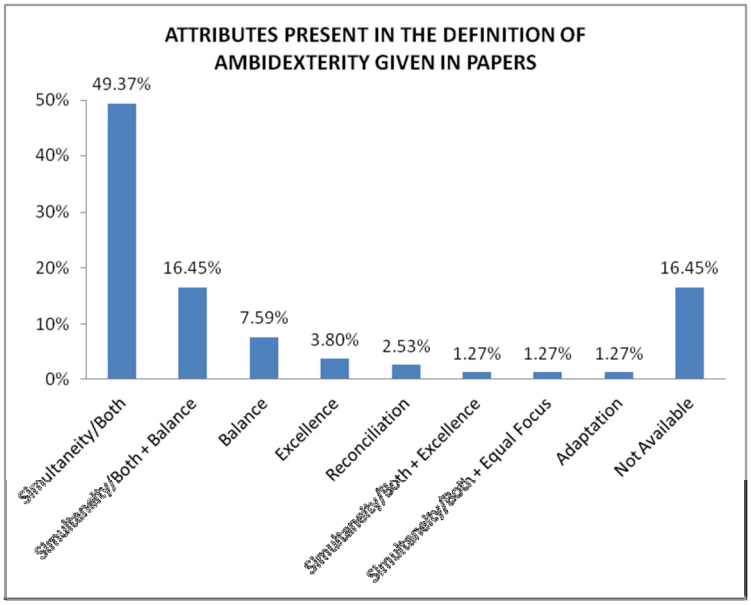

Figure 15: Attributes that define ambidexterity

2.2.11.Effects of being ambidextrous

26 times ambidexterity is depicted as a predictor of performance, while 4 times is a predictor of innovation. Twice is a predictor of commercialization as well as customer side. Once is a predictor of knowledge sharing. For further details please see Table 18 and Figure 16.

Table 18: Effects of being ambidextrous

Ambidexterity PREDICTOR of:		NUMBER OF CITATIONS
PERFORMANCE (26)	Firm Performance	9
	Financial Performance	7
	Business Performance	2
	Business Unit Performance	2
	Export Venture Performance	1
	Sales Performance	1
	Innovating Performance	1
	Organizational Performance	1
	Competitive Advantage	1
	Profit Level and Market Share	1
INNOVATION (4)	Innovation	2
	Firm Innovativeness	1
	Solution Development	1
COMMERCIALIZATION (2)	Research Commercialization Results	1
	Technology Commercialization	1
CUSTOMER SIDE (2)	Customer Capital	1
	Customer Satisfaction	1
KNOWLEDGE SHARING (1)	Knowledge Sharing	1

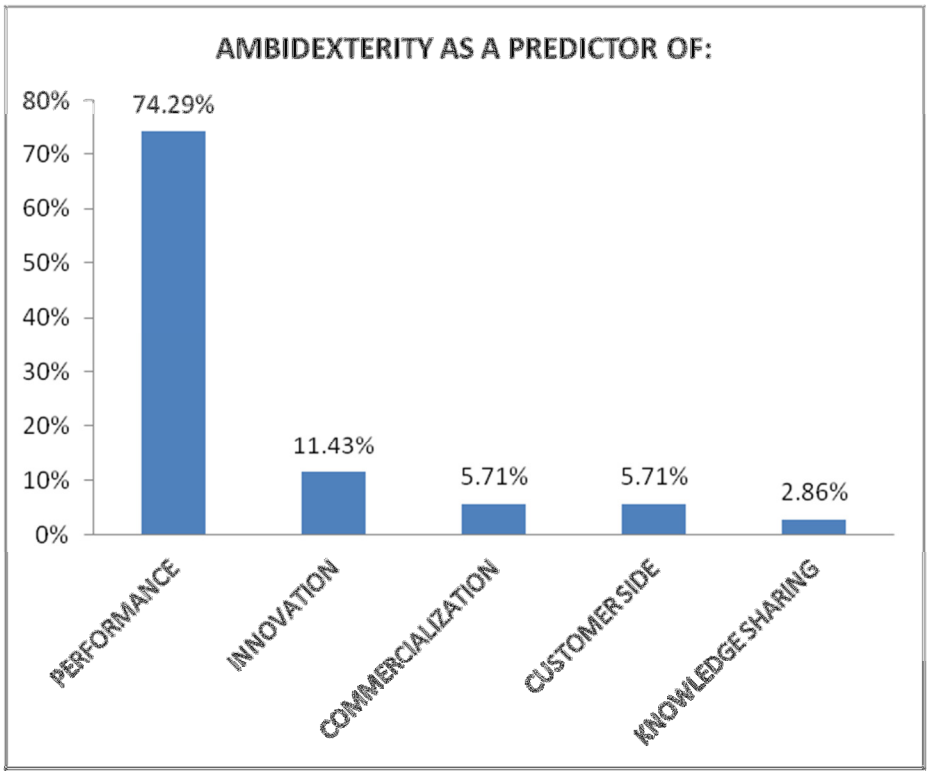

Figure 16: Effects of being ambidextrous

2.2.12.Relation between ambidexterity and performance

As shown in the previous paragraph, many papers claim that companies which attempt to be ambidextrous are associated with the most superior performance (e.g., Leidner, Lo, & Preston, 2011). Since ambidexterity has been most depicted as a predictor of performance, the next step is going deeper into this aspect, trying to give an answer to the question: What is the relation between OA and firm performance? 10 revealing works have been taken into consideration, listed below in order of publication.

He and Wong (2004) provided empirical evidence of the positive effect of the ambidexterity construct in the context of technological innovation. “We find evidence consistent with the ambidexterity hypothesis by showing that (1) the interaction between explorative and exploitative innovation strategies is positively related to sales growth rate, and (2) the relative imbalance between explorative and exploitative innovation strategies is negatively related to sales growth rate” (He & Wong, 2004, p. 481). They provided also some practical advice for managers who want to implement ambidexterity. “One obvious managerial implication is the need for senior managers to become more explicitly aware of the need to allocate resources between explorative versus exploitative innovation. […] Senior managers may need to consider introducing new metrics to prioritize resource allocation and benchmark performance along the

explorative versus exploitative innovation dimensions" (He & Wong, 2004, p. 492). Nevertheless, besides providing empirical evidence on the potential benefits of ambidexterity, their findings also suggest that "there may be limits to ambidexterity, possibly due to the fact that the organizational tension inherent between exploration and exploitation may become unmanageable when both are pushed to extreme limits" (He & Wong, 2004, p. 492).

Lubatkin, Simsek, & al. (2006) took into consideration the pivotal role of top management team (TMT) behavioral integration in facilitating the processing of disparate demands essential to attaining ambidexterity in SMEs. They focused on SMEs because they represent a vital component of most nations' economies (Lubatkin, Simsek, & al., 2006). "We reason that although an ambidextrous orientation does not assure subsequent SME performance, it is an essential core driver that should enhance returns for the firm relative to its competitors—as they are better able to attain and sustain their advantages in the marketplace and, thus, are more able to shield their future cash flows from external selection pressures. We also reason that the empirical linkage between ambidexterity and the firm's relative performance will be more evident at SMEs than at larger firms, given that determinants of performance at the latter are driven by a larger set of influences extraneous to TMT diversity, such as multiple products, markets, and divisions" (Lubatkin, Simsek, & al., 2006, p. 653).

In a study conducted in 2007, Lin, Yang, & al. specifically focused on the structure-based ambidexterity in alliance formation. "Our findings show that although an ambidextrous formation of alliances benefits large firms, a focused formation of either exploratory or exploitative alliances benefits small firms. In an uncertain environment an ambidextrous formation enhances firm performance but so does a focused formation in a stable environment" (Lin, Yang, & al., 2007, p. 1645). The ambidexterity approach in alliance formation does not always guarantee increased economic benefits for companies (Lin, Yang, & al., 2007). "Rather, firms need to evaluate it based on their own organizational characteristics and external conditions. Our findings support the argument that large firms are able to reap the benefits of ambidexterity, whereas small firms are advised to maximize the value of their limited resources by adopting a focused approach in alliance formation. Also, we found that an ambidextrous approach helps firms in uncertain environments, which demand both efficiency and flexibility, whereas a stable environment gives firms more leeway in adopting either exploitation or exploration" (Lin, Yang, & al., 2007, p. 1656).

Bierly and Daly (2007) studied the relationship between knowledge strategy (i.e., exploration and exploitation) and performance. “We did not find that simultaneously pursuing exploration and exploitation significantly increased firm performance. […] Other important insights drawn from these results are: Exploitation is a stronger driver of performance than exploration, and there is an optimal level of exploitation. We found that the relationship between exploration and performance is linear and positive, and that the relationship between exploitation and performance is concave (inverted U). Part of the explanation for the concave relationship between exploitation and performance is the argument of diminishing returns; the first attempts of exploitation are the easiest to yield large benefits, but each subsequent exploitation attempt yields a smaller benefit. However, overreliance on exploitation can actually result in reduced performance after a point. This is consistent with research in product development that illustrates how excessive tinkering and overengineering can be detrimental to the success of the firm. When firms focus too much on exploitation, they lose focus on the true customer needs and their constant tinkering does not allow them to develop a stable, efficient manufacturing process” (Bierly & Daly, 2007, pp. 508-509).

Morgan and Berthon (2008) found that “the ambidexterity exhibited by firms in the form of exploitative innovation strategy and explorative innovation strategy significantly explains improvements in firms’ business performance” (Morgan & Berthon, 2008, p. 1329).

In the same year (2008), Han and Celly were the first who tried to link the ambidexterity construct to International New Ventures (INVs) performance. They proposed that INVs that pursue strategic ambidexterity can achieve superior performance, even if there seems to be an optimal balance between the simulutaneous pursue of both exploitation and exploration (Han & Celly, 2008). “This finding suggests that there could be optimal thresholds to ambidexterity; that is, that too much or too little ambidexterity is undesirable. There might be an upper limit on ambidexterity because it is increasingly difficult for the INV to balance two paradoxical strategies as they become unmanageably intense. […] If it is difficult for firms to manage high levels of ambidexterity, it seems likely that it is even more difficult for INVs that face liabilities of newness, foreignness, and possibly smallness, to find the resources and capabilities necessary to manage high levels of ambidexterity. Moderate levels of ambidexterity may be beneficial, but high levels may prove detrimental. Future research could test these threshold relationships between ambidexterity and firm performance” (Han & Celly, 2008, p. 346).

Uotila, Maula, & al. (2009) suggested that there is an optimal balance between exploration and exploitation too, and that aspiring to achieve it is most important in high R&D intensive industries. “The literature suggests that established firms need to balance their exploration and exploitation activities in order to achieve superior performance. […] In this study, we show that there is a trade-off between exploration and exploitation and that the optimal balance between exploration and exploitation depends upon environmental conditions. […] We find an inverted U-shaped relationship between the relative share of explorative orientation and financial performance. This relationship is positively moderated by the R&D intensity of the industry in which the firm operates” (Uotila, Maula, & al., 2009, p. 221).

Tushman, Smith, & al. (2010) empirically explored the relations between alternative organizational designs and a firm’s ability to explore and exploit. The authors found that while transitions to ambidextrous designs are associated with increased innovation outcomes, shifts away from ambidextrous designs are associated with decreased innovation outcomes (Tushman, Smith, & al., 2010). They also argued that physical separation seems to be important. “For example, in the HP Scanner Division, the portable scanners were developed and marketed in a location several miles from the flatbed organization. […] This physical separation may provide the freedom for the exploratory unit to experiment without interference from the exploitative unit” (Tushman, Smith, & al., 2010, pp. 1344).

Based on a survey of Chinese firms, Su, Li, Yang, & al. (2011) revealed that while the interaction of exploratory learning and exploitative learning has a negative effect on firm performance when the organizational structure is mechanistic, this interaction has a positive effect when the organizational structure is organic[9].

Finally, McDermott and Prajogo (2012) found that individually exploitation and exploration have no direct effect on business performance, but they produce synergistic effect on performance. “Individually, exploitation and exploration innovation seem to have no direct, independent effect on business performance in our sample.

[9] “Briefly, mechanistic structures are characterized by such attributes as centralized decision making, strict adherence to formally prescribed rules and procedures, tight control of information flow, and carefully constructed reporting and workflow relationships. Conversely, decentralized decision making, organizational adaptiveness and flexibility, open communications, and a deemphasis on formal rules and procedures are typical of organic structures” (Slevin & Covin, 1997, pp. 193-194).

Instead, the effect becomes evident in their interaction, suggesting the need for creating balance and synergy between the two. Our findings, therefore, demonstrate that SMEs benefit from ambidextrous innovation. Second, most of these SMEs focus their efforts only on exploitation innovation. However, SMEs are, by definition, small firms, and with success their organizational size increases as they grow. As they grow, the effect of exploration on performance increases, while exploitation innovation's link to performance decreases. This finding is interesting and deserves examination in future research to confirm these findings, and to explore the underlying reasons for this phenomenon, perhaps using longitudinal data that tracks growth patterns over time" (McDermott & Prajogo, 2012, p. 233).

2.2.13.Ways for resolving the tensions posed

Marketing exploration vs. marketing exploitation, knowledge exploration vs. knowledge exploitation, local vs. distant search, and alignment vs. adaptability are only few examples of the great variety of tensions taken into considerations by the papers reviewed. The ambidexterity construct has been used in many different management fields, and this is the reason why the conflicts studied change every time. Anyhow, it is possible to trace them back to exploration vs. exploitation, in a broad sense. According to Jasmand, Blazevic, and de Ruyter (2012), exploration and exploitation are fundamentally umbrella terms in the organizational literature and refer to various conflicting demands at different organizational levels.

However, the most recommended way to reconcile the conflicts posed is through organizational design (47.01% of the papers suggests it). Then, dropping down, they propose to solve the tensions by means of management practices (22.22%), top management team (18.80%), culture (7.69%), and strategy (4.28%). Further information are available on Table 19 and Figure 17. Please note that some papers can suggest more than a single way to solve tensions, which can belong to different boxes.

Table 19: How the papers suggest to solve the conflicts posed

	WAYS FOR RESOLVING TENSIONS	NUMBER OF CITATIONS
ORGANIZATIONAL DESIGN (55)	Interactions/collaboration, cooperation, organization structure, parallel structure, network, separate units with aligned architectures and targeted integration	17
	Integration mechanisms (e.g., integrate exploration into the routine exploitative capabilities without creating excessive disturbance, tension or division)	17
	Organizational context	7
	Linking activities for communication (e.g., making phone calls, writing e-mails and memos, participating in face-to-face discussions in formal and informal meetings, and transferring records and other documentation)	5
	Organizational linkages	2
	Across organizational boundaries (alliances)	2
	Specialization	2
	Physically separate and distinct units	1
	Synchronization across multiple levels	1
	Balanced structural designs	1
MANAGEMENT PRACTICES (26)	Resource allocation	11
	Knowledge Management (KM) practices, knowledge combination, integration, ideas & knowledge sharing	9
	Human Resource Management (HRM) practices (e.g., choosing team members having the best set of experiences, training, enrichment, job rotation, planning and selection, training and development, performance appraisal and reward system)	3
	Absorptive capacity	2
	Total Quality Management (TQM) approach	1

TOP MANAGEMENT TEAM (22)	Management style/managers' ability and attributes (the leader needs to be sensitive to know which leader behavior is situationally appropriate)	15
	Transformational leadership (e.g., individual consideration, intellectual stimulation, idealized influence, inspirational motivation)	5
	Senior team that explicitly owns the ambidextrous strategy	1
	Ambidextrous leadership (conflict resolution, resource allocation)	1
CULTURE (9)	Learning culture (e.g., psychological safety, openness to diverse opinions, participation in decision making, participation in innovation teams)	7
	Vision and values that promote a common identity but separate cultures (shared with STRATEGY)	1
	Entrepreneurial orientation	1
STRATEGY (5)	Hybrid strategy (marketing differentiation strategy and cost leadership)	1
	Strategic intent	1
	Vision and values that promote a common identity but separate cultures (shared with CULTURE)	1
	Proactive and responsive market orientation	1
	Coherence between strategic level decisions and project level activities	1

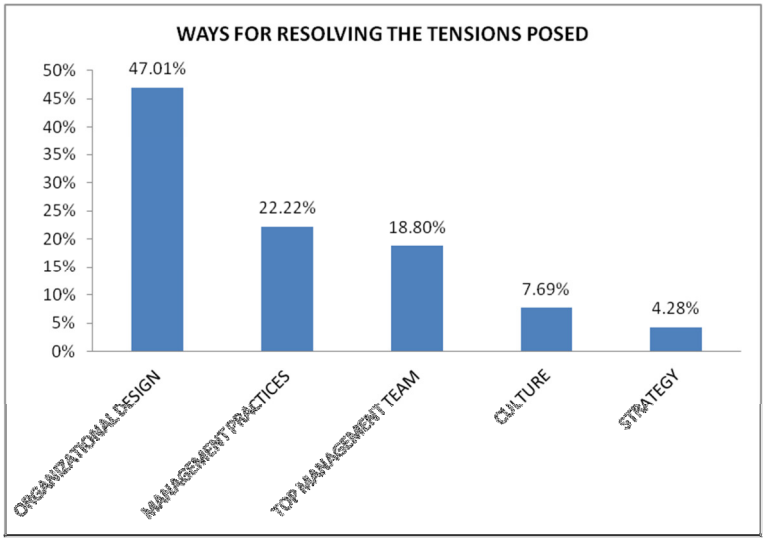

Figure 17: Ways for resolving tensions

2.2.14.Some limitations

There are basically two main limitations on the findings of the majority of the papers reviewed. One derives from the cross-sectional data sampling design, which indicates that dynamic causality cannot be established (Liu, Luo, & Huang, 2011). That is, the cross-sectional design does not allow to fully establish the causality between the independent variables and the dependent variable (Leidner, Lo, & Preston, 2011). A carefully designed longitudinal study could help to solve this first limitation.

Sometimes it is also difficult to generalize the results, and this is the second main shortcoming. The findings of the studies are often limited to companies located in a single country (e.g., Su, Li, Yang, & al., 2011). Sometimes the results derived from an empirical study set in a unique company (e.g., Jasmand, Blazevic, & de Ruyter, 2012) or at a certain level (e.g., Chandrasekaran, Linderman, & Schroeder, 2012). Again, sometimes they are limited to specific sectors or they take into consideration a particular firm dimension (e.g., SME), and this could limit the generalizability of the results (see McDermott & Prajogo, 2012). Thus, scholars should be cautious in generalizing the findings to contexts different from the ones they studied.

CHAPTER 3

Survey on innovation in Italian and Austrian companies

3.1.The innovation challenge

In today's turbulent and complex environment, survival and growth of companies depend not only on the ability to provide a product that meets the needs of *today*, but also on the ability to satisfy the needs of *tomorrow*. Thus, they invest time and effort into creating systems, structures and processes to ensure a sustained flow of innovation (Bessant & von Stamm, 2009).

"One of the biggest innovation challenges is dealing with discontinuous innovation. When technologies shift, new markets emerge, the regulatory rules of the game move or someone introduces a new business model, many successful organizations suddenly become vulnerable.

A key part of the problem is that dealing with discontinuity requires a very different set of capabilities for organizing and managing innovation: searching in unlikely places, building links to strange partners, allocating resources to high risk ventures, exploring new ways of looking at the business – all of these challenge the conventional approach to the innovation challenge. How does an organization start building discontinuous innovation capability?" (Bessant & von Stamm, 2009, p. 7).

The survey cited in this master's thesis concerns innovation and it draws inspiration from a previous survey developed by the AIM DILab[10]. It is made up of seven parts (87 items in all): "Demographics" (6 items), "Learning about markets for radical innovation" (10 items), "Managing radical idea generation" (6 items), "Network management system for radical innovation" (4 items), "Openness to external sources for radical innovation" (8 items), "Innovative culture and entrepreneurship for radical innovation" (10 items), and "Competencies, types of innovation, and performance" (43 items).

[10] The Advanced Institute of Management (AIM) Discontinuous Innovation Laboratory (DILab), which started in spring 2006, allows networks of firms in the UK, Germany and Denmark, to link up with each other, and to work with academic researchers, drawing on experience in different sectors and countries, providing a chance to compare, contrast, share and develop understanding of the discontinuous innovation challenge (www.innovation-lab.org).

Please note that not every single item is useful for the analyses performed in this thesis. The items actually used to build the scales explained later on are listed in Appendix 6 in English, in Italian, and in German.

3.2.Research setting and data collection

3.2.1.What is sampling?

Sampling is the process of selecting a sufficient number of respondents from the population that the researcher wishes to investigate (Forza, 2002). “By studying the sample and understanding the characteristics of the sample subjects, the researcher will be able to generalize the properties or characteristics to the population elements” (Forza, 2002, pp. 163-164).

3.2.2.Sample specifications

The target population frame consisted of Italian and Austrian medium- and high-tech companies, with at least 50 employees, and covering the specific two-digit NACE codes C20, C21, C25, C26, C27, C28, C29, C30, C32 (see Table 20). NACE stands for “Nomenclature générale des Activités économiques dans les Communautés Européennes”, which is the standard for classification of economic activities in the EU. The latest NACE codes (Revision 2) are based on the Regulation (EC) No. 1893/2006 of the European Parliament and of the Council, establishing the statistical classification of economic activities[11].

The sample consists of both business to business firms (B2B, organizations that sell their products or services to other companies and not directly to consumers), business to consumer firms (B2C, firms selling their products or services directly to consumers), and firms that present both approaches.

[11] Source: European Commission website (http://ec.europa.eu/environment) - retrieved June 27, 2012

Table 20: Industries and NACE codes of the companies involved

SECTOR	NACE CODE
Manufacture of chemicals and chemical products	C20
Manufacture of basic pharmaceutical products and pharmaceutical preparations	C21
Manufacture of fabricated metal products, except machinery and equipment	C25
Manufacture of computer, electronic and optical products	C26
Manufacture of electrical equipment	C27
Manufacture of machinery and equipment n.e.c. (not elsewhere classified)	C28
Manufacture of motor vehicles, trailers and semi-trailers	C29
Manufacture of other transport equipment	C30
Other manufacturing	C32

3.2.3.Italian sample

Medium- and high-tech Italian companies with at least 50 employees and covering the specific two-digit NACE codes previously stated were randomly selected from the database Aida. Aida contains comprehensive information on 1 million companies in Italy[12]. The survey was mailed to 500 firms. Respondents were typically vice president or director of R&D department or CEO (Chief Executive Officer). 104 responses were received, resulting in a response rate of 20.8%. Of the total, 19 questionnaires were discarded due to too much incomplete information, resulting in an effective response rate of 17% (85 usable questionnaires). In order to test for non-respondent bias several telephone calls were conducted with those firms that had not answered and it was concluded that the main reasons for replay's failure was lack of time and inadequacy of their organization.

3.2.4.Austrian sample

Medium- and high-tech Austrian companies with at least 50 employees and covering the specific two-digit NACE codes previously stated were randomly selected from the database of the Upper Austrian Chamber of Commerce (WKOÖ). The survey was mailed to 870 firms. The data collection process was supported by the use of

[12] Source: Bureau van Dijk website (http://www.bvdinfo.com) - retrieved September 9, 2012

CMDcomplete (http://www.cmdcomplete.at). Again, Respondents were typically vice president or director of R&D department or CEO. 115 responses were received, resulting in a response rate of 13.2%. Of the total, 15 questionnaires were discarded due to too much incomplete information, resulting in an effective response rate of 11.5% (100 usable questionnaires). In order to test for non-respondent bias several telephone calls were conducted with those firms that had not answered and, as for Italian companies, it was concluded that the main reasons for replay's failure was lack of time and inadequacy of their organization.

3.2.5.Handling missing data

Missing data is a troublesome issue in most research settings. They are "information not available for a subject (or case) about whom other information is available. Missing data often occur when a respondent fails to answer one or more questions in a survey" (Hair & al., 2010, p. 36). The examination of the data is an essential part of any statistical analysis.

If what is missing is an objective datum (e.g. number of employees of a firm), it is possible to retrieve it asking directly to the company or searching it in archives. On the other hand, if a perceptual value (e.g. Likert scale datum) is missing, it is normally possible to replace the gap by means of the sample's overall mean score for that variable (Hair & al., 2010). This process is called "imputation". Alternatively, it is obviously possible to use only valid data, even if this approach will reduce the sample.

Additionally, all data should be carefully checked to see if there are any typing mistakes. If there are too many missing data for a single company and/or obvious mistakes that cannot be fixed, it is better to remove the company from the sample (usually a 10% of the sample is left out for these reasons).

Figure 18 and Table 21 show the impact of missing data on sample size.

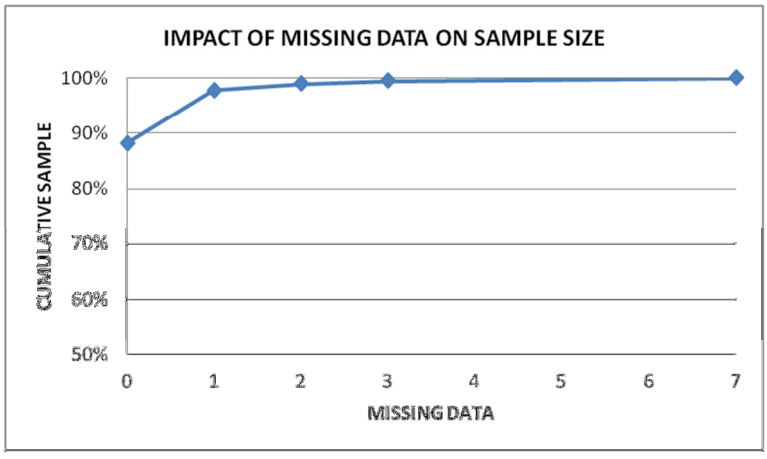

Figure 18: Impact of missing data on sample size, *N* = 185

Table 21: Impact of missing data on sample size, *N* = 185

MISSING DATA		CUMULATIVE SAMPLE SIZE	
0	0.00%	163	88.11%
1	3.70%	181	97.84%
2	7.41%	183	98.92%
3	11.11%	184	99.46%
7	25.93%	185	100.00%

Before any imputation, it is useful to check whether the data follow a normal distribution, the benchmark for statistical method. The simplest diagnostic test for normality is a visual check of the distribution of the observed data values. “If the variation from the normal distribution is sufficiently large, all resulting statistical tests are invalid” (Hair & al., 2010, p. 71).

From a practical point of view, what does “sufficiently large” mean? According to Hair & al. (2010, p. 71) “the shape of any distribution can be described by two measures: kurtosis and skewness. Kurtosis refers to the ‘peakedness’ or ‘flatness’ of the distribution compared with the normal distribution. […] Whereas kurtosis refers to the height of the distribution, skewness is used to describe the balance of the distribution; that is, is it unbalanced and shifted to one side (right or left) or is it centered and symmetrical with about the same shape on both sides? If a distribution is unbalanced, it is skewed. A positive skew denotes a distribution shifted to the left, whereas a negative skewness reflects a shift to the right. […] Both skewness and kurtosis have empirical measures that are available in all statistical programs. In most programs, the skewness and kurtosis of a normal distribution are given values of zero. Then, values above or below zero denote departures from normality”. To judge the question “are they large enough to worry about?” it is possible to use statistical tests to assess normality. “A simple test is a rule of thumb based on the skewness and kurtosis values (available as part of the basic descriptive statistics for a variable computed by all statistical programs). The statistic value (*z*) for the skewness value is calculated as:

$$z_{skewness} = \frac{skewness}{\sqrt{\frac{6}{N}}}$$

where *N* is the sample size. A *z* value can also be calculated for the kurtosis value using the following formula:

$$z_{kurtosis} = \frac{kurtosis}{\sqrt{\frac{24}{N}}}$$

If either calculated *z* value exceeds the specific critical value, then the distribution is nonnormal in terms of that characteristics. The critical value is from a *z* distribution, based on the significance level we desire. The most commonly used critical values are ± 2.58 (0.01 significance level) and ± 1.96, which corresponds to a 0.05 error level. With these simple tests, the researcher can easily assess the degree to which the skewness and peakedness of the distribution vary from the normal distribution" (Hair & al., 2010, pp. 72-73).

All the items of interest respect $z_{kurtosis}$ limit at 0.01 significance level, while items CNTX_1,2,3,4,6,7,8 are too negatively skewed (i.e., $z_{skewness}$ ranges from -5.172 for CNTX_6 to -3.198 for CNTX_8). This means that respondents mostly provided high Likert values answers for these items.

All the statistical analyses have been performed using *IBM SPSS Statistics* (Appendix 7 provides more details on this software).

3.2.6.Final sample and considerations on sample size

In the end, the final sample counts 185 useful questionnaires (85 Italian and 100 Austrian), resulting in an effective response rate of 13.5% (the survey was mailed to 1370 medium- and high-tech companies). Table 22 summarizes the sample.

Table 22: Sample (summary)

	ITALY	AUSTRIA
Company type	Medium- and high-tech	
Minimum number of employees	50	
Initial sample	500	870
Responses	104	115
Effective sample	85	100
Total (response rate)	185 (13.5%)	

Are 185 valid questionnaires enough?

A critical aspect when making statistical inference is sample size (Forza, 2002). "It is a complex issue which is linked to the significance level and the statistical power of the test, and also to the size of the researched relationship" (Forza, 2002, p. 165). Significance level is marked with the Greek letter *α*, and is typically taken to 0.05 (Forza, 2002). "A high statistical power [i.e., 0.8 is a reasonable and realistic value for research in social/behavioural sciences] is required to reduce the probability of failing to detect an effect when it is present. […] Low power leads to a study which is not able to detect large size effects, while high power leads to committing unnecessary resources only in order to be able to detect trivial effects" (Forza, 2002, pp. 165-166). Table 23 sums up the required sample size for different values of *α*, statistical power, and the researched relationship (i.e., small, medium, or strong association). "One can see that the required sample sizes increases while increasing the statistical power, and/or decreasing the significance level, and/or decreasing the size of the effect researched" (Forza, 2002, p. 166).

Thus, a sample of 185 usable surveys is significant, covering all the cases written in boldface in Table 23. Besides, it meets the most frequent combination, that is *α* equal to 0.05, statistical power of 0.8, and medium effect relationship (combination underlined in Table 23).

Table 23: Effect size and statistical power and sample size
(Adapted from Forza, 2002)

Researched relationship	Stat. power = 0.6		Stat. power = 0.8	
	α = 0.05	*α* = 0.01	*α* = 0.05	*α* = 0.01
Large effect	**12**	**18**	**17**	**24**
Medium effect	**30**	**45**	**44**	**62**
Small effect	**179**	274	271	385

Moreover, Hair & al. (2010) stated that the simple regression can be effective with a sample size of 20, but on the other hand sample should be 100 or larger to perform factor analysis.

3.3.Model

3.3.1.Generality

By means of factor analysis and simple regression, the author performed a confirmatory survey research[13] testing three hypotheses. Hypothesis 1 links structural ambidexterity to innovation performance (i.e., the ability to simultaneously generate incremental and radical innovation), while hypotheses 2 and 3 investigate whether social support context and performance management context mediate the relationship between structural ambidexterity and innovation performance (see Figure 19).

"Structural ambidexterity" is the *independent variable* of the tested model and it is derived from items CNTX_9,10,11 (source: Jansen, Tempelaar, & al., 2009). "Innovation performance" is the *dependent variable* of the model and it is derived either from items INN_EXP_1,2,3,4 and INN_EXT_1,2,3 (source: Jansen, Van Den Bosch, & Volberda, 2006), or items KW_EXR_1,2,3,4 and KW_EXT_1,2,3,4,5 (Source: Zahra, Ireland, & Hitt, 2000). In the first case it is called "Innovation performance (INN)", in the second "Innovation performance (KW)". "Social support context" and "Performance management context" work as *mediators* between the dependent and the independent variables and they are derived from items CNTX_1,2,3,4,5,6,7,8 (source: Birkinshaw & Gibson, 2004).

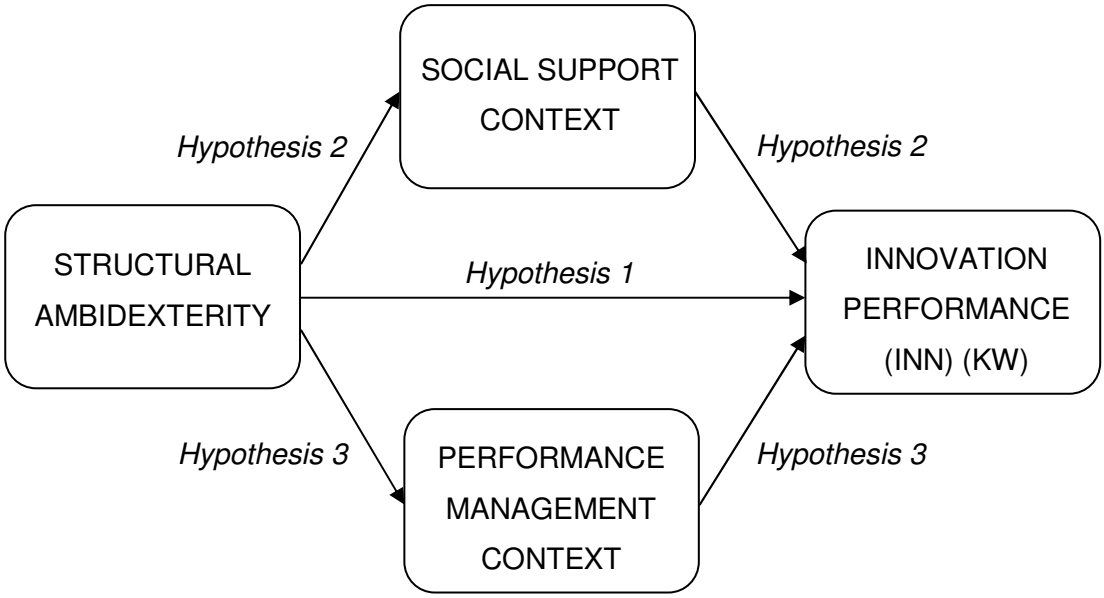

Figure 19: Hypothesized model

[13] "Confirmatory (or theory testing or explanatory) survey research takes place when knowledge of a phenomenon has been articulated in a theoretical form using well-defined concepts, models and propositions" (Forza, 2002, p. 155).

3.3.2.Hypotheses

Studies have predominantly suggested that organizations pursuing exploration and exploitation simultaneously obtain superior innovation performance. As Paragraph 2.2.11. highlights, in literature ambidexterity is mainly depicted as a predictor of performance (e.g., firm performance, financial performance, business performance, sales performance) and innovation (e.g., firm innovativeness, solution development).

To give a few examples, Rosing, Frese, and Bausch (2011) suggested that ambidexterity is necessary for an effective innovation process. They posed the proposition that "innovative performance requires ambidexterity" (p. 965). Tushman, Smith, & al. (2010, p. 1331) wrote that "transitions to ambidextrous designs are associated with increased innovation outcomes, while shifts away from ambidextrous designs are associated with decreased innovation outcomes".

Current literature distinguishes between two different ways to be ambidextrous. Structural ambidexterity physically separates exploratory units (e.g. R&D) from exploitative units (e.g. Production and Sales), while contextual ambidexterity simultaneously balances exploration and exploitation by means of processes or systems that encourage employees to split their own time between radical and incremental activities (Filippini, Güttel, & Nosella, 2012).

This study is focused on structural ambidexterity. Following what literature shows, the first hypothesis links structural ambidexterity to innovation performance. Hence,

HYPOTHESIS 1: *A structural ambidexterity solution in the innovation process is positively associated with innovation performance.*

The second stage seeks to test two hypotheses partially derived from a study by Gibson and Birkinshaw (2004). They showed that a supportive organizational context – characterized by a combination of performance management and social support – is associated with a higher level of ambidexterity (Birkinshaw & Gibson, 2004). They argued that senior executives play an important role in making an organizational context effective, and they encouraged a supportive organizational context that generates simultaneous capacities to explore and expoit (Gibson & Birkinshaw, 2004).

Many studies took into consideration the role played by the context (in particular social support context and performance management context) in ambidextrous companies. For instance, Lubatkin, Simsek, & al. (2006) focused on the pivotal role of top management team behavioral integration in facilitating the processing of disparate demands essential in attaining ambidexterity in small- to medium-sized firms (SMEs). Lin and McDonough III (2011, p. 500) suggested that "organization cultures that foster

learning and knowledge sharing are particularly conducive to the attainment of innovation ambidexterity because they provide employees with opportunities to explore, investigate, experiment, and share knowledge and ideas, thus simultaneously fostering multiple types of innovation". In particular (p.506), "leaders also need to ignite the creativity of employees. They can do this by actively and directly encouraging employees to exploit existing ideas and to explore for new ideas, to look at problems from different angles and to arouse their curiosity about new ways of doing things. […] In facilitating these behaviors, strategic leaders are promoting cultural norms of behavior that also enhance interactions and collaboration among organizational members that can, in turn, lead to exploitation and exploration activities. […] Modeling behavior on the part of strategic leaders can also encourage organization members to share ideas and knowledge about new processes, solutions to customer problems, and radically new products".

Following these hints, the second and third hypotheses investigate whether social support context and performance management context mediate the relationship between structural ambidexterity and innovation performance. Hence,

HYPOTHESIS 2: *Social support context mediates the relationship between structural ambidexterity solution in the innovation process and innovation performance.*

HYPOTHESIS 3: *Performance management context mediates the relationship between structural ambidexterity solution in the innovation process and innovation performance.*

3.3.3.Measurement and validation of constructs

The author performed several factor analyses to build the scales to test the hypotheses. Factor analysis allows to examine the underlying patterns or relationships for a large number of variables and to determine whether the information can be summarized in a smaller set of factors or components (Hair & al., 2010).

Before starting the paragraph, review briefly the *key terms* to develop an understanding of the concepts and terminology used[14].

Communality: Total amount of variance an original variable shares with all other variables included in the analysis.

*Correlation coefficient (R)**: Coefficient that indicates the strength of the association between any two metrics variables. The sign (+ or -) indicates the direction of the relationship. The value can range from +1 to -1, with +1 indicating a perfect positive

[14] Source: Hair & al., 2010, p. 92, pp. 156-157*, p. 160**

relationship, 0 indicating no relationship, and -1 indicating a perfect negative or reverse relationship (as one variable grows larger, the other variable grows smaller).

Cronbach's alpha: Measure of reliability (i.e., the consistency of the measure) that ranges from 0 to 1, with values of 0.60 to 0.70 deemed the lower limit of acceptability.

Eigenvalue: Column sum of squared loadings for a factor; also referred to as the "latent root". It represents the amount of variance accounted for by a factor.

Factor: Linear combination (variate) of the original variables. Factors also represent the underlying dimensions (constructs) that summarize or account for the original set of observed variables.

Factor loadings: Correlation between the original variables and the factors, and the key to understanding the nature of a particular factor. Squared factor loadings indicate what percentage of the variance in an original variable is explained by a factor.

Factor rotation: Process of manipulation or adjusting the factor axes to achieve a simpler and pragmatically more meaningful factor solution.

Orthogonal: Mathematical independence (no correlation) of factor axes to each other (i.e., at right angles, or 90 degrees).

Orthogonal factor rotation: Factor rotation in which the factors are extracted so that their axes are maintained at 90 degrees. Each factor is independent of, or orthogonal to, all other factors. The correlation between the factors is determined to be 0.

*Significance Level (Sig.)***: Commonly referred to as the level of statistical significance, the significance level represents the probability the researcher is willing to accept that the estimated coefficient is classified as different from zero when it actually is not. The most widely used level of significance is 0.05, although researchers use level ranging from 0.01 (more demanding) to 0.10 (less conservative and easier to find significance).

Varimax: The most popular orthogonal factor rotation methods focusing on simplifying the columns in a factor matrix. Generally considered superior to other orthogonal factor rotation methods in achieving a simplified factor structure.

In performing factor analyses the author observed in particular the following three rules of thumb suggested by Hair & al. (2010):

(1) "Variables should generally have communalities of greater than 0.50 to be retained in the analysis" (p. 122).
(2) In a sample between 150 and 200 respondents, factor loadings of 0.40 - 0.45 and above are significant.
(3) "Using the eigenvalue for establishing a cutoff is most reliable when the number of variables is between 20 and 50. If the number of variables is less than 20, the tendency is for this method to extract a conservative number of factors (too

few)" (p. 109). An alternative is the *percentage of variance criterion*. "The percentage of variance criterion is an approach based on achieving a specified cumulative percentage of total variance extracted by successive factors. […] "In the social sciences, where information is often less precise, it is not uncommon to consider a solution that accounts for 60 percent of the total variance (and in some instances even less) as satisfactory" (p. 109).

Based on prior studies, the author generated the scales listed below. Table 24 summarizes the main outcomes of factor analysis.

Independent variable: Structural ambidexterity. The measure for "Structural ambidexterity" was adapted from Jansen, Tempelaar, & al. (2009). The resulting two-item scale for "Structural ambidexterity" (Cronbach's alpha = 0.59) indicates that organizations segment the activities involved in the innovation process into spatially dispersed units. The total percentage of variance explained by this solution is 70.83%.
To make a digression on Cronbach's alpha on two-item scales, there seems to be disagreement among scholars regarding the best indicator of scale reliability in a two-item measure. Although some academics believe that Cronbach's alpha should be used, others are certain that a correlation coefficient should be used and that Cronbach's alpha is inappropriate. Both sides to this issue base their arguments on the equation for Cronbach's alpha. For further information on this topic please refer to *Journal of Consumer Psychology*, 10 (1&2), pp. 55-69, 2001, Lawrence Erlbaum Associates, Inc.
Anyway, correlation between the items that define the scale for "Structural ambidexterity" is 0.42 (*Sig.* = 0.01).

Mediating variables: Social support context and Performance management context. The four-item measure for "Social support context" (Cronbach's alpha = 0.79) was adapted from Birkinshaw and Gibson (2004). It captures the extent to which management systems in the organizations encourage people to challenge outmoded practices, and devote considerable effort in developing subordinates, pushing decisions down to the lowest appropriate level.
Also the two-item scale for "Performance management context" (Cronbach's alpha = 0.60; Correlation coefficient = 0.43, *Sig.* = 0.01) was adapted from Birkinshaw and Gibson (2004). It captures the extent to which managers use business goals and performance indicators to run their business.
This solution accounts for 65.03% of the total variance explained.

Dependent variable: Innovation performance. The author defines “Innovation performance” as the ability to simultaneously pursue incremental and radical innovation. It is measured by multiplicative score between “Exploration” and “Exploitation”. The author built two exploration and exploitation scales, testing items coming from two different sources. Items INN_EXP_1,2,3,4 and INN_EXT_1,2,3 derive from a work by Jansen, Van Den Bosch, and Volberda (2006), while items KW_EXR_1,2,3,4 and KW_EXT_1,2,3,4,5 have Zahra, Ireland, and Hitt (2000) as source. Naturally, the multiplicative score between “Exploration (INN)” and “Exploitation (INN)” represents “Innovation performance (INN)”, while “Exploration (KW)” multiplies by “Exploitation (KW)” gives “Innovation performance (KW)” as a result.

The four-item measure for “Exploration (INN)” (Cronbach’s alpha = 0.80) used the items adapted from Jansen, Van Den Bosch, and Volberda (2006). It captures the extent to which organizations, over the last three years, introduced new generation of products, extended product range, opened up new markets, entered in new technology fields.

The three-item measure for “Exploitation (INN)” (Cronbach’s alpha = 0.70) was adapted from Jansen, Van Den Bosch, and Volberda (2006) too. It captures the extent to which organizations, over the last three years, improved existing products, reduced production costs, opened up new markets, enhanced existing markets.

The total percentage of variance explained by this solution is 64.33%.

The four-item measure for “Exploration (KW)” (Cronbach’s alpha = 0.82) used the items adapted from Zahra, Ireland, and Hitt (2000). It captures the extent to which organizations, over the last three years, acquired new manufacturing technologies and managerial and organizational skills, strengthened innovation skills in area where it had no prior experience, learn product development and processes skills entirely new.

Also the three-item measure for “Exploitation (KW)” (Cronbach’s alpha = 0.82) was adapted from Zahra, Ireland, and Hitt (2000). It captures the extent to which organizations, over the last three years, strengthened knowledge and skills for projects that improve efficiency of existing innovation activities.

This solution accounts for 63.36% of the total variance explained.

Table 24: Factor analysis results

(Extraction method: Principal Component Analysis with Varimax Rotation)

ITEM DESCRIPTION SUMMARY	FACTOR LOADING	COMMUNALITY
Independent variable:		
"Structural ambidexterity"		
(Cronbach's α = 0.59; R = 0.42, *Sig.* = 0.01)		
• *CNTX_9: Our organization has separate units to enhance innovation and flexibility.*	0.84	0.71
• *CNTX_10: Innovation and production activities are structurally separated within our organization.*	0.84	0.71
Mediating variable:		
"Social support context" (Cronbach's α = 0.79)		
• *CNTX_1: The management systems in this organization encourage people to challenge outmoded traditions/practices/sacred cows.*	0.82	0.68
• *CNTX_2: Managers in my organization devote considerable effort to developing subordinates.*	0.84	0.73
• *CNTX_3: Managers in my organization push decisions down to the lowest appropriate level.*	0.64	0.52
• *CNTX_5: Managers in my organization issue creative challenges to their people instead of narrowly defining tasks.*	0.72	0.56
Mediating variable:		
"Performance management context"		
(Cronbach's α = 0.60; R = 0.43, *Sig.* = 0.01)		
• *CNTX_6: Managers in my organization use business goals and performance measures to run their business.*	0.81	0.71
• *CNTX_7: Managers in my organization hold people accountable for their performances.*	0.82	0.71
Dependent variable:		
"Innovation performance" (Exploration x Exploitation)		
"Exploration (INN)" (Cronbach's α = 0.80)		
• *INN_EXP_1: Over the last three years, to what extent has your firm introduced new products?*	0.81	0.68

• *INN_EXP_2: Over the last three years, to what extent has your firm extended product range?*	0.70	0.63
• *INN_EXP_3: Over the last three years, to what extent has your firm opened up new markets?*	0.74	0.59
• *INN_EXP_4: Over the last three years, to what extent has your firm entered in new technology fields?*	0.82	0.68
"Exploitation (INN)" (Cronbach's α = 0.70)		
• *INN_EXT_1: Over the last three years, to what extent has your firm improved existing products?*	0.75	0.63
• *INN_EXT_2: Over the last three years, to what extent has your firm reduced production costs?*	0.83	0.69
• *INN_EXT_3: Over the last three years, to what extent has your firm enhanced existing markets?*	0.72	0.61
"Exploration (KW)" (Cronbach's α = 0.82)		
• *KW_EXR_1: Over the last three years, to what extent has your firm acquired manufacturing technologies and skills entirely new to the firm?*	0.8	0.66
• *KW_EXR_2: Over the last three years, to what extent has your firm learn product development and processes skills (such as product design, prototyping new products, timing of new products introduction and customizing products for local markets) entirely new for the industry?*	0.76	0.69
• *KW_EXR_3: Over the last three years, to what extent has your firm acquired entirely new managerial and organizational skills that are important for innovation (such as forecasting technological trends; identifying emerging markets and technologies)?*	0.69	0.62
• *KW_EXR_4: Over the last three years, to what extent has your firm strengthened innovation skills in area where it had no prior experience?*	0.79	0.68
"Exploitation (KW)" (Cronbach's α = 0.78)		
• *KW_EXT_2: Over the last three years, to what extent has your firm invested in enhancing skills in exploiting mature technologies that improve productivity of current innovation operations?*	0.68	0.54

• *KW_EXT_3: Over the last three years, to what extent has your firm enhanced competencies in searching for solutions to customer problems that are near to existing solutions rather than completely new solutions?*	0.76	0.60
• *KW_EXT_4: Over the last three years, to what extent has your firm upgraded skills in product/service development processes in which the firm already possesses significant experience?*	0.78	0.66
• *KW_EXT_5: Over the last three years, to what extent has your firm strengthened your knowledge and skills for projects that improve efficiency of existing innovation activities?*	0.72	0.62

Note. All items were measured on a five-point Likert scale, anchored by *1 = strongly disagree* and *5 = strongly agree*.

3.3.4.Analyses and results

To test the hypotheses the author performed several simple regression analyses. "The objective of regression analysis is to predict a single dependent variable from the knowledge of one or more independent variables. When the problem involves a single independent variable, the statistical technique is called simple regression" (Hair & al. 2010, p. 162).

Before starting the paragraph, review briefly the *key terms* to develop an understanding of the concepts and terminology used[15].

Adjusted coefficient of determination (adjusted R^2): Modified measure of the "coefficient of determination" that takes into account the number of independent variables included in the regression equation and the sample size.

Beta coefficient (β): Standardized regression coefficient that allows for a direct comparison between coefficients as to their relative explanatory power of the dependent variable.

Coefficient of determination (R^2): Measure of the proportion of the variance of the dependent variable about its mean that is explained by the independent, or predictor, variables. The coefficient can vary between 0 and 1. If the regression model is properly applied and estimated, the researcher can assume that the higher the value of R^2, the

[15] Source: Hair & al., 2010, p. 156, p. 161*

greater the explanatory power of the regression equation, and therefore the better the prediction of the dependent variable.

Collinearity: Expression of the relationship between two (collinearity) or more (multicollinearity) independent variables. Two independent variables are said to exhibit complete collinearity if their correlation coefficient is 1, and complete lack of collinearity if their correlation coefficient is 0. Multicollinearity occurs when any single independent variable is highly correlated with a set of other independent variables. An extreme case of collinearity/multicollinearity is singularity, in which an independent variable is perfectly predicted (i.e., correlation of 1.0) by another independent variable (or more than one).

*Variance inflation factor (VIF)**: Measure of collinearity or multicollinearity among the independent variables. Large VIF values indicate a high degree of collinearity or multicollinearity among the independent variables.

Table 25 presents descriptive statistics and correlations for the study variables. Only "Innovation Performance (INN)" and "Innovation Performance (KW)" are highly correlated (R = 0.74, *Sig.* = 0.01). Table 26 presents the results of the regression analyses. Model 1 includes the effect of structural ambidexterity on innovation performance. Model 2 adds social support context and performance management context as mediators of the former relationship.

To examine multicollinearity, the author computed variance inflation factors (VIFs) for each of the regression equations. The maximum *VIF* within the models was 1.38, which is well below the rule of thumb cutoff of 10 (Hair & al., 2010).

Table 25: Means, standard deviations, and correlations

	Mean	*S.D.*	SA	IP_INN	IP_KW	SSC	PMC
Structural Ambidexterity	*3.08*	*0.92*	(0.59)*				
Innovation Perform. (INN)	*10.65*	*4.27*	0.33	-			
Innovation Perform. (KW)	*8.52*	*3.91*	0.35	0.74	-		
Social Support Context	*3.45*	*0.77*	0.36	0.30	0.43	(0.79)	
Performance Mgmt Context	*3.69*	*0.81*	0.26	0.19	0.21	0.46	(0.60)**

Notes. Numbers in parentheses on the diagonal are Cronbach's alphas of the composite scales. All correlations are significant at *Sig.* < 0.01, N = 185. *Two-item scale: R = 0.42 (*Sig.* = 0.01). **Two-item scale: R = 0.43 (*Sig.* = 0.01).

Table 26: Results of regression analyses

	Model 1		Model 2	
	Innovation Performance (INN)	Innovation Performance (KW)	Innovation Performance (INN)	Innovation Performance (KW)
Independent variable:				
Structural Ambidexterity	0.33 *Sig.* < 0.001	0.35 *Sig.* < 0.001	0.25 *Sig.* = 0.001	0.22 *Sig.* = 0.002
Mediator variables:				
Social Support Context			0.20 *Sig.* = 0.014	0.35 *Sig.* < 0.001
Perform. Mgmt Context			0.03 *Sig.* > 0.5	-0.01 *Sig.* > 0.5
Adjusted R^2	0.11	0.11	0.14	0.21

Note. Beta coefficients (*β*) are reported.

To assess the effects of structural ambidexterity, social support context and performance management context on innovation performance, the author followed a four-step procedure suggested by Baron and Kenny (1986), and previously followed by other scholars (e.g., Jansen, Tempelaar, & al., 2009).

(Step 1) Show that the independent variable is correlated with the dependent variable.
Examining the relationship between structural ambidexterity and innovation performance, Model 1 shows that the coefficient for structural ambidexterity is positive and significant (items INN: *β* = 0.33, *Sig.* < 0.001; items KW: *β* = 0.35, *Sig.* < 0.001).

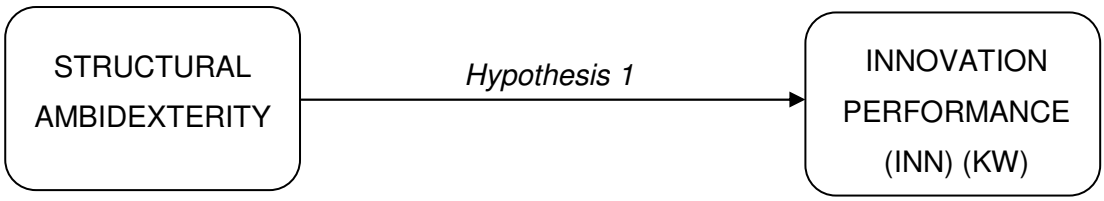

Figure 20: Baron and Kenny's procedure (1986): Step 1

(Step 2) Show that the mediators are correlated with the dependent variable.
Thus, social support context and performance management context need to be significantly related to innovation performance. As shown in Model 2, however, performance

management context is not significantly related to innovation performance (items INN: β = 0.03, *Sig.* > 0.5; items KW: β = -0.01, *Sig.* > 0.5). Social support context is positively related to innovation performance (items INN: β = 0.20, *Sig.* = 0.014; items KW: β = 0.35, *Sig.* < 0.001).

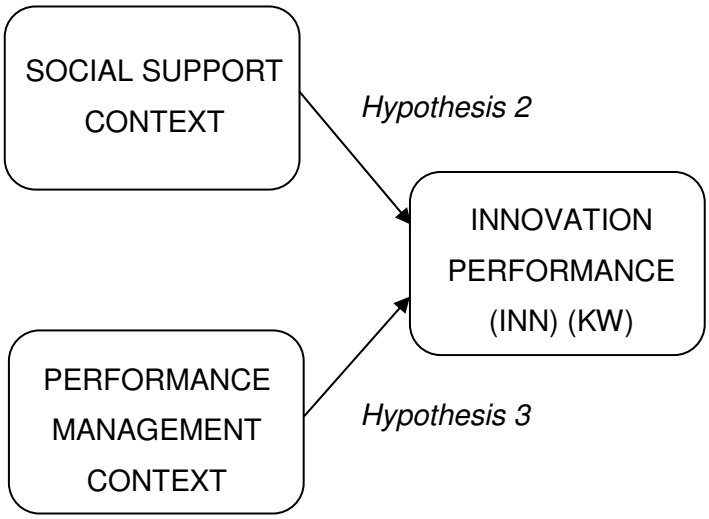

Figure 21: Baron and Kenny's procedure (1986): Step 2

(Step 3) Show that mediators affect the dependent variable.

This means that the significant relationship between structural ambidexterity and innovation performance needs to become insignificant when the mediating variables are introduced in the regression model. As shown in Model 2, however, even if the relationship between structural ambidexterity and innovation performance decreases, it remains significant when the two mediating variables are added (items INN: β = 0.25, *Sig.* = 0.001; items KW: β = 0.22, *Sig.* = 0.002).

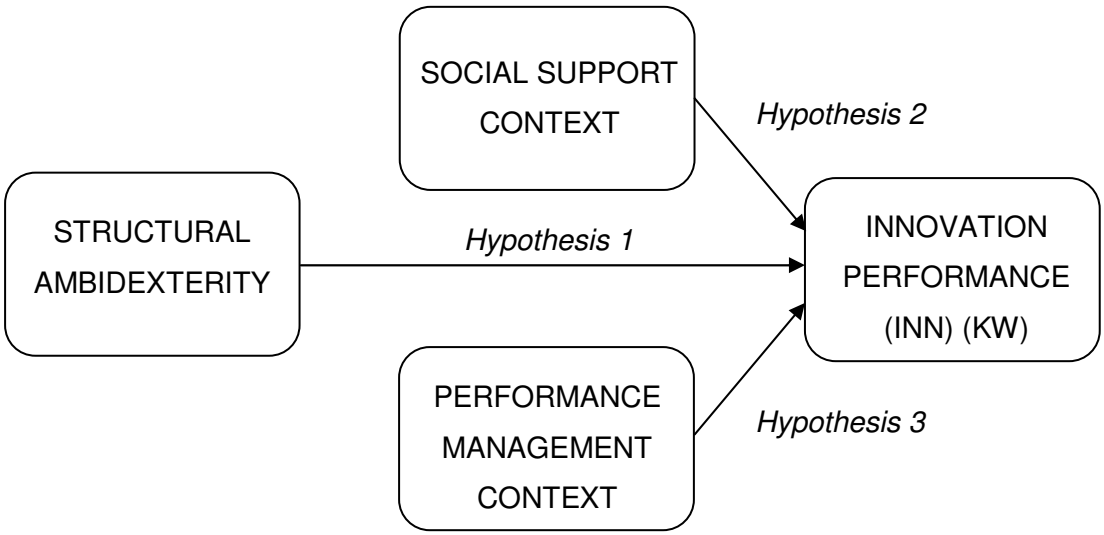

Figure 22: Baron and Kenny's procedure (1986): Step 3

(Step 4) Show that the independent variable is correlated with the mediators.

Structural ambidexterity needs to be significantly related to the mediating variables. The regression analyses results indicate that structural ambidexterity is significantly related both to social support context (β = 0.36, *Sig.* < 0.001) and to performance management context (β = 0.46, *Sig.* < 0.001).

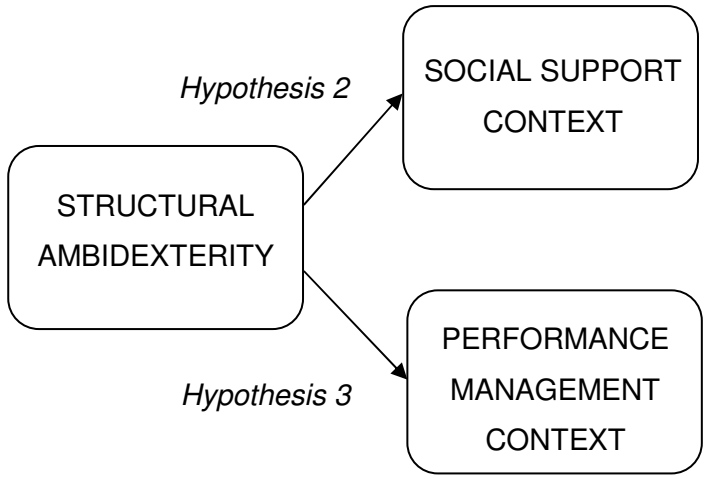

Figure 23: Baron and Kenny's procedure (1986): Step 4

The four-step procedure provides various interesting outcomes. It provides support for Hypothesis 1 about the positive relation between structural ambidexterity and innovation performance. Also Hypothesis 2 about the mediating role of social support context is partially supported. Indeed, social support context *partially* mediates the relationship between structural ambidexterity and innovation performance, since all the steps but the Step 3 are met[16]. Hypothesis 3, which proposed a mediating effect of performance management context on the relationship between structural ambidexterity and innovation performance, is not verified.

So, these findings support previous assertions concerning the importance of social support in ambidextrous organizations and the positive relation between ambidextrous organization and innovation performance. Besides, the scale for "Innovation performance" built using items KW (adapted from Zahra, Ireland, and Hitt, 2000), seems to be more robust than the one adapted from Jansen, Van Den Bosch, and Volberda (2006), built using items INN.

Recent studies found that ambidexterity leads to higher performance for high-tech organizations (Auh & Menac, 2005). For this kind of companies, ambidexterity

[16] "If all four of these steps are met, then the data are consistent with the hypothesis that variable M *completely* mediates the X-Y relationship, and if the steps are met but the Step 3 is not, then *partial* mediation is indicated". (Source: http://davidakenny.net/cm/mediate.htm - retrieved September 3, 2012)

becomes more relevant since they cannot temporally separate exploration and exploitation to remain competitive (Chandrasekaran, Linderman, & Schroeder, 2012). This study cannot say that, but it confirms that organizations in which certain units are responsible for exploration, and others for exploitation, integrated strategically by high-level governance (i.e., structural ambidexterity) generally show better innovation performance.

Moreover, social support context partially mediates the relationship between structural ambidexterity and innovation performance. Social support context captures the extent to which management systems in the organizations encourage people to challenge outmoded practices, and devote considerable effort in developing subordinates, pushing decisions down to the lowest appropriate level. Mediating relationships occur when a third variable plays an important role in governing the relationship between the dependent and the independent variables. Partial mediation means that the mediating variable accounts for some, but not all, of the relationship between the independent variable and dependent variable.

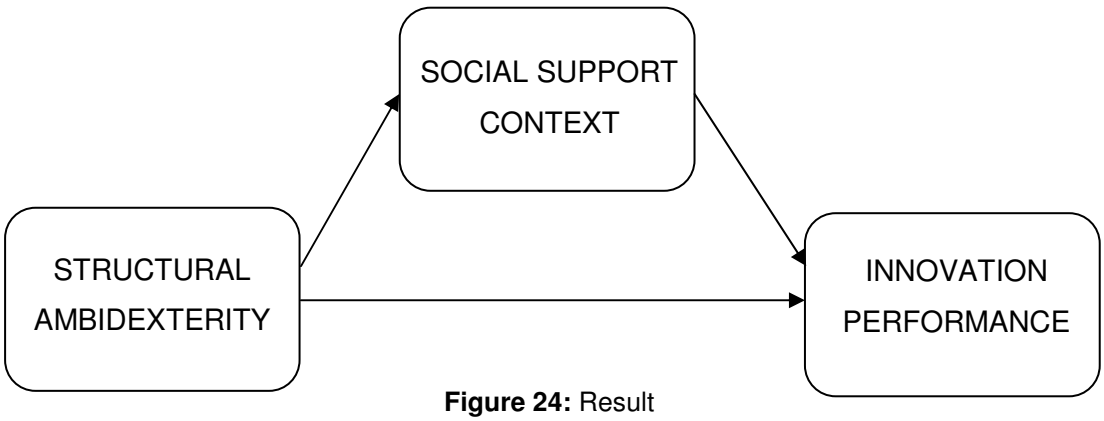

Figure 24: Result

3.3.5.Limitations and future research suggestions

As literature review already highlighted (see paragraph 2.2.14.), one limitation derives from the cross-sectional data sampling design adopted, which indicates that dynamic causality cannot be established (Liu, Luo, & Huang, 2011). That is, the cross-sectional design does not allow to fully establish the causality between the independent variables and the dependent variable (Leidner, Lo, & Preston, 2011). A carefully designed longitudinal study could help to solve this limitation.

Second, the findings of this quantitative study are limited to medium- and high-tech Italian and Austrian companies, from 50 employees on. This could limit generalization of the results to contexts different from the one studied. Future research could also

take into account the dimension of the companies in terms of number of employees, studying the ambidextrous construct in smaller as well as larger situations.

The author measured “Innovation performance” by multiplicative score between “Exploration” and “Exploitation”. Future research could extend this issue adopting a deviation score, that is absolute difference between exploration and exploitation (see paragraph 2.2.8. for furter information on the difference between the two).

Some items (i.e., CNTX_1,2,3,4,6,7,8) are too negatively skewed. This shortcoming means that respondents mostly provided high Likert values answers for these items. This could derive from the subjectivity of a value judgment. Let us take an example: Item CNTX_3 says “Managers in my organization push decisions down to the lowest appropriate level”. What does “to the lowest appropriate level” mean exactly? One manager could have a certain level in mind, which is different from another. And since high Likert values mean a better outcome (at least in this specific set of items), managers tend to give high Likert values answers. And here comes the suggestion for future research: to try to build a more quantitative survey, or at least to reduce the “degree of freedom” of a value judgment.

CONCLUSION

The thesis is divided into two main parts: An updated qualitative review of the whole literature on the theme of Organizational Ambidexterity (OA) and a quantitative research based on a survey on innovation performed in 185 medium- and high-tech Italian and Austrian companies. Thus, there is need for two conclusions which briefly summarize the main outcomes.

Ambidexterity literature review (1996 - March 2012):

Over the last 16 years, 79 meaningful papers published in Impact Factor provided journals were found. The 79 papers reviewed in the first part of this thesis (58 empirical, 21 conceptual) have been published in 43 different scientific journals. It seems that the interest for the subject has been increased since 2008 and from that year on, the theme has spread like wildfire among the journals, involving Marketing, Research and Development, Operations Management, and Information Technology. In 2011, for the first time, Asiatic journals like “Asia Pacific Journal of Management” and “Asian Business & Management” appeared.

Geographic distribution of the empirical works shows that 24 research studies have been held in America, 10 in Europe, 10 in Asia, and 2 in Oceania. In 5 papers the sample of companies studied is not limited to a specific geographical area, while in 7 research papers it is unclear. What is notable is that there seems to be a growing interest on the subject from emerging economies (BRIC countries and Asiatic ones).

The great majority of the papers reviewed (about 60%) deals with OA at firm/organization level. “Simultaneity/Both” exploration and exploitation are the most represented attributes (around 50%) present in the definition of OA given in the papers. Thus, simultaneity of the tensions is a fundamental attribute in pursuing ambidexterity, unlike punctuated equilibrium.

Studies have predominantly suggested that organizations pursuing exploration and exploitation simultaneously obtain superior innovation performance, and this represents the bridge between the qualitative and the quantitative parts of this master’s thesis.

There are basically two main limitations on the findings of the majority of the papers reviewed. One derives from the cross-sectional data sampling design, which indicates that dynamic causality cannot be established. The second main shortcoming is the difficulty to generalize the results, because of the sample, which is too specific. The findings of the studies are often limited to companies located in a single country,

sometimes they are limited to specific sectors or they take into consideration a particular firm dimension. This, as said, could limit the generalizability of the results. Future research could study in detail the ambidextrous construct on companies based in emerging countries, as recent studies actually started to do. Moreover, many papers reviewed take into account SMEs. With success SMEs grow up in size. Following the hint recently proposed by McDermott and Prajogo (2012, p. 233), "as they grow, the effect of exploration on performance increases, while exploitation innovation's link to performance decreases. This finding is interesting and deserves examination in future research to confirm these findings, and to explore the underlying reasons for this phenomenon, perhaps using longitudinal data that tracks growth patterns over time".

Survey on innovation in Italian and Austrian companies:

The author undertook a series of regression analyses using *IBM SPSS Statistics*, which showed that (1) a structural ambidexterity solution in the innovation process is positively associated with innovation performance, (2) social support context is positively related to innovation performance, (3) performance management context is not significantly related to innovation performance, (4) structural ambidexterity is significantly related to social support context, (5) structural ambidexterity is significantly related to performance management context, (6) the relationship between structural ambidexterity and innovation performance remains significant when the two mediating variables (i.e., social support context and performance management context) are added.

Thus, Hypothesis 1 (i.e., a structural ambidexterity solution in the innovation process is positively associated with innovation performance) was supported, Hypothesis 2 (i.e., social support context mediates the relationship between structural ambidexterity solution in the innovation process and innovation performance) was partially supported, and Hypothesis 3 (i.e., performance management context mediates the relationship between structural ambidexterity solution in the innovation process and innovation performance) was not supported.

Similarly to the first part of this thesis, the quantitative research performed presents mainly the same two limitations. One derives from the cross-sectional data sampling design adopted, which does not allow to fully establish the causality between the independent variables and the dependent variable. A carefully designed longitudinal study could help to solve this limitation. Second, the findings are limited to medium- and high-tech Italian and Austrian companies, from 50 employees on. This could limit generalization of the results to contexts different from the one studied. Future research

could also take into account the dimension of the companies in terms of number of employees, studying the ambidextrous construct in smaller as well as larger situations.

BIBLIOGRAPHY

Abernathy, W. J., & Wayne, K. (1974). "Limits of the learning curve". *Harvard Business Review*, pp. 52, 109-119.

Adler, P. S., Goldoftas, B., & al. (1999). "Flexibility versus efficiency? A case study of model changeovers in the Toyota production system". *Organization Science*, 10(1), pp. 43-68.

Adler, P., Benner, M., Brunner, D., MacDuffie, J., Osono, E., Staats, B., et al. (2009). "Perspectives on the productivity dilemma". *Journal of Operations Management*, 27 (2), pp. 99–113.

Andriopoulos, C., & Lewis, M. W. (2009). "Exploitation-Exploration Tensions and Organizational Ambidexterity: Managing Paradoxes of Innovation". *Organization Science*, 20(4), pp. 696-717.

Andriopoulos, C., & Lewis, M. W. (2010). "Managing Innovation Paradoxes: Ambidexterity Lessons from Leading Product Design Companies". *Long Range Planning*, 43(1), pp. 104-122.

Auh, S., & Menac, B. (2005). "Balancing exploration and exploitation: the moderating role of competitive intensity". *Journal of Business Research*, 58, pp. 1652–1661.

Baker, W., & Sinkula, J. (1999). "Learning Orientation, Market Orientation, and Innovation: Integrating and Extending Models of Organizational Performance". *Journal of Market Focused Management*, 4(4), pp. 295–308.

Baron, R. M., & Kenny, D. A. (1986). "The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations". *J. Personality Soc. Psych.*, 51, pp. 1173-1182.

Benner, M. J., & Tushman, M. L. (2003). "Exploitation, exploration, and process management: The productivity dilemma revisited". *Academy of Management Review*, 28(2), pp. 238-256.

Bessant, J., & von Stamm, B. (2009). *"Is discontinuous innovation on your radar? Twelve search strategies that could save your organisation".* Executive briefing: AIM Research.

Bierly, P., & Daly, P. (2007). "Alternative Knowledge Strategies, Competitive Environment, and Organizational Performance in Small Manufacturing Firms". *Entrepreneurship Theory & Practice*, 31(4), pp. 493-516.

Birkinshaw, J., & Gibson, C. B. (2004). "Building Ambidexterity Into an Organization". *MIT SLOAN Management Review*, Summer, pp. 47-55.

Bodwell, W., & Chermack, T. J. (2010). "Organizational ambidexterity: Integrating deliberate and emergent strategy with scenario planning". *Technological Forecasting and Social Change*, 77(2), pp. 193-202.

Cantarello, S. (2011). *"Analysis of ambidexterity in the search phase of innovation process: a practice-based approach".* Università degli Studi di Padova: PhD thesis.

Cao, Q., Gedajlovic, E., & al. (2009). "Unpacking Organizational Ambidexterity: Dimensions, Contingencies, and Synergistic Effects". *Organization Science*, 20(4), pp. 781-796.

Cao, Q., Simsek, Z., & Zhang, H. (2010). "Modelling the Joint Impact of the CEO and the TMT on Organizational Ambidexterity". *Journal of Management Studies* , November, pp. 1272-1296.

Carmeli, A., & Halevi, M. Y. (2009). "How top management team behavioral integration and behavioral complexity enable organizational ambidexterity: The moderating role of contextual ambidexterity". *Leadership Quarterly*, 20(2), pp. 207-218.

Cegarra-Navarro, G. J., Sanchez-Vidal, E. M., & Cegarra-Leiva, D. (2011). "Balancing exploration and exploitation of knowledge through an unlearning context An empirical investigation in SMEs". *Management Decision*, Volume: 49, Issue: 7-8, pp. 1099-1119.

Cegarra-Navarro, J. G., & Dewhurst, F. (2007). "Linking organizational learning and customer capital through an ambidexterity context: an empirical investigation in SMEs". *International Journal of Human Resource Management*, 18(10), pp. 1720-1735.

Chae, B. (2012). "A framework for new solution development: an adaptive search perspective". *Service Industries Journal*, Vol. 32, Issue 1, pp. 127-149.

Chandrasekaran, A., Linderman, K., & Schroeder, R. (2012). "Antecedents to ambidexterity competency in high technology organizations". *Journal of Operations Management*, Vol. 30, Issue 1/2, pp. 134-151.

Chang, Y. C., Yang, P. Y., & al. (2009). "The determinants of academic research commercial performance: Towards an organizational ambidexterity perspective". *Research Policy*, 38(6), pp. 936-946.

Chang, Y.-Y., Hughes, M., & Hotho, S. (2011). "Internal and external antecedents of SMEs' innovation ambidexterity outcomes". *Management Decision*, Vol. 49, Issue 10, pp. 1658-1676.

Christensen, C. M. (1997). *"The innovator's dilemma: When new technologies cause great firms to fail".* Boston, MA: Harvard Business School Press.

de Visser, M., de Weerd-Nederhof, P., & al. (2009). "Structural ambidexterity in NPD processes: A firm-level assessment of the impact of differentiated structures on innovation performance". *Technovation*, 30(5-6), pp. 291-299.

Duncan, R. B. (1976). "The ambidextrous organization: Designing dual structures for innovation". (R. H. Kilmann, L. R. Pondy, & D. Slevin, Eds.) *The management of organization design: Strategies and implementation*, pp. 167-188.

Eisenhardt, K. M., Furr, N. R., & al. (2010). "Microfoundations of Performance: Balancing Efficiency and Flexibility in Dynamic Environments". *Organization Science*, 21(6), pp. 1263-1273.

Filippini, R., Güttel, W. H., & Nosella, A. (2012). "Ambidexterity and the evolution of knowledge management initiatives". *Journal of Business Research*, Vol. 65, Issue 3, pp. 317-324.

Forza, C. (2002). "Survey research in operations management: a process-based perspective". *International Journal of Operations & Production Management*, Vol. 22, No. 2, pp. 152-194.

Foster, R., & Kaplan, S. (2001). *"Creative destruction: Why companies are built to last and underperform the market - and how to successfully transform them".* New York: Currency.

Gauthier, E. (1998). *"Bibliometric Analysis of Scientific and Technological Research: A User's Guide to the Methodology".* Canada: Observatoire des Sciences et des Technologies, Science and Technology Redesign Project, ST-98-08.

Gedajlovic, E., Cao, Q., & Zhang, H. (2012). "Corporate shareholdings and organizational ambidexterity in high-tech SMEs: Evidence from a transitional economy". *Journal of Business Venturing*, In Press.

Ghoshal, S., & Bartlett, C. A. (1994). "Linking organizational context and managerial action: The dimensions of quality of management". *Strategic Management Journal*, 15, pp. 91–112.

Ghoshal, S., & Bartlett, C. A. (1997). *"The individualized corporation".* New York: Harper Collins.

Giacomon, S. (2012). "Recent ambidexterity literature review". *Austrian Management Review*, Vol. 2, pp. 104-106.

Gibson, C. B., & Birkinshaw, J. (2004). "The Antecedents, Consequences, and Mediating Role of Organizational Ambidexterity". *Academy of Management Journal*, Vol. 47, No. 2, pp. 209-226.

Gottardi, G. (2006). *"Gestione dell'innovazione e dei progetti".* CEDAM, Padova.

Gulati, R., & Puranam, P. (2009). "Renewal Through Reorganization: The Value of Inconsistencies Between Formal and Informal Organization". *Organization Science*, 20(2), pp. 422-440.

Gupta, A. K., Smith, K. G., & al. (2006). "The interplay between exploration and exploitation". *Academy of Management Journal*, 49(4), pp. 693-706.

Hair, J. F., & al. (2010, Seventh Edition). *"Multivariate Date Analysis - A Global Perspective".* New Jersey: Pearson Education.

Han, M., & Celly, N. (2008). "Strategic Ambidexterity and Performance in International New Ventures". *Canadian Journal of Administrative Sciences-Revue Canadienne Des Sciences De L'Administration*, 25(4), pp. 335-349.

He, Z. L., & Wong, P. K. (2004). "Exploration vs. exploitation: An empirical test of the ambidexterity hypothesis". *Organization Science*, 15(4), pp. 481-494.

Henderson, R. M., & Clark, K. (1990). "Architectural innovation: The reconfiguration of existing product technologies and the failure of established firms". *Administrative Science Quarterly*, 35, pp. 9–30.

Ho, Y.-C., Fang, H.-C., & Lin, J.-F. (2011). "Technological and design capabilities: is ambidexterity possible?". *Management Decision*, Volume: 49, Issue: 2, pp. 208-225.

Hughes, M., Martin, S. L., & al. (2010). "Realizing Product-Market Advantage in High-Technology International New Ventures: The Mediating Role of Ambidextrous Innovation". *Journal of International Marketing*, 18(4), pp. 1-21.

Im, G. Y., & Rai, A. (2008). "Knowledge sharing ambidexterity in long-term interorganizational relationships". *Management Science*, 54(7), pp. 1281-1296.

Jansen, J. J., George, G., & al. (2008). "Senior team attributes and organizational ambidexterity: The moderating role of transformational leadership". *Journal of Management Studies*, 45(5), pp. 982-1007.

Jansen, J. J., Tempelaar, M. P., & al. (2009). "Structural Differentiation and Ambidexterity: The Mediating Role of Integration Mechanisms". *Organization Science*, 20(4), pp. 797-811.

Jansen, J. J., Van Den Bosch, F. A., & Volberda, H. W. (2006). "Exploratory Innovation, Exploitative Innovation, and Performance: Effects of Organizational Antecedents and Environmental Moderators". *Management Science*, Vol. 52, No. 11, pp. 1661-1674.

Jasmand, C., Blazevic, V., & de Ruyter, K. (2012). "Generating Sales While Providing Service: A Study of Customer Service Representatives' Ambidextrous Behavior". *Journal of Marketing*, Vol. 76, Issue 1, pp. 20-37.

Judge, W. Q., & Blocker, C. P. (2008). "Organizational capacity for change and strategic ambidexterity". *European Journal of Marketing*, 42(9-10), pp. 915-926.

Kang, S. C., & Snell, S. A. (2009). "Intellectual Capital Architectures and Ambidextrous Learning: A Framework for Human Resource Management". *Journal of Management Studies*, 46(1), pp. 65-92.

Kauppila, O. P. (2010). "Creating ambidexterity by integrating and balancing structurally separate interorganizational partnerships". *Strategic Organization*, 8(4), pp. 283-312.

Kollmann, T., & Stoeckmann, C. (2010). "Antecedents of strategic ambidexterity: effects of entrepreneurial orientation on exploratory and exploitative innovations in adolescent organisations". *International Journal of Technology Management*, 52(1-2), pp. 153-174.

Kristal, M. M., Huang, X., & Roth, A. V. (2010). "The effect of an ambidextrous supply chain strategy on combinative competitive capabilities and business performance". *Journal of Operations Management*, 69(7), pp. 415-429.

Lane, P. J., Koka, B. R., & Pathak, S. (2006). "The reification of absorptive capacity: A critical review and rejuvenation of the construct". *Academy of Management Review*, 31(4), pp. 833-863.

Lavie, D., & Rosenkopf, L. (2006). "Balancing Exploration and Exploitation in Alliance Formation". *Academy of Management Journal*, Vol. 49, No. 4, pp. 797-818.

Lavie, D., Kang, J., & Rosenkopf, L. (2011). "Balance Within and Across Domains: The Performance Implications of Exploration and Exploitation in Alliances". *Organization Science*, Vol. 22, Issue 6, pp. 1517-1538.

Lee, J. Y., & MacMillan, I. C. (2008). "Managerial knowledge-sharing in chaebols and its impact on the performance of their foreign subsidiaries". *International Business Review*, 17(5), pp. 533-545.

Leidner, D. E., Lo, J., & Preston, D. (2011). "An empirical investigation of the relationship of IS strategy with firm performance". *Journal of Strategic Information Systems*, Volume: 20, Issue: 4, pp. 419-437.

Levinthal, D. A., & March, J. G. (1993). "The myopia of learning". *Strategic Management Journal*, Vol. 14, Winter, pp. 95-112.

Li, C. R., Lin, C. J., & al. (2008). "The nature of market orientation and the ambidexterity of innovations". *Management Decision*, 46(7), pp. 1002-1026.

Lichtenthaler, U., & Lichtenthaler, E. (2009). "A Capability-Based Framework for Open Innovation: Complementing Absorptive Capacity". *Journal of Management Studies*, 46(8), pp. 1315-1338.

Lin, H.-E., & McDonough III, E. F. (2011). "Investigating the Role of Leadership and Organizational Culture in Fostering Innovation Ambidexterity". *IEEE Transactions on Engineering Management*, Vol. 58, Issue 3, pp. 497-509.

Lin, Z., Yang, H. B., & al. (2007). "The performance consequences of ambidexterity in strategic alliance formations: Empirical investigation and computational theorizing". *Management Science*, 53(10), pp. 1645-1658.

Liu, H., Luo, J.-h., & Huang, J. X.-f. (2011). "Organizational learning, NPD and environmental uncertainty: An ambidexterity perspective". *Asian Business & Management*, Volume: 10, Issue: 4, pp. 529-553.

Lubatkin, M. H., Simsek, Z., & al. (2006). "Ambidexterity and performance in small- to medium-sized firms: The pivotal role of top management team behavioral integration". *Journal of Management*, 32(5), pp. 646-672.

Luo, Y. D., & Rui, H. C. (2009). "An Ambidexterity Perspective Toward Multinational Enterprises From Emerging Economies". *Academy of Management Perspectives*, 23(4), pp. 49-70.

Marabelli, M., Frigerio, C., & Rajola, F. (2012). "Ambidexterity in Service Organizations: Reference Models from the Banking Industry". *Industry & Innovation*, Vol. 19, Issue 2, pp. 109-126.

March, J. G. (1991). "Exploration and exploitation in organizational learning". *Organization Science*, Vol. 2, No. 1, pp. 71-87.

McCain, K. W. (1990). "Mapping authors in intellectual space: A technical overview". *Journal of the American Society for Information Science*, 41(6), pp. 433-443.

McCarty, I. P., & Gordon, B. R. (2011). "Achieving contextual ambidexterity in R&D organizations: a management control system approach". *R&D Management*, Vol. 41, Issue 3, pp. 240-258.

McDermott, C. M., & Prajogo, D. I. (2012). "Service innovation and performance in SMEs". *International Journal of Operations & Production Management*, Vol. 32, Issue 2, pp. 216-237.

Menguc, B., & Auh, S. (2008). "The asymmetric moderating role of market orientation on the ambidexterity-firm performance relationship for prospectors and defenders". *Industrial Marketing Management*, 37(4), pp. 455-470.

Mom, T. J., van den Bosch, F. A., & al. (2009). "Understanding Variation in Managers' Ambidexterity: Investigating Direct and Interaction Effects of Formal Structural and Personal Coordination Mechanisms". *Organization Science*, 20(4), pp. 812-828.

Moreno Luzon, M. D., & Valls Pasola, J. (2011). "Ambidexterity and total quality management: towards a research agenda". *Management Decision*, Vol. 49, Issue 6, pp. 927-947.

Morgan, R. E., & Berthon, P. (2008). "Market Orientation, Generative Learning, Innovation Strategy and Business Performance Inter-Relationships in Bioscience Firms". *Journal of Management Studies*, 45(8), pp. 1329-1353.

Napier, N., Mathiassen, L., & Robey, D. (2011). "Building contextual ambidexterity in a software company to improve firm-level coordination". *European Journal of Information Systems*, Vol. 20, Issue 6, pp. 674-690.

Nelson, R., & Winter, S. (1982). *"An evolutionary theory of economic change".* Cambridge, MA: Harvard University Press.

Nemanich, L. A., & Vera, D. (2009). "Transformational leadership and ambidexterity in the context of an acquisition". *Leadership Quarterly*, 20(1), pp. 19-33.

Nosella, A., Cantarello, S., & Filippini, R. (2012). "The Intellectual Structure Of Organizational Ambidexterity: A Bibliographic Investigation Into The State Of The Art". *Strategic Organization*, forthcoming.

O'Reilly III, C. A., & Tushman, M. L. (2004). "The ambidextrous organization". *Harvard Business Review*, April, pp. 74–83.

O'Reilly III, C. A., & Tushman, M. L. (2008). "Ambidexterity as a dynamic capability: Resolving the innovator's dilemma". *Research in Organizational Behavior*, 28, pp. 185-206.

O'Reilly III, C. A., & Tushman, M. L. (2011). "Organizational Ambidexterity in Action: How Managers Explore and Exploit". *California Management Review*, Vol. 53, Issue 4, pp. 5-22.

O'Reilly III, C. A., Harreld, J. B., & al. (2009). "Organizational Ambidexterity: IBM and Emerging Business Opportunities". *California Management Review*, 51(4), pp. 75-99.

Patel, P. C., Terjesen, S., & Li, D. (2012). "Enhancing effects of manufacturing flexibility through operational absorptive capacity and operational ambidexterity". *Journal of Operations Management*, Volume 30, Issue 3, pp. 201-220.

Podsakoff, P. M., MacKenzie, S. B., Bachrach, D. G., & Podsakoff, N. P. (2005). "The influence of management journals in the 1980s and 1990s". *Strategic Management Journal*, 26(5), pp. 473-488.

Popadiuk, S. (2012). "Scale for classifying organizations as explorers, exploiters or ambidextrous". *International Journal of Information Management*, Vol. 32, Issue 1, pp. 75-87.

Probst, G., Raisch, S., & Tushman, M. L. (2011). "Ambidextrous leadership: Emerging challenges for business and HR leaders". *Organizational Dynamics*, Volume: 40, Issue: 4, Special Issue: SI, pp. 326-334.

Raisch, S. (2008). "Balanced Structures: Designing Organizations for Profitable Growth". *Long Range Planning*, 41(5), pp. 483-508.

Raisch, S., & Birkinshaw, J. (2008). "Organizational Ambidexterity: Antecedents, Outcomes, and Moderators". *Journal of Management*, Vol. 34, No. 3, pp. 375-409.

Raisch, S., Birkinshaw, J., & al. (2009). "Organizational Ambidexterity: Balancing Exploitation and Exploration for Sustained Performance". *Organization Science*, 20(4), pp. 685-695.

Ramos-Rodríguez, A. R., & Ruíz-Navarro, J. (2004). "Changes in the intellectual structure of strategic management research: A bibliometric study of the Strategic Management Journal, 1980-2000". *Strategic Management Journal*, 25(10), pp. 981-1004.

Riccaboni, M., & Moliterni, R. (2009). "Managing technological transitions through R&D alliances". *R&D Management*, 39(2), pp. 124-135.

Rosing, K., Frese, M., & Bausch, A. (2011). "Explaining the heterogeneity of the leadership-innovation relationship: Ambidextrous leadership". *The Leadership Quarterly*, Vol. 22, Issue 5, pp. 956-974.

Rothaermel, F. T., & Alexandre, M. T. (2009). "Ambidexterity in Technology Sourcing: The Moderating Role of Absorptive Capacity". *Organization Science*, 20(4), pp. 759-780.

Schreyogg, G., & Sydow, J. (2010). "Organizing for Fluidity? Dilemmas of New Organizational Forms". *Organization Science*, 21(6), pp. 1251-1262.

Simsek, Z. (2009). "Organizational Ambidexterity: Towards a Multilevel Understanding". *Journal of Management Studies*, 46(4), pp. 597-624.

Simsek, Z., Heavey, C., & al. (2009). "A Typology for Aligning Organizational Ambidexterity's Conceptualizations, Antecedents, and Outcomes". *Journal of Management Studies*, 46(5), pp. 864-894.

Slevin, D. P., & Covin, J. G. (1997). "Strategy formation patterns, performance, and the significance of context". *Journal of Management*, 23(2), pp. 189-209.

Smith, W. K., & Tushman, M. L. (2005). "Managing strategic contradictions: A top management model for managing innovation streams". *Organization Science*, 16(5), pp. 522-536.

Smith, W. K., Binns, A., & al. (2010). "Complex Business Models: Managing Strategic Paradoxes Simultaneously". *Long Range Planning*, 43(2-3), pp. 448-461.

Su, Z., Li, J., Yang, Z., & al. (2011). "Exploratory learning and exploitative learning in different organizational structures". *Asia Pacific Journal of Management*, Volume: 28, Issue: 4, pp. 697-714.

Taylor, A., & Helfat, C. E. (2009). "Organizational Linkages for Surviving Technological Change: Complementary Assets, Middle Management, and Ambidexterity". *Organization Science*, 20(4), pp. 718-739.

Tiwana, A. (2008). "Do bridging ties complement strong ties? An empirical examination of alliance ambidexterity". *Strategic Management Journal*, 29(3), pp. 251-272.

Tushman, M. L., & Anderson, P. (1986). "Technological discontinuities and organizational environments". *Administrative Science Quarterly*, 31, pp. 439–465.

Tushman, M. L., & O'Reilly III, C. A. (1997). *"Winning through innovation: A practical guide to leading organizational change and renewal".* Boston, MA: Harvard University Press.

Tushman, M. L., & O'Reilly III, C. A. (1996). "Ambidextrous Organizations: Managing Evolutionary and Revolutionary Change". *California Management Review*, Vol. 38, No. 4, Summer 1996, pp. 8-30.

Tushman, M. L., & Smith, W. (2002). "Organizational technology". (J. Baum, Ed.) *Companion to organizations*, New York: Blackwell.

Tushman, M. L., Smith, W. K., & Binns, A. (2011). "The Ambidextrous CEO". *Harvard Business Review*, Vol. 89, Issue 6, pp. 74-80.

Tushman, M., Smith, W. K., & al. (2010). "Organizational designs and innovation streams". *Industrial and Corporate Change*, 19(5), pp. 1331-1366.

Uotila, J., Maula, M., & al. (2009). "Exploration, Exploitation, and Financial Performance: Analysis of S&P 500 Corporations". *Strategic Management Journal*, 30(2), pp. 221-231.

Victor, B., Boynton, A., & Stephens-Jahng, T. (2000). "The effective design of work under total quality management". *Organization Science*, 11 (1), pp. 102–117.

Vorhies, D., Orr, L., & Bush, V. (2011). "Improving customer-focused marketing capabilities and firm financial performance via marketing exploration and exploitation". *Journal of the Academy of Marketing Science*, Vol. 39, Issue 5, pp. 736-756.

Wehmeier, S., McIntosh, C., Turnbull, J., & Ashby, M. (2005). *"Oxford Advanced Learner's Dictionary of Current English - 7th Edition".* Oxford: Oxford University Press.

Zahra, S. A., Ireland, R. D., & Hitt, M. A. (2000). "International Expansion by New Venture Firms: Internal Diversity, Mode of Entry, Technological Learning, and Performance". *Academy of Management Journal*, 43 (5), pp. 925-950.

APPENDICES

Appendix 1: Journal Impact Factor[17]

Journal Impact Factor is from Journal Citation Report (JCR), a product of Thomson ISI (Institute for Scientific Information). JCR provides quantitative tools for evaluating journals. The impact factor is one of these; it is a measure of the frequency with which the "average article" in a journal has been cited in a given period of time.
The impact factor for a journal is calculated based on a three-year period, and can be considered to be the average number of times published papers are cited up to two years after publication. For example, the impact factor 2012 for a journal would be calculated as follows:

A = the number of times articles published in 2010-2011 were cited in indexed journals during 2012

B = the number of articles, reviews, proceedings or notes published in 2010-2011

Impact Factor 2012 = A/B

Note that the impact factor 2011 will be actually published in 2012, because it could not be calculated until all of the 2011 publications had been received. Impact factor 2012 will be published in 2013.

[17] Source: Science Gateway website (http://www.sciencegateway.org/impact) - retrieved March 27, 2012

Appendix 2: List of the 24 papers found (June 2011 - March 2012)

TITLE	AUTHOR(S)	JOURNAL	CL.
Ambidexterity and total quality management: towards a research agenda	Luzon Maria D. Moreno, Pasola Jaume Valls	Management Decision	1
Explaining the heterogeneity of the leadership-innovation relationship: Ambidextrous leadership	Rosing Kathrin, Frese Michael, Bausch Andreas	The Leadership Quarterly	1
Antecedents to ambidexterity competency in high technology organizations	Chandrasekaran Aravind, Linderman Kevin, Schroeder Roger	Journal of Operations Management	1
Generating Sales While Providing Service: A Study of Customer Service Representatives' Ambidextrous Behavior	Jasmand Claudia, Blazevic Vera, de Ruyter Ko	Journal of Marketing	1
Technological and design capabilities: is ambidexterity possible?	Ho Yung-Ching, Fang Hui-Chen, Lin Jing-Fu	Management Decision	2
Ambidextrous leadership: Emerging challenges for business and HR leaders	Probst Gilbert, Raisch Sebastian, Tushman Michael L.	Organizational Dynamics	2
Service innovation and performance in SMEs	McDermott Christopher M., Prajogo Daniel I.	International Journal of Operations & Production Mgmt	2
Achieving contextual ambidexterity in R&D organizations: a management control system approach	McCarthy Ian P., Gordon Brian	R&D Management	2

TITLE	AUTHOR(S)	JOURNAL	CL.
Investigating the Role of Leadership and Organizational Culture in Fostering Innovation Ambidexterity	Lin Hsing-Er, McDonough III Edward F.	IEEE Transactions on Engineering Management	2
Building contextual ambidexterity in a software company to improve firm-level coordination	Napier Nannette, Mathiassen Lars, Robey Daniel	European Journal of Information Systems	2
Internal and external antecedents of SMEs' innovation ambidexterity outcomes	Chang Yi-Ying, Hughes Mathew, Hotho Sabine	Management Decision	2
Ambidexterity in Service Organizations: Reference Models from the Banking Industry	Marabelli Marco, Frigerio Chiara, Rajola Federico	Industry & Innovation	2
Ambidexterity and the evolution of knowledge management initiatives	Filippini Roberto, Guettel Wolfgang H., Nosella Anna	Journal of Business Research	2
The Ambidextrous CEO	Tushman Michael L., Smith Wendy K., Binns Andy	Harvard Business Review	2
Organizational Ambidexterity in Action: How Managers Explore and Exploit	O'Reilly III Charles A., Tushman Michael L.	California Management Review	2
Organizational learning, NPD and environmental uncertainty: An ambidexterity perspective	Liu Heng, Luo Jin-hui, Huang Jeffrey Xiao-fei	Asian Business & Management	3

TITLE	AUTHOR(S)	JOURNAL	CL.
Improving customer-focused marketing capabilities and firm financial performance via marketing exploration and exploitation	Vorhies Douglas, Orr Linda, Bush Victoria	Journal of the Academy of Marketing Science	3
Exploratory learning and exploitative learning in different organizational structures	Su Zhongfeng, Li Jingyu, Yang Zhiping, & al.	Asia Pacific Journal of Management	3
Enhancing effects of manufacturing flexibility through operational absorptive capacity and operational ambidexterity	Patel Pankaj C., Terjesen Siri, Li Dan	Journal of Operations Management	3
Balancing exploration and exploitation of knowledge through an unlearning context An empirical investigation in SMEs	Gabriel Cegarra-Navarro Juan, Eugenia Sanchez-Vidal M., Cegarra-Leiva David	Management Decision	3
An empirical investigation of the relationship of IS strategy with firm performance	Leidner Dorothy E., Lo Janice, Preston David	Journal of Strategic Information Systems	3
Balance Within and Across Domains: The Performance Implications of Exploration and Exploitation in Alliances	Lavie Dovev, Kang Jingoo, Rosenkopf Lori	Organization Science	3
A framework for new solution development: an adaptive search perspective	Chae Bongsug (Kevin)	Service Industries Journal	3
Scale for classifying organizations as explorers, exploiters or ambidextrous	Popadiuk Silvio	International Journal of Information Mgmt	3

Appendix 3: List of the 79 papers reviewed (1996 - 2012)

YEAR	AUTHOR(S)	LITERATURE STREAM	OA VIEW	LEVEL OF ANALYSIS
1996	Tushman & O'Reilly III	Organization Design	Structural	Individuals/Leaders + Firm/Organization
1999	Adler, Goldoftas, & al.	Organization Design	Contextual	Strategic Business Unit (SBU)
2003	Benner & Tushman	Technological Innovation + Organizational Adaptation	Structural	Firm/Organization
2004	Birkinshaw & Gibson	Organization Design	Contextual	Firm/Organization
	Gibson & Birkinshaw	Organization Design	Contextual	Strategic Business Unit (SBU)
	He & Wong	Technological Innovation	Mixed/Unclear	Firm/Organization
2005	Smith & Tushman	Unclear	Mixed/Unclear	Firm/Organization
2006	Gupta, Smith, & Shalley	Organizational Learning	Mixed/Unclear	Firm/Organization
	Lubatkin, Simsek, & al.	Unclear	Mixed/Unclear	Firm/Organization
2007	Bierly & Daly	Organizational Learning	Mixed/Unclear	Firm/Organization
	Cegarra-Navarro & Dewhurst	Organizational Learning	Contextual	Firm/Organization
	Lin, Yang, & Demirkan	Strategic Management	Mixed/Unclear	Network of firms/Alliances
2008	Im & Rai	Organizational Learning	Contextual	Firm/Organization
	Jansen, George, & al.	Technological Innovation	Structural	Firm/Organization
	Judge & Blocker	Strategic Management	Mixed/Unclear	Firm/Organization
	Lee & MacMillan	Organizational Learning	Structural	Network of firms/Alliances

2008	Menguc & Auh	Strategic Management	Structural	Firm/Organization
	Morgan & Berthon	Technological Innovation	Mixed/Unclear	Strategic Business Unit (SBU)
	O'Reilly III & Tushman	Strategic Management	Mixed/Unclear	Firm/Organization + Strategic Business Unit (SBU)
	Raisch & Birkinshaw	Unclear	Mixed/Unclear	Firm/Organization
	Tiwana	Technological Innovation	Mixed/Unclear	Project/Initiative/ Activity
	Han & Celly	Strategic Management	Mixed/Unclear	Firm/Organization
	Li, Lin, & al.	Technological Innovation	Structural	Firm/Organization
	Raisch	Organization Design	Mixed/Unclear	Firm/Organization
2009	Andriopoulos & Lewis	Technological Innovation	Mixed/Unclear	Project/Initiative/ Activity
	Cao, Gedajlovic, & Zhang	Technological Innovation	Mixed/Unclear	Firm/Organization
	Carmeli & Halevi	Strategic Management	Mixed/Unclear	Group/Team
	Chang, Yang, & Chen	Organization Design	Mixed/Unclear	Individuals/Leaders
	Gulati & Puranam	Organization Design	Mixed/Unclear	Firm/Organization
	Jansen, Tempelaar, & al.	Technological Innovation	Structural	Firm/Organization
	Kang & Snell	Unclear	Mixed/Unclear	Firm/Organization
	Mom, van den Bosch, & Volberda	Organizational Learning	Contextual	Individuals/Leaders
	Nemanich & Vera	Organizational Learning	Mixed/Unclear	Group/Team
	O'Reilly III, Harreld, & Tushman	Organizational Adaptation	Structural	Firm/Organization
	Raisch, Birkinshaw, & al.	Unclear	Mixed/Unclear	Individuals/Leaders + Firm/Organization

2009	Riccaboni & Moliterni	Strategic Management + Technological Innovation	Mixed/Unclear	Firm/Organization
	Rothaermel & Alexandre	Technological Innovation	Mixed/Unclear	Firm/Organization
	Simsek	Unclear	Mixed/Unclear	Firm/Organization + Network of firms/Alliances + Macro (economy, industry, market, environment)
	Simsek, Heavey, & al.	N.A.	Mixed/Unclear	Unclear
	Taylor & Helfat	Technological Innovation	Mixed/Unclear	Firm/Organization
	Lichtenthaler & Lichtenthaler	Organizational Learning	Mixed/Unclear	Firm/Organization
	Luo & Rui	Strategic Management	Mixed/Unclear	Firm/Organization
	Uotila, Maula, & al.	Strategic Management	Mixed/Unclear	Firm/Organization
2010	Andriopoulos & Lewis	Technological Innovation	Mixed/Unclear	Firm/Organization
	Bodwell & Chermack	Strategic Management	Mixed/Unclear	Firm/Organization
	Cao, Simsek, & Zhang	Strategic Management	Mixed/Unclear	Firm/Organization
	de Visser, de Weerd-Nederhof, & al.	Technological Innovation	Structural	Firm/Organization
	Kristal, Huang, & Roth	Strategic Management	Mixed/Unclear	Firm/Organization
	Hughes, Martin, & al.	Strategic Management + Technological Innovation	Mixed/Unclear	Firm/Organization
	Kauppila	Strategic Management	Mixed/Unclear	Process
	Kollmann & Stoeckmann	Technological Innovation	Mixed/Unclear	Firm/Organization
	Schreyogg & Sydow	Organization Design	Mixed/Unclear	Firm/Organization

2010	Tushman, Smith, & al.	Organization Design	Mixed/Unclear	Strategic Business Unit (SBU)
	Eisenhardt, Furr, & al.	Organization Design	Mixed/Unclear	Firm/Organization
	Smith, Binns, & al.	Strategic Management	Mixed/Unclear	Group/Team
2011	Liu, Luo, & Huang	Organizational Learning + Organizational Adaptation	Mixed/Unclear	Firm/Organization
	Vorhies, Orr, & Bush	Organizational Learning + Organizational Adaptation	Contextual	Single Business Unit Firms
	Su, Li, Yang, & al.	N.A.	Mixed/Unclear	Firm/Organization
	Cegarra-Navarro, Sanchez-Vidal, & Cegarra-Leiva	N.A.	Mixed/Unclear	Individuals/Leaders + Firm/Organization
	Leidner, Lo, & Preston	Unclear	Mixed/Unclear	Firm/Organization
	Ho, Fang, & Lin	Technological Innovation + Organization Design	Contextual	Firm/Organization
	Probst, Raisch, & Tushman	Organizational Adaptation	Contextual	Group/Team
	Lavie, Kang, & Rosenkopf	Organizational Learning	Mixed/Unclear	Network of firms/Alliances
	McCarthy & Gordon	Unclear	Contextual	Strategic Business Unit (SBU)
	Moreno Luzon & Valls Pasola	Organizational Learning + Organizational Adaptation	Mixed/Unclear	Unclear
	Lin & McDonough III	Organizational Learning + Strategic Management	Mixed/Unclear	Strategic Business Unit (SBU)

2011	Rosing, Frese, & Bausch	Strategic Management	Contextual	Individuals/Leaders + Group/Team
	Napier, Mathiassen, & Robey	Organization Design	Contextual	Firm/Organization
	Chang, Hughes, & Hotho	Technological Innovation	Mixed/Unclear	Firm/Organization
	Tushman, Smith, & Binns	Strategic Management	Mixed/Unclear	Individuals/Leaders
	O'Reilly III & Tushman	Organizational Adaptation	Structural	Individuals/Leaders
2012	Patel, Terjesen, & Li	Technological Innovation	Contextual	Firm/Organization
	Chae	Unclear	Mixed/Unclear	Firm/Organization
	McDermott & Prajogo	Organizational Learning	Mixed/Unclear	Firm/Organization
	Chandrasekaran, Linderman, & Schroeder	Unclear	Mixed/Unclear	Strategic Business Unit (SBU)
	Marabelli, Frigerio, & Rajola	Organization Design	Structural	Process
	Popadiuk	Organizational Learning	Mixed/Unclear	Firm/Organization
	Filippini, Guettel, & Nosella	Organizational Learning	Mixed/Unclear	Project/Initiative/ Activity
	Jasmand, Blazevic, & de Ruyter	Organizational Learning	Contextual	Individuals/Leaders

YEAR	AUTHOR(S)	TENSIONS ANALYZED	METHOD	SAMPLE
1996	Tushman & O'Reilly III	Short term efficiency vs. Long term innovation	Conceptual paper	-
1999	Adler, Goldoftas, & al.	Efficiency vs. Flexibility	Empirical paper (qualitative) - retrospective	U.S.
2003	Benner & Tushman	Efficiency vs. Flexibility, Differentiation vs. Low-cost, Global integration vs. Local Responsiveness, Alignment vs. Adaptability, Alignment and Efficiency in management of today's business demands vs. Adaptation to changes in the environment	Conceptual paper	-
2004	Birkinshaw & Gibson	Alignment vs. Adaptability	Conceptual paper	-
	Gibson & Birkinshaw	Alignment vs. Adaptability	Empirical paper (quantitative) - cross sectional	International Survey
	He & Wong	Exploitation vs. Exploration (strategies)	Empirical paper (quantitative) - cross sectional	Singapore & Malaysia
2005	Smith & Tushman	Procedural vs. Coordinative knowledge sharing	Conceptual paper	-
2006	Gupta, Smith, & Shalley	Refinement and extensions of existing competences vs. Experimentation of new alternatives	Conceptual paper	-
	Lubatkin, Simsek, & al.	Exploitation vs. Exploration, Incremental vs. Radical innovation, Flexibility to keep innovation options open vs. Commitment to well-defined innovation pathways, Divergent vs. Convergent behavior	Empirical paper (quantitative) - cross sectional	U.S.

	Bierly & Daly	Exploration vs. Exploitation	Empirical paper (quantitative) - cross sectional	U.S.
2007	Cegarra-Navarro & Dewhurst	Exploration vs. Exploitation (behavior)	Empirical paper (quantitative) - cross sectional	Spain
	Lin, Yang, & Demirkan	Exploration vs. Exploitation (alliances)	Empirical paper (quantitative) - cross sectional	U.S.
	Im & Rai	Exploration vs. Exploitation, Alignment vs. Adaptability	Empirical paper (quantitative) - cross sectional	U.S.
	Jansen, George, & al.	Radical vs. Incremental innovation	Empirical paper (quantitative) - cross sectional	The Netherlands
	Judge & Blocker	N.A.	Conceptual paper	-
	Lee & MacMillan	N.A.	Empirical paper (quantitative) - cross sectional	Korea
2008	Menguc & Auh	Alignment vs. Adaptation, Refinement of existing partner relationships vs. Development of new network relations	Empirical paper (quantitative) - cross sectional	Australia
	Morgan & Berthon	Threat vs. Opportunity	Empirical paper (quantitative) - unclear	UK
	O'Reilly III & Tushman	Exploration vs. Exploitation, Open vs. Closed networks, Knowledge intensity vs. knowledge extensity	Conceptual paper	-
	Raisch & Birkinshaw	Formal vs. Informal Organization	Conceptual paper	-

2008	Tiwana	Exploration vs. Capability to refine existing competencies and resources to improve operational efficiency exploitation	Empirical paper (quantitative) - cross sectional	U.S.
	Han & Celly	Exploitation vs. Exploration (activities), Innovation vs. Replication	Empirical paper (quantitative) - cross sectional	Canada
	Li, Lin, & al.	Differentiation vs. Integration, Individual vs. Organization, Static vs. Dynamic, Internal vs. External	Empirical paper (quantitative) - cross sectional	Taiwan
	Raisch	N.A.	Empirical paper (qualitative) - unclear	International Survey
2009	Andriopoulos & Lewis	Authonomy vs. Control	Empirical paper (qualitative) - cross sectional	U.S.
	Cao, Gedajlovic, & Zhang	Exploration vs. Exploitation	Empirical paper (quantitative) - cross sectional	China
	Carmeli & Halevi	Exploration vs. Exploitation	Conceptual paper	-
	Chang, Yang, & Chen	Exploratory vs. Exploitative innovation	Empirical paper (quantitative) - cross sectional	Taiwan
	Gulati & Puranam	Exploitation vs. Exploration (knowledge)	Empirical paper (qualitative) - cross sectional	U.S.
	Jansen, Tempelaar, & al.	N.A.	Empirical paper (quantitative) - cross sectional	Unclear

2009	Kang & Snell	N.A.	Conceptual paper	-
	Mom, van den Bosch, & Volberda	Exploration vs. Exploitation (in terms of non local-local search in three-dimensional supply, demand and geographic space)	Empirical paper (quantitative) - cross sectional	Unclear
	Nemanich & Vera	Radical vs. Incremental learning	Empirical paper (quantitative) - cross sectional	U.S.
	O'Reilly III, Harreld, & Tushman	Exploration vs. Exploitation	Empirical paper (qualitative) - cross sectional	U.S.
	Raisch, Birkinshaw, & al.	Exploitation vs. Exploration, Ambidexterity vs. Punctuated Equilibrium, Duality vs. Specialization	Conceptual paper	-
	Riccaboni & Moliterni	Exploratory vs. Exploitative knowledge sharing	Conceptual paper	-
	Rothaermel & Alexandre	Exploration vs. Exploitation	Empirical paper (quantitative) - cross sectional	U.S.
	Simsek	Commitment vs. Flexibility, Exploratory vs. Exploitative learning	Conceptual paper	-
	Simsek, Heavey, & al.	Trust vs. Opportunism	Conceptual paper	-
	Taylor & Helfat	Exploration vs. Exploitation	Empirical paper (qualitative) - retrospective	U.S.
	Lichtenthaler & Lichtenthaler	Exploitation vs. Exploration (learning)	Conceptual paper	-

2009	Luo & Rui	Exploitation vs. Exploration (learning)	Empirical paper (qualitative) - cross sectional	International Survey
	Uotila, Maula, & al.	N.A.	Empirical paper (quantitative) - longitudinal	Unclear
2010	Andriopoulos & Lewis	Adaptability vs. Alignment	Empirical paper (qualitative) - cross sectional	U.S.
	Bodwell & Chermack	Deliberate vs. Emergent strategies	Conceptual paper	-
	Cao, Simsek, & Zhang	Business performance (outcome of exploitation) vs. Knowledge performance (outcome of exploration)	Empirical paper (quantitative) - cross sectional	China
	de Visser, de Weerd-Nederhof, & al.	Incremental vs. Radical New Product Development (NPD) processes	Empirical paper (quantitative) - cross sectional	U.S.
	Kristal, Huang, & Roth	Pro-profit vs. Pro-growth strategies	Empirical paper (quantitative) - cross sectional	U.S.
	Hughes, Martin, & al.	Exploitative vs. Exploratory innovation	Empirical paper (quantitative) - cross sectional	Mexico
	Kauppila	Exploitation vs. Exploration, Specialists vs. Generalists, Cooperative vs. Entrepreneurial, Mechanistic vs. Organic	Empirical paper (qualitative) - retrospective	Finland
	Kollmann & Stoeckmann	The Organization's Orientation Priority vs. The Professional's Orientation Priority	Empirical paper (quantitative) - cross sectional	Germany

2010	Schreyogg & Sydow	Exploitative vs. Explorative innovation strategy	Conceptual paper	-
	Tushman, Smith, & al.	Bridging ties (providing access to a broader repertoire of skills, expertise and capabilities) vs. Strong ties (enhancing project-level knowledge integration) in innovation-seeking alliances	Empirical paper (qualitative) - longitudinal	Unclear
	Eisenhardt, Furr, & al.	Exploration vs. Exploitation	Conceptual paper	-
	Smith, Binns, & al.	Explore existing business vs. Explore new business	Empirical paper (qualitative) - retrospective	Unclear
2011	Liu, Luo, & Huang	Explorative learning vs. Exploitative learning	Empirical paper (quantitative) - cross sectional	China
	Vorhies, Orr, & Bush	Marketing exploration vs. Marketing exploitation	Empirical paper (quantitative) - unclear	U.S.
	Su, Li, Yang, & al.	Explorative learning vs. Exploitative learning	Empirical paper (quantitative) - cross sectional	China
	Cegarra-Navarro, Sanchez-Vidal, & Cegarra-Leiva	Knowledge exploration vs. Knowledge exploitation	Empirical paper (quantitative) - cross sectional	Spain
	Leidner, Lo, & Preston	Innovation System (IS) innovator vs. IS conservative	Empirical paper (quantitative) - cross sectional	U.S.
	Ho, Fang, & Lin	Technological vs. Design capabilities	Empirical paper (quantitative) - cross sectional	Taiwan

2011	Probst, Raisch, & Tushman	New growth businesses vs. Existing businesses	Empirical paper (qualitative) - retrospective	Switzerland
	Lavie, Kang, & Rosenkopf	Exploration vs. Exploitation in alliances	Empirical paper (quantitative) - longitudinal	U.S.
	McCarthy & Gordon	Exploration vs. Exploitation behaviours	Empirical paper (qualitative) - unclear	Canada
	Moreno Luzon & Valls Pasola	Exploration vs. Exploitation	Conceptual paper	-
	Lin & McDonough III	Incremental vs. Radical product innovation	Empirical paper (quantitative) - cross sectional	Taiwan
	Rosing, Frese, & Bausch	Exploration vs. Exploitation	Conceptual paper	-
	Napier, Mathiassen, & Robey	Alignment vs. Adaptability	Empirical paper (qualitative) - longitudinal	International Survey
	Chang, Hughes, & Hotho	Explorative innovation vs. Exploitative innovation	Empirical paper (quantitative) - cross sectional	Scotland
	Tushman, Smith, & Binns	Old vs. New	Empirical paper (qualitative) - unclear	Unclear
	O'Reilly III & Tushman	Exploration vs. Exploitation (opportunities and threats)	Empirical paper (qualitative) - unclear	International Survey
2012	Patel, Terjesen, & Li	Exploration vs. Exploitation	Empirical paper (quantitative) - cross sectional	U.S.

	Chae	Local search vs. Distant search	Conceptual paper	-
	McDermott & Prajogo	Exploration innovation vs. Exploitation innovation	Empirical paper (qualitative) - cross sectional	Australia
	Chandrasekaran, Linderman, & Schroeder	Exploration vs. Exploitation	Empirical paper (quantitative) - cross sectional	U.S.
2012	Marabelli, Frigerio, & Rajola	Exploratory vs. Exploitative strategies at branch level	Empirical paper (quantitative + qualitative) - cross sectional	Italy
	Popadiuk	Exploration vs. Exploitation	Empirical paper (quantitative) - cross sectional	Brazil
	Filippini, Guettel, & Nosella	Exploration vs. Exploitation	Empirical paper (qualitative) - longitudinal	Italy
	Jasmand, Blazevic, & de Ruyter	Exploitation vs. Exploration in the context of Customer Service Representatives' (CSRs') service-sales alignment	Empirical paper (quantitative) - unclear	Unclear

YEAR	AUTHOR(S)	CENTRALITY OF THE CONSTRUCT	JOURNAL	IF 2010 JCR Social Science Edition
1996	Tushman & O'Reilly III	1	California Management Review	1.706
1999	Adler, Goldoftas, & al.	2	Organization Science	3.800
2003	Benner & Tushman	2	Academy of Management Review	6.720
2004	Birkinshaw & Gibson	1	MIT Sloan Management Review	1.452
	Gibson & Birkinshaw	3	Academy of Management Journal	5.250
	He & Wong	3	Organization Science	3.800
2005	Smith & Tushman	2	Organization Science	3.800
2006	Gupta, Smith, & Shalley	2	Academy of Management Journal	5.250
	Lubatkin, Simsek, & al.	2	Journal of Management	3.758
2007	Bierly & Daly	3	Entrepreneurship Theory & Practice	2.272
	Cegarra-Navarro & Dewhurst	3	International Journal of Human Resource Management	0.869
	Lin, Yang, & Demirkan	3	Management Science	2.221
2008	Im & Rai	3	Management Science	2.221
	Jansen, George, & al.	3	Journal of Management Studies	3.817
	Judge & Blocker	1	European Journal of Marketing	0.824
	Lee & MacMillan	3	International Business Review	1.489
	Menguc & Auh	3	Industrial Marketing Management	1.694
	Morgan & Berthon	3	Journal of Management Studies	3.817

2008	O'Reilly III & Tushman	2	Research in Organizational Behavior	4.833
	Raisch & Birkinshaw	2	Journal of Management	3.758
	Tiwana	3	Strategic Management Journal	3.583
	Han & Celly	1	Canadian Journal of Administrative Sciences	0.714
	Li, Lin, & al.	3	Management Decision	1.078
	Raisch	2	Long Range Planning	1.727
2009	Andriopoulos & Lewis	2	Organization Science	3.800
	Cao, Gedajlovic, & Zhang	1	Organization Science	3.800
	Carmeli & Halevi	2	The Leadership Quarterly	2.902
	Chang, Yang, & Chen	2	Research Policy	2.508
	Gulati & Puranam	2	Organization Science	3.800
	Jansen, Tempelaar, & al.	3	Organization Science	3.800
	Kang & Snell	2	Journal of Management Studies	3.817
	Mom, van den Bosch, & Volberda	3	Organization Science	3.800
	Nemanich & Vera	3	The Leadership Quarterly	2.902
	O'Reilly III, Harreld, & Tushman	2	California Management Review	1.706
	Raisch, Birkinshaw, & al.	2	Organization Science	3.800
	Riccaboni & Moliterni	2	R&D Management	1.580
	Rothaermel & Alexandre	2	Organization Science	3.800

2009	Simsek	2	Journal of Management Studies	3.817
	Simsek, Heavey, & al.	2	Journal of Management Studies	3.817
	Taylor & Helfat	2	Organization Science	3.800
	Lichtenthaler & Lichtenthaler	3	Journal of Management Studies	3.817
	Luo & Rui	1	Academy of Management Perspectives	2.470
	Uotila, Maula, & al.	3	Strategic Management Journal	3.583
2010	Andriopoulos & Lewis	2	Long Range Planning	1.727
	Bodwell & Chermack	2	Technological Forecasting and Social Change	2.034
	Cao, Simsek, & Zhang	3	Journal of Management Studies	3.817
	de Visser, de Weerd-Nederhof, & al.	2	Technovation	2.993
	Kristal, Huang, & Roth	3	Journal of Operations Management	5.093
	Hughes, Martin, & al.	3	Journal of International Marketing	2.975
	Kauppila	2	Strategic Organization	2.727
	Kollmann & Stoeckmann	2	International Journal of Technology Management	0.519
	Schreyogg & Sydow	3	Organization Science	3.800
	Tushman, Smith, & al.	2	Industrial and Corporate Change	1.235
	Eisenhardt, Furr, & al.	2	Organization Science	3.800
	Smith, Binns, & al.	2	Long Range Planning	1.727
2011	Liu, Luo, & Huang	3	Asian Business & Management	0.610

	Vorhies, Orr, & Bush	3	Journal of the Academy of Marketing Science	3.269
	Su, Li, Yang, & al.	3	Asia Pacific Journal of Management	3.355
	Cegarra-Navarro, Sanchez-Vidal, & Cegarra-Leiva	3	Management Decision	1.078
	Leidner, Lo, & Preston	3	Journal of Strategic Information Systems	2.900
	Ho, Fang, & Lin	2	Management Decision	1.078
	Probst, Raisch, & Tushman	2	Organizational Dynamics	0.862
	Lavie, Kang, & Rosenkopf	3	Organization Science	3.800
2011	McCarthy & Gordon	2	R&D Management	1.580
	Moreno Luzon & Valls Pasola	1	Management Decision	1.078
	Lin & McDonough III	2	IEEE Transactions on Engineering Management	1.344
	Rosing, Frese, & Bausch	1	The Leadership Quarterly	2.902
	Napier, Mathiassen, & Robey	2	European Journal of Information Systems	1.767
	Chang, Hughes, & Hotho	2	Management Decision	1.078
	Tushman, Smith, & Binns	2	Harvard Business Review	1.881
	O'Reilly III & Tushman	2	California Management Review	1.706
	Patel, Terjesen, & Li	3	Journal of Operations Management	5.093
2012	Chae	3	Service Industries Journal	1.071
	McDermott & Prajogo	2	International Journal of Operations & Production Management	1.812

	Chandrasekaran, Linderman, & Schroeder	1	Journal of Operations Management	5.093
	Marabelli, Frigerio, & Rajola	2	Industry & Innovation	1.831
2012	Popadiuk	3	International Journal of Information Management	1.564
	Filippini, Guettel, & Nosella	2	Journal of Business Research	1.773
	Jasmand, Blazevic, & de Ruyter	1	Journal of Marketing	3.770

Appendix 4: Paper for the "Austrian Management Review"

Recent ambidexterity literature review

The review described in this short paper covers the period June 2011 - March 2012. This is part of the author's master's thesis work, held in Linz between February and July 2012. Databases were consulted between the 5th and the 15th March 2012. It continues and broadens out a previous work started in January 2010 and continuously updated until June 2011 by professors Filippini R., Nosella A. (Università di Padova, Italy), Güttel W.H. (JKU Linz, Austria), and their team. The purpose of the work was the examination of the literature on ambidexterity since 1996, when Tushman and O'Reilly III released their seminal article on the theme.

Meeting the Change: The boiling frog story

The well-known story of the boiling frog says that if you put a frog into a pot of pleasant water and then you gradually heat the pot until it starts boiling, the frog will not become aware of the threat until it is too late. Carrying out the story into the business world, companies should be vigilant to change, to avoid going the same way as the frog in the anecdote. They can meet the change basically through incremental innovation (i.e. exploitation) as well as radical innovation (i.e. exploration). To put it in a nutshell, exploitation deals with efficiency, increasing productivity, control, certainty, and variance reduction while exploration is about search, discovery, autonomy, innovation, and embracing variation. Ambidexterity is about doing both activities.[1] Three important dates on the theme of organizational ambidexterity (OA, hereafter) are: 1976 - Duncan was the first who used the term OA, putting out roots for the concept of Structural Ambidexterity;[2] 1996 - Tushman & O'Reilly III published their seminal work on the topic;[3] 2004 - Gibson & Birkinshaw developed the concept of Contextual Ambidexterity.[4]

Sources of data, keywords, search strings, exclusion criteria, and intellectual core identification

The author consulted the three main social sciences databases (EBSCO Business Source® Premier, ISI Web of Science®, ScienceDirect) using the keywords "ambidexterity" or "ambidextrous" in the automatic filtering tools provided, on the fields Title, Abstract, Topic, Keywords, Subject Terms, and Full Text, when possible. Research returned 565 papers, published between June 2011 and March 2012. However, after excluding papers which don't meet criteria such as published in English, dealing with managerial or organizational topics, and contribution on the theme published in journals with Impact Factor, only a few (24!) are relevant.

Questions which need answers through an overarching literature review

There are at least six important questions looking for answers.

- Definitions of ambidexterity given in papers: How is ambidexterity viewed (e.g., learning resources, processes, results)?
- Which are the emerging approaches to ambidexterity (e.g. ambidexterity and TQM)?
- Is there a growing interest on the theme from BRIC and Asiatic countries?
- Are there "difficulties" in measuring ambidexterity explicitly (various approaches to measure it, sometimes "home-made")?
- How can firms deal with tensions (i.e., ways for resolving the conflicts posed)?
- How does OA impact performance?

Some evidence from recent literature

Study Type: 21 papers are empirical, while only 3 are conceptual (research that both present and test theory with empirical data are counted as empirical studies).
Time Horizon (empirical papers): 12 studies are cross-sectional, 3 are longitudinal, 1 is retrospective. For 5 papers it is not available or however unclear.
Type of Analysis (id.): 13 papers present quantitative studies, 7 qualitative, and 1 both.
Sample used in the surveys (id.): Geographic distribution shows that 7 research have been held in America, 5 in Europe, 4 in Asia, 1 in Oceania. In 2 papers the sample of companies studied is not limited to a specific geographical area, while in 2 research papers it is unclear. What is important to note is that there seems to be a growing interest on the subject from emerging countries (in particular Brazil, India, and China).

"There seems to be a growing interest on ambidexterity from BRIC countries and Asiatic ones"

Journals: 20 social sciences journals have been found. For the first time appear journals like "Asia Pacific Journal of Management" and "Asian Business & Management".
Ambidexterity Measure: 10 papers measure OA explicitly, even if only 6 of them measure it using two "standard" approaches (i.e., multiplicative score and/or absolute deviation score[5]). What about the others? They sometimes develop "home-made" approaches.
Level of Analysis and Attributes: The majority of the papers reviewed (10 out of 24) deals with OA at firm/organization level. Furthermore, "simultaneity/both" are the most represented attributes (15 times out of 24) present in the definition of OA given in the papers.

Role played by OA: 7 times ambidexterity is a predictor of performance, twice is a predictor of innovation, once is a predictor of coordination as well as satisfaction and commercialization. In 2 papers ambidexterity acts as a moderator, while in 11 works it is depicted as an outcome. As for the outcomes, 3 times ambidexterity is facilitated through culture, twice through strategy, twice by means of management practices as well as top-management team, once through HRM system, and once through organization.

References

[1] O'Reilly III, C. A., & Tushman, M. L. (2008). "Ambidexterity as a dynamic capability: Resolving the innovator's dilemma". *Research in Organizational Behavior*, 28, pp. 185-206.

[2] Duncan, R. B. (1976). "The ambidextrous organization: Designing dual structures for innovation". (R. H. Kilmann, L. R. Pondy, & D. Slevin, Eds.) *The management of organization design: Strategies and implementation*, pp. 167-188.

[3] Tushman, M. L., & O'Reilly III, C. A. (1996). "Ambidextrous Organizations: Managing Evolutionary and Revolutionary Change". *California Management Review*, Vol. 38, No. 4, Summer 1996, pp. 8-30.

[4] Gibson, C. B., & Birkinshaw, J. (2004). "The Antecedents, Consequences, and Mediating Role of Organizational Ambidexterity". *Academy of Management Journal*, Vol. 47, No. 2, pp. 209-226.

[5] He, Z. L., & Wong, P. K. (2004). "Exploration vs. Exploitation: an empirical test of the ambidexterity hypothesis". *Organization Science*, 15 (4), pp. 481-494.

Über den Autor

Mein Name ist Stefano Giacomon. Ich komme aus Italien. Ich habe ein Diplom in Mechanical Engineering (Bachelor's Degree) und zurzeit bin ich Diplomand in Engineering & Management (Master's Degree) an der Università degli Studi di Padova, in Vicenza.

In Linz bin ich als Erasmus-Student um meine Diplomarbeit zu schreiben, die von den Professoren Güttel (JKU Linz), Filippini und Nosella (Università degli Studi di Padova) betreut wird.

Ich wollte mein Auslandssemester gerne in einem deutschsprachigen Land absolvieren, um mein Deutsch zu verbessern. Das gemeinsame Projekt der Universitäten Padova und Linz hat mich überzeugt und so bin ich hier.

In Österreich fühle ich mich wohl. Es ist das erste Mal, dass ich an einer Campus Universität studiere. Ich wohne in einem Studentenheim mit mehr als 1300 Studenten aus der ganzen Welt. Es ist ein kleines globales Dorf.

Das Leben am Institut für Human Resource und Change Management (HRCM, hier arbeite ich) ist anregend und auch etwas unterschiedlich zu Italien. Zum Beispiel hatte ich noch nie eine Abteilung mit einer Küche gesehen. Manchmal sitzen wir an der Abteilung zusammen und essen gemeinsam. Wir sind rund zehn Leute, die ideale Anzahl, eine familiäre Atmosphäre zu schaffen. Die Kollegen sind immer sehr freundlich und hilfsbereit. Ich bin der einzige Ausländer und so höre ich immer Deutsch sprechen. Das hilft mir meine Deutschkenntnisse zu verbessern. Manchmal habe ich selbstverständlich Schwierigkeiten, aber das ist ein Teil des Weges um zu wachsen.

Ich empfehle wirklich allen, mindestens drei Monate im Ausland zu verbringen. Meiner Meinung nach hat Erasmus keine Nachteile. Der Vergleich mit anderen Kulturen ist einfach konstruktiv. Man lernt, dass die Welt auch mit anderen Augen gesehen werden kann. Wenn man es einmal geschafft hat Probleme im Ausland zu überwinden, fällt es einem leichter dieselben Probleme zu Hause zu managen. Und Probleme zu überwinden stärkt das Selbstbild.

Appendix 5: Extended abstract for the "First International Conference on Competence-Based Strategic Management", Denmark, November 2012

Organizational ambidexterity from the origin to nowadays

Literature review from 1996 to 2012

The review described in this extended abstract covers the period 1996 - 2012. The purpose of the work was the examination of the whole literature on ambidexterity since 1996, when Tushman and O'Reilly III released their seminal article on the theme.

Meeting the Change: Ambidexterity as a way to let companies survive

A McKinsey study of the life expectancy of firms in the S&P 500 showed that in 1935 the average expectancy was 90 years. In 1975 that number dropped to 30 years and in 2005 it was estimated to be only 15 years (Foster & Kaplan, 2001; O'Reilly III & Tushman, 2008).

Many years ago the English naturalist and author of the theory of evolution by natural selection Charles Darwin wrote that “it is not the strongest of the species that survive, nor the most intelligent, but the one that is most responsive to change”. In the 1850s Darwin obviously did not think about companies, but surprisingly the sentence fits well also to them nowadays. It seems that firms which focus only either on exploration or exploitation activities cannot live long in a hyper-competitive environment like the current one.

However, in spite of the high failure rates stated above, some firms survive and prosper over long periods of time. They can meet the change basically through incremental innovation (i.e. exploitation) as well as radical innovation (i.e. exploration). When they succeed in doing both simultaneously they are ambidextrous.

The idea behind the concept of ambidexterity is that in an organization there are always trade-offs to be made. Although these trade-offs can never entirely be eliminated, ambidextrous companies reconcile them, and in doing so they become successful firms (Gibson & Birkinshaw, 2004). Thus, ambidexterity forces managers to think in a paradoxical way. In reality the concept of ambidexterity is something more than the simple reconciliation between two tensions. Generally, the paradoxical ambidextrous approach succeeds in obtaining both poles at high level.

There are four important contributions to the theme of organizational ambidexterity (OA, hereafter). Duncan (1976) was the first who used the term “ambidextrous organization”. He puts out roots for the concept of Structural

Ambidexterity. March (1991) studied the exploitation-exploration dilemma in organizations and its consequence. In 1996 Tushman and O'Reilly III published their seminal work on the topic and literature on ambidexterity started spreading. At last, in 2004 Gibson and Birkinshaw developed the concept of Contextual Ambidexterity.
Starting from the recent literature on the theme (i.e., June 2011 – March 2012), this paper goes back in time to review the whole literature on the topic (i.e., from 1996 to nowadays), in order to show some useful trends. Seventy-nine significant papers in total have been found and reviewed.

Method: Sources of data, keywords, search strings, exclusion criteria, and intellectual core identification

From 1996 on, the ambidexterity construct has been used in hundreds and hundreds of managerial and academic papers. Following a work by Nosella, Cantarello, and Filippini (2012), the author consulted the three main social sciences databases (EBSCO Business Source® Premier, ISI Web of Science®, ScienceDirect) using the keywords "ambidexterity" or "ambidextrous" in the automatic filtering tools provided, on the fields Title, Abstract, Topic, Keywords, Subject Terms, and Full Text, when possible.
In all, research returned more than 2500 papers, published between 1996 and March 2012. However, only a few are relevant. The exclusion criteria adopted are: Papers not written in English, papers published in journals with no Impact Factor (ISI Journal Citation Reports), papers that do not deal with managerial or organizational topics, and duplicates. The final output consists of a set of 232 papers.
To identify the most important contribution on the theme, based on a work by Lane, Koka, and Patack (2006), each paper has been read and classified as follows:

(1) The paper extends the construct's definition → 10 papers (4.31%)
(2) The paper is centered on the subject and on its dynamics → 39 papers (16.81%)
(3) The construct is part of the paper's hypotheses and/or model → 30 papers (12.93%)
(4) The construct is instrumental in developing the logic for the paper's propositions or hypotheses or the paper uses the construct to explain the results or the paper uses the construct as a minor citation with little or no discussion → 153 papers (65.95%)

The subsequent analyses are limited to the 79 most influential papers on ambidexterity found, from the least taken-for-granted to the most (classes 1, 2, and 3).

Some evidence from the literature and short discussion

Journals: The 79 papers reviewed have been published in 43 different scientific journals. It seems that the interest for the subject has been increased since

2008. From 1996 to 2008 a maximum of 3 significant papers per year have been published. From 2008 onwards, the number has increased, exceeding 10 papers per year. The theme has spread like wildfire among the journals, involving Marketing, Research and Development, Operations Management, and Information Technology. Until 2008 the journals that dealt with ambidexterity were only 9. From 2008 on, the theme of ambidexterity began to affect new journals, including "Journal Of Operations Management", "R&D Management", "European Journal Of Information Systems", "Journal Of Marketing", "Journal Of Strategic Information Systems", and "Journal Of The Academy Of Marketing Science". In 2011, for the first time, Asiatic journals like "Asia Pacific Journal of Management" and "Asian Business & Management" appeared. Among the 9 pioneering journals that published research works on ambidexterity until 2008, only "Organization Science" and "California Management Review" have published significant papers over the past three years (from 2009 until March 2012).

Study Type: 58 papers are empirical, while 21 are conceptual. Empirical studies include some kind of data or data analysis in the study (both statistical and qualitative analyses). Literature reviews, untested theoretical models, and proposed mathematical models are defined as conceptual studies. Studies that both present and test theory with empirical data are counted as empirical studies.

Type of Analysis (for empirical papers only): 39 papers present quantitative studies, 18 qualitative, and 1 both.

Time Horizon (for empirical papers only): 41 studies are cross-sectional (quantitative, qualitative, and both) while 5 are longitudinal (quantitative and qualitative), and 5 are retrospective (only qualitative). For 7 papers it is not available or is unclear.

Sample used in the surveys (for empirical papers only): Geographic distribution shows that 24 research studies have been held in America (20 in U.S., 2 in Canada, 1 in Brazil, and 1 in Mexico), 10 in Europe (2 in Italy and Spain, 1 in Scotland, UK, Switzerland, Finland, Netherlands, and Germany), 10 in Asia (4 in China as well as in Taiwan, 1 in Korea, 1 in Singapore and Malaysia together), and 2 in Oceania (both in Australia). In 5 papers the sample of companies studied is not limited to a specific geographical area, while in 7 research papers it is unclear. What is notable is that there seems to be a growing interest on the subject from emerging economies (BRIC countries and Asiatic ones).

Ambidexterity Measure: 29 papers measure OA explicitly, even if only 20 of them measure it using two "standard" approaches used by He and Wong (2004), Gibson and Birkinshaw (2004), Lubatkin, Simsek, & al. (2006). 12 papers use a multiplicative score between exploration and exploitation while 4 use absolute deviation score between exploration and exploitation, and 4 use both the approaches. What about the others? They sometimes develop "home-made" approaches.

Level of Analysis and Attributes: The great majority of the papers reviewed (about 60%) deals with OA at firm/organization level. Furthermore,

"simultaneity/both" exploration and exploitation are the most represented attributes (around 50%) present in the definition of OA given in the papers.
Effects of being ambidextrous: 26 times ambidexterity is a predictor of performance, and 4 times is a predictor of innovation. Twice is a predictor of coordination/configuration (i.e., firm-level coordination and resource configurations) as well as customer satisfaction and commercialization. Once is a predictor of knowledge sharing.
Tensions posed and ways for resolving them: The ambidexterity construct has been used in many fields, following different theoretical literature streams. For a detailed description of these five streams please see Raisch and Birkinshaw (2008). Marketing exploration vs. marketing exploitation, knowledge exploration vs. knowledge exploitation, local vs. distant search, and alignment vs. adaptability are only few examples of the great variety of tensions taken into considerations by the papers. However, the most recommended way to reconcile the conflicts posed is through organizational design (32.76% of the papers suggest it). Then, dropping down, they propose to solve the tensions by means of management practices (25.86%), top management team (18.96%), strategy (15.52%), and culture (6.90%).
Since ambidexterity has been most depicted as a predictor of performance (70%), one next step will be going deeper into this aspect and trying to give an answer to the question: How does OA impact performance?
Another step ahead is to look at the definition of OA given in the papers found to study how ambidexterity is viewed: As a learning resource, as a learning process, as a learning result, or as a high-order capability (Lavie & Rosenkopf, 2006).

References

Duncan, R. B. (1976). "The ambidextrous organization: Designing dual structures for innovation". (R. H. Kilmann, L. R. Pondy, & D. Slevin, Eds.) *The management of organization design: Strategies and implementation*, pp. 167-188.

Foster, R., & Kaplan, S. (2001). *"Creative destruction: Why companies are built to last and underperform the market - and how to successfully transform them".* New York: Currency.

Gibson, C. B., & Birkinshaw, J. (2004). "The Antecedents, Consequences, and Mediating Role of Organizational Ambidexterity". *Academy of Management Journal*, Vol. 47, No. 2, pp. 209-226.

He, Z. L., & Wong, P. K. (2004). "Exploration vs. exploitation: An empirical test of the ambidexterity hypothesis". *Organization Science*, 15(4), pp. 481-494.

Lane, P. J., Koka, B. R., & Pathak, S. (2006). "The reification of absorptive capacity: A critical review and rejuvenation of the construct". *Academy of Management Review*, 31(4), pp. 833-863.

Lavie, D., & Rosenkopf, L. (2006). "Balancing Exploration and Exploitation in Alliance Formation". *Academy of Management Journal*, Vol. 49, No. 4, pp. 797-818.

Lubatkin, M. H., Simsek, Z., & al. (2006). "Ambidexterity and performance in small- to medium-sized firms: The pivotal role of top management team behavioral integration". *Journal of Management*, 32(5), pp. 646-672.

March, J. G. (1991). "Exploration and exploitation in organizational learning". *Organization Science*, Vol. 2 No. 1, pp. 71-87.

Nosella, A., Cantarello, S., & Filippini, R. (2012). "The Intellectual Structure Of Organizational Ambidexterity: A Bibliographic Investigation Into The State Of The Art". *Strategic Organization*, forthcoming.

O'Reilly III, C. A., & Tushman, M. L. (2008). "Ambidexterity as a dynamic capability: Resolving the innovator's dilemma". *Research in Organizational Behavior*, 28, pp. 185-206.

Raisch, S., & Birkinshaw, J. (2008). "Organizational Ambidexterity: Antecedents, Outcomes, and Moderators". *Journal of Management*, Vol. 34, No. 3, pp. 375-409.

Tushman, M. L., & O'Reilly III, C. A. (1996). "Ambidextrous Organizations: Managing Evolutionary and Revolutionary Change". *California Management Review*, Vol. 38, No. 4, Summer 1996, pp. 8-30.

Appendix 6: Items of the questionnaire on innovation in Italian and Austrian companies took into account

	ENGLISH	ITALIAN	GERMAN
	INNOVATIVE CULTURE AND ENTREPRENEURSHIP FOR RADICAL INNOVATION	**CULTURA INNOVATIVA DELL'IMPRESA E CLIMA IMPRENDITORIALE**	**INNOVATIONSKULTUR UND ENTREPRENEURSHIP FÜR RADIKALE INNOVATIONEN**
	Answers (1-5): *1 – I strongly disagree with this statement / Not at all* *2 – I disagree with this statement / Just a bit* *3 – I neither agree nor disagree with this statement / Quite a lot* *4 – I agree with this statement / A lot* *5 – I strongly agree with this statement / Very much*	*Risposte (1-5):* *1 - Sono fortemente in disaccordo con l'affermazione* *2 - Non sono d'accordo con l'affermazione* *3 - Non sono né d'accordo né in disaccordo con l'affermazione* *4 - Sono d'accordo con l'affermazione* *5 - Sono fortemente d'accordo con l'affermazione*	*Antworten (1-5):* *1 – Ich stimme gar nicht zu / Keine* *2 – Ich stimme eher nicht zu / Nicht viele* *3 – Neutral / Recht viele* *4 – Ich stimme eher zu / Viele* *5 – Ich stimme vollkommen zu / Sehr viele*
	Over the last three years, to what extent has your firm:	Quanto l'impresa, rispetto al passato, negli ultimi tre anni:	Zu welchen Grad hat/ist Ihre Firmen in den letzten drei Jahren:
INN_EXP_1	☐ Introduced new generation of products?	☐ Ha introdotto nuove generazioni di prodotti?	☐ Eine neue Generation von Produkten eingeführt?
INN_EXP_2	☐ Extended product range?	☐ Ha esteso la gamma di prodotto?	☐ Die Produktpalette erweitert?
INN_EXP_3	☐ Opened up new markets?	☐ Ha aperto nuovi mercati?	☐ Neue Märkte erschlossen?
INN_EXP_4	☐ Entered in new technology fields?	☐ È entrata in nuovi campi tecnologici?	☐ In neue technologische Bereiche eingestiegen?
INN_EXT_1	☐ Improved existing products?	☐ Ha migliorato i prodotti esistenti?	☐ Existierende Produkte verbessert?
INN_EXT_2	☐ Reduced production costs?	☐ Ha ridotto i costi di produzione?	☐ Produktionskosten gesenkt?
INN_EXT_3	☐ Enhanced existing markets?	☐ Ha ampliato i mercati esistenti?	☐ Bestehende Märkte weiterentwickelt?

	COMPETENCIES, TYPES OF INNOVATION, AND PERFORMANCE	**COMPETENZE, TIPOLOGIE DI INNOVAZIONI E PERFORMANCE**	**KOMPETENZEN, INNOVATIONSARTEN UND PERFORMANCE**
	Answers (1-5): *1 – Not at all / Not important / I strongly disagree with this statement* *2 – Just a bit / Just a bit / I disagree with this statement* *3 – Quite a lot / Important / I neither agree nor disagree with this statement* *4 – A lot / Very important / I agree with this statement* *5 – Very much / Essential / I strongly agree with this statement*	*Risposte (1-5):* *1 - Sono fortemente in disaccordo con l'affermazione* *2 - Non sono d'accordo con l'affermazione* *3 - Non sono né d'accordo né in disaccordo con l'affermazione* *4 - Sono d'accordo con l'affermazione* *5 - Sono fortemente d'accordo con l'affermazione*	*Antworten (1-5):* *1 – Keine / Nicht so wichtig / Ich stimme gar nicht zu* *2 – Nicht viele / Recht wichtig / Ich stimme eher nicht zu* *3 – Recht viele / Wichtig / Neutral* *4 – Viele / Sehr wichtig / Ich stimme eher zu* *5 – Sehr viele / Essentiell / Ich stimme vollkommen zu*
	Over the last three years, to what extent has your firm:	Quanto l'impresa, rispetto al passato, negli ultimi tre anni:	Zu welchen Grad hat/ist Ihre Firmen in den letzten drei Jahren:
KW_EXR_1	☐ Acquired manufacturing technologies and skills entirely new to the firm?	☐ Ha acquisito tecnologie produttive ed abilità interamente nuove?	☐ Für die Firma gänzlich neue Produktionstechnologien und -fähigkeiten erworben?
KW_EXR_2	☐ Learn product development and processes skills (such as product design, prototyping new products, timing of new products introduction and customizing products for local markets) entirely new for the industry?	☐ Ha acquisito abilità di sviluppo prodotto e processi nuovi per il settore (design e/o prototipazione di nuovi prodotti, timing dell'introduzione di nuovi prodotti, customizzazione)?	☐ Für die Branche gänzlich neue Produktentwicklungs- und Verarbeitungsfähigkeiten) erlernt (z.B. Produktdesign; Prototypenentwicklung; Timing von Neuprodukteinführung und kundenspezifische Anpassung der Produkte für lokale Märkte)?
KW_EXR_3	☐ Acquired entirely new managerial and organizational skills that are important for innovation (such as forecasting technological trends; identifying emerging markets and technologies)?	☐ Ha acquisito capacità gestionali ed organizzative interamente nuove importanti per l'innovazione (ad esempio forecast tecnologico e di mercato)?	☐ Sich gänzlich neue Management- und Organisationsfähigkeiten, die für Innovation wichtig sind, angeeignet (z.B. Vorhersage technologischer Trends; Identifikation aufkommender Märkte und Technologien; Koordinieren und Integrieren von R&D, Marketing, Produktion und anderen Funktionen)?
KW_EXR_4	☐ Strengthened innovation skills in area where it had no prior experience?	☐ Ha rafforzato abilità innovative in aree nelle quali non era presente un'esperienza precedente?	☐ Innovationsfähigkeiten in Bereichen gestärkt, in denen sie vorher keine Erfahrung hatte?

KW_EXT_1	☐ Upgraded current knowledge and skills for familiar products and technologies?	☐ Ha migliorato le abilità e la conoscenza relativamente a prodotti e tecnologie familiari?	☐ Bestehendes Wissen und Fähigkeiten für verwandte Produkte und Technologien ausgebaut?
KW_EXT_2	☐ Invested in enhancing skills in exploiting mature technologies that improve productivity of current innovation operations?	☐ Ha investito nel migliorare le abilità nello sfruttamento di tecnologie mature che permettano di migliorare la produttività?	☐ In das Verbessern von Fähigkeiten zur Ausnutzung ausgereifter Technologien investiert, die die Produktivität bestehender Innovationsabläufe verbessern?
KW_EXT_3	☐ Enhanced competencies in searching for solutions to customer problems that are near to existing solutions rather than completely new solutions?	☐ Ha potenziato le competenze nella ricerca di soluzioni ai problemi dei clienti, a partire da soluzioni esistenti, piuttosto che da soluzioni completamente nuove?	☐ Kompetenzen zur Suche von Lösungen von Kundenproblemen verbessert, die Nahe an bestehenden Lösungen sind als gänzlich neue Lösungen?
KW_EXT_4	☐ Upgraded skills in product/service development processes in which the firm already possesses significant experience?	☐ Ha valorizzato le abilità nei processi di sviluppo del prodotto/servizio nei quali è già presente una significativa esperienza?	☐ Fähigkeiten für Produkt-/ Dienstleistungsentwicklungsprozessen ausgebaut, in denen die Firma bereits erhebliche Erfahrung besitzt?
KW_EXT_5	☐ Strengthened your knowledge and skills for projects that improve efficiency of existing innovation activities?	☐ Ha investito nel migliorare le proprie skills su tecnologie mature?	☐ Wissen und Fähigkeiten für Projekte gestärkt, die die Effizienz von bestehenden Innovationsaktivitäten verbessern?
	Indicate your degree of agreement about how well these statements describe the market and competitive environment during the last three years (1-5 Likert scale):	Esprimere una valutazione in termini di accordo/disaccordo rispetto alle singole affermazioni (scala Likert 1-5):	Bitte geben Sie an, wie sehr diese Aussagen den Markt und das Wettbewerbsumfeld in den letzten drei Jahren beschreiben (1-5 Likert-Skala):
CNTX_1	☐ The management systems in this organization encourage people to challenge outmoded traditions/practices/sacred cows.	☐ I manager dell'impresa hanno il compito di creare il giusto contesto organizzativo nel quale i dipendenti operano.	☐ Die Managementsysteme in dieser Organisation ermutigen Mitarbeiter/innen überholte Traditionen und Praktiken in Frage zu stellen.
CNTX_2	☐ Managers in my organization devote considerable effort to developing subordinates.	☐ I manager dedicano sforzi considerevoli per la crescita delle persone.	☐ Manager/innen in meiner Organisation widmen beträchtlichen Aufwand der Weiterentwicklung von Mitarbeiter/innen.

CNTX_3	☐ Managers in my organization push decisions down to the lowest appropriate level.	☐ I manager delegano le decisioni al livello gerarchico appropriato.	☐ Manager/innen in meiner Organisation geben Entscheidung an die niedrigste, dafür geeigneten Ebene weiter.
CNTX_4	☐ Managers have access to the information they need to make good decisions.	☐ I manager hanno accesso alle informazioni necessarie per prendere buone decisioni.	☐ Manager/innen haben Zugang zu den Informationen, die sie brauchen, um gute Entscheidungen zu treffen.
CNTX_5	☐ Managers in my organization issue creative challenges to their people instead of narrowly defining tasks.	☐ I manager tracciano sfide creative per i dipendenti, anziché definire compiti circoscritti.	☐ Manager/innen in meiner Organisation geben ihren Mitarbeiter/innen kreative Herausforderungen anstelle von eng definierten Aufgaben.
CNTX_6	☐ Managers in my organization use business goals and performance measures to run their business.	☐ I manager fanno uso di indicatori di performance e definiscono obiettivi di business.	☐ Manager/innen in meiner Organisation verwenden Unternehmensziele und Leistungskennzahlen um ihre Geschäfte zu führen.
CNTX_7	☐ Managers in my organization hold people accountable for their performances.	☐ I manager tengono informati i dipendenti circa le loro performance.	☐ Manager/innen in meiner Organisation ziehen Mitarbeiter/innen für deren Leistung zur Verantwortung.
CNTX_8	☐ Managers in my organization encourage and reward hard work through incentive compensation.	☐ I manager incoraggiano e premiano chi lavora “duro” attraverso incentivi.	☐ Manager/innen in meiner Organisation ermutigen und belohnen harte Arbeit durch Anreizsysteme.
CNTX_9	☐ Our organization has separate units to enhance innovation and flexibility.	☐ Se è opportuno, vengono separate le business units tradizionali da business units dedicate all'innovazione radicale.	☐ Unsere Organisation hat eigene Einheiten, um Innovation und Flexibilität zu erhöhen.
CNTX_10	☐ Innovation and production activities are structurally separated within our organization.	☐ Esistono meccanismi alternativi e paralleli per la generazione di idee innovative radicali.	☐ Innovation- und Produktionsaktivitäten sind in unserer Organisation strukturell getrennt.
CNTX_11	☐ We have units that are either focused on the short term or the long term.	☐ Le business units sono focalizzate o su obiettivi di breve termine o su obiettivi di lungo termine.	☐ Wir haben Einheiten die entweder kurzfristig oder langfristig orientiert sind.

Appendix 7: Notes on IBM SPSS Statistics[18]

IBM SPSS Statistics is used to solve a range of business and research problems. It offers rich statistical capabilities paired with features that make it easier to access and manage data, select and perform analyses and share results.

IBM SPSS Statistics supports the entire analytical process. It helps people validate assumptions faster, guiding them in using the right statistical capability at the right time. It also gives analysts flexible access to powerful analytical techniques, whatever their level of expertise. Finally, it helps organizations make the most of their analytical resources by scaling from the simplest to the most widespread initiative.

SPSS Statistics features robust and sophisticated functionality and procedures that address the entire analysis lifecycle:

- It includes procedures to account for missing data that otherwise could negatively impact the validity of your results;
- It supports all common data sources used by enterprise organizations;
- Statistical functions and procedures are kept apart from the data, reducing the risk of errors;
- Open technologies allow for the use of external programming languages, so that it is possible to add or customize additional functionalities;
- Various modular offerings support different types of analyses.

[18] Source: IBM website (http://www.ibm.com/software) - retrieved August 5, 2012