



Ambidextrous capacity in small and medium-sized enterprises[☆]

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ARTICLE INFO

Keywords:

Ambidextrous capacity
Organizational ambidexterity
Disruptive innovation
Incremental innovation

ABSTRACT

This study examines the ambidextrous capacity—the ability to respond simultaneously to both disruptive and incremental innovation processes—of small and medium-sized enterprises (SMEs) in Portugal. The purpose is to understand the organizational ambidexterity of SMEs and its relationship to organizational performance and innovation capacity. The objectives are to evaluate the characteristics that identify ambidextrous organizations and analyze the effect of organizational ambidexterity on performance, supported by the contingency-based approach, organizational theory, behavioral theory of the firm, and organizational learning theory. After factor analysis is performed, a structural equations model is used to analyze a sample of 202 valid responses. The analysis shows that, for SMEs, disruptive innovation factors relate mainly to innovation capacity and incremental innovation factors relate to organizational performance. The confirmation of organizational ambidexterity in SMEs and the increased recognition of the importance of disruptive innovation are relevant contributions to the literature.

1. Introduction

The main challenges for ambidextrous organizations are simultaneously managing existing knowledge and new knowledge, ensuring better products and services, and achieving organizational development (Birkinshaw & Gupta, 2013; Nosella, Cantarello, & Filippini, 2012; O'Reilly & Tushman, 2008). Ambidexterity refers to a firm's ability to develop and use new resources and skills (exploration of resources) while making efficient use of the resources already available (exploitation of resources) (Hafkesbrink & Schroll, 2014). Organizational ambidexterity comprises the ability of an organization to create sustainable capacity in a dual context, by balancing resource exploration, also referred to as disruptive innovation, with resource exploitation, also known as incremental innovation (March, 1991; Tushman & O'Reilly III, 1996). An organization becomes ambidextrous when its structure, organization, and management behaviors assure processes that can contribute to its development under adverse conditions. Jansen, van den Bosch, and Volberda (2005) found a positive relationship between performance and an organizational unit's ability to overcome tensions and simultaneously engage in disruptive innovation (exploration) and incremental innovation (exploitation). Disruptive innovation and incremental innovation explore the conflicting demands of innovation and efficiency resulting from the pursuit of ambidexterity

(March, 1991). The search for an ambidextrous strategy is a challenging balancing act, since disruptive innovation involves creative thinking and exploratory and non-routine actions, while incremental innovation depends on standardized routines for exploring skills and knowledge (Bledow, Frese, Anderson, Erez, & Farr, 2009; Gupta, Tesluk, & Taylor, 2007). Organizational ambidexterity shows that the simultaneous pursuit of exploration and exploitation is feasible and beneficial for organizational performance (He & Wong, 2004; Jansen, van den Bosch, & Volberda, 2009).

The literature offers limited understanding of ambidextrous processes (Nosella et al., 2012; Raisch, Birkinshaw, Probst, & Tushman, 2009). The question of how the tensions of ambidexterity are managed remains unexplored, and the understanding of ambidextrous processes remains very important (Cantarello, Martini, & Nosella, 2012; O'Reilly II & Tushman, 2011). Successful innovation requires the use of both existing and new knowledge within the framework of organizational ambitions, but it hinges on a separate verification mechanism for the trade-off between the exploitation of new and existing knowledge within the organization (Nosella et al., 2012; Turner, Swart, & Maylor, 2013). Little is known today about how organizations manage the trade-off between disruptive innovation and incremental innovation (Suzuki, 2014), but it is very important in practice to understand ambidextrous processes and how managers carry out these processes

[☆] Authors are grateful to contributions from Ricardo Rodrigues, Centre of Management Studies, School of Economics and Management.

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(O'Reilly II & Tushman, 2011). It is also important to know how organizations must structure themselves to respond to the needs of disruptive innovation and incremental innovation (Papachroni, Heracleous, & Paroutis, 2016).

Organizational theory is confronted with the exploitation by companies of their existing and new capabilities to ensure efficiency and growth (Raisch et al., 2009). Research examined this issue using the contingency-based approach to organizational adaptation (Burns & Stalker, 1961; Lawrence & Lorsch, 1967; Miller & Friesen, 1983), organizational theory (Raisch et al., 2009), behavioral theory of the firm (Cyert & March, 1963), and organizational learning theory (Zollo & Singh, 2004; Zollo & Winter, 2002).

The purpose of this study is to understand the organizational ambidexterity of SMEs and its relationship to organizational performance and innovation capacity. The first objective is to evaluate the factors that identify disruptive innovation (exploration) and incremental innovation (exploitation); the second is to analyze the effect of organizational ambidexterity on organizational performance and innovation capacity. The structural equation model (SEM) and factor analysis used a sample of 202 valid answers collected from a universe of 2.991 Portuguese SMEs.

The results show that disruptive innovation develops in an organizational culture with a flexible structure, the ability to create new routines, and the capacity to absorb knowledge, as well as a leader who can inspire the dynamics of teamwork. In contrast, incremental innovation develops with stability, centralization, and a propensity for decisions to be made by upper levels of management. For small and medium enterprises, one would bet on incremental innovation based on routinized rules, a culture of security, and a formal hierarchy. This study's main contribution to the literature is the recognition of the importance of organizational ambidexterity in SMEs and the practical difficulty of simultaneously adopting two cultures in the same company.

The remainder of this paper is organized as follows. Following the introduction, Section 2 presents a literature review that addresses organizational ambidexterity as well as performance and innovation capacity. Section 3 describes the methodology, including the research model and hypotheses, constructs and variables, data and sample, and measures and methods. Section 4 reports the results of the analysis, including descriptive statistics and a confirmatory analysis. Section 5 presents the discussion, and Section 6 offers the conclusions and describes the study's contributions.

2. Literature review

2.1. Organizational ambidexterity

Ambidexterity (Sarkees & Hulland, 2009) stems from the need to manage the different levels of tension between exploration and exploitation as two objectives on a continuum, where the poles compete for scarce resources and where ambidexterity implies the opposite of organizational capacity (March, 1991; Turner et al., 2013). Other authors (Gupta, Smith, & Shalley, 2006; Lubatkin, Simsek, Yan, & Veiga, 2006) view ambidexterity as interrelated processes, where organizations can maintain a high level of both activities with no need to balance them. Cao, Gedajlovic, and Zhang (2009) and Lavie, Stettner, and Tushman (2010) explore this difference, and provide evidence of the potentially positive effects of exploration and exploitation. Major efforts for disruptive innovation can often improve a company's effectiveness in exploring new knowledge and developing resources that support new products and markets, where the newly acquired knowledge (exploration) is soon adopted as the organization integrates it into its main operations. Different perspectives on the paradox of the relationship between exploration and exploitation raise interesting questions about whether there is a conflict between these two processes and under what circumstances a conflict exists (Andriopoulos & Lewis,

2010; Martini, Laugen, Gastaldi, & Corso, 2013). Moreover, this discussion raises the question of how agents themselves perceive the relationship between exploration and exploitation and under what circumstances they perceive it as a relationship of complementarity, separation, or conflict.

Ambidextrous organizations deal with innovation in a dual way to obtain the best performance: through the creation and generation of ideas and with their use. As a result, they develop the conditions necessary for fundamental and disruptive innovation to anticipate market trends or needs, create new products and services, or redesign existing ones. At the same time, they conduct their activities using rules, processes, and routines to take advantage of this disruptive innovation. They face the challenge of providing the organization with an environment conducive to creativity while simultaneously making use of these new products and services or making existing ones more efficient. Tushman and O'Reilly III (1996) advocate the need for separate structures within the organization to accommodate the opposing skills, systems, and practices of exploration and exploitation, as well as the competition for scarce resources derived from the relationship between disruptive innovation and incremental innovation. The tensions that arise between exploration and exploitation are managed by top managers, who ensure efficient conditions (Fang, Lee, & Schilling, 2010; O'Reilly III & Tushman, 2004). Some authors (e.g., Raisch & Birkinshaw, 2008) emphasize the importance of adopting parallel structures as an alternative to spatial separation. In this case, they allow organizations to alternate between structures within the same business unit depending on the needs for exploration or exploitation. Parallel structures are a solution for avoiding isolation between structurally separate units (Devins & Kähr, 2010). This evaluation is still scarcely explored in the context of organizational ambidexterity. Temporal separation between structures is another concept to be considered for managing tensions when an organization changes sequentially between phases of exploration and exploitation (Jansen et al., 2005). Devins and Kähr (2010), Geerts, Blindenbach-Driessen, and Gemmel (2010), and Siggelkow and Levinthal (2003) refer to the need to establish a temporary equilibrium in the face of the turbulent competitive context and advocate a simultaneous equilibrium approach between exploration and exploitation. During the temporary balancing, this organizational structure allows movement from a centralized (mechanistic) to a decentralized (organic) structure as organizations move from the exploration to the exploitation phase (Devins & Kähr, 2010). Some authors advocate a sequential development for exploration and exploitation (Burgelman, 1991) while others refer to the dynamic capacity of companies to temporarily alternate periods of exploration and exploitation (Boumgarden, Nickerson, & Zenger, 2012). In relation to the creation of organizational ambidexterity, Papachroni et al. (2016) and Uotila, Maula, Keil, and Zahra (2009) refer to the crucial role of time and explore and understand the development of tensions between disruptive innovation and incremental innovation that evolve as part of the learning process.

In ambidextrous organizations, it is both feasible and beneficial for organizational performance to simultaneously search for disruptive innovation and incremental innovation, which allows them to achieve their innovation objectives without affecting business performance (He & Wong, 2004; Jansen, Vera, & Crossan, 2009; O'Reilly III & Tushman, 2004; Raisch et al., 2009; Tushman & O'Reilly III, 1996).

Breitzman and Hicks (2008) consider that SMEs have a higher proportion of patents per employee, have greater impact using proven metrics, and are generally more technologically important than large companies. Successful companies adopt a dual purpose that is relevant to organizations of all sizes, exploring an existing business and simultaneously exploiting a related new business (Konlechner & Güttel, 2010; Simsek, 2009). The use of functional expertise increases the absorption of knowledge (Cohen & Levinthal, 1990; Ketokivi, 2008). Jansen, van den Bosch, and Volberda (2006) report that formalization has a positive influence on an organization's incremental innovation but

a negative effect on disruptive innovation. Centralization also negatively affects the disruptive innovation performance of an organizational unit (Tsai, 2002). The bottom-up knowledge gained by managers and their horizontal inflows are positively related to their involvement in disruptive innovation activities, while the top-down knowledge inflows of managers are positively related to their engagement in incremental innovation activities (Bledow et al., 2009; Mom, van den Bosch, & Volberda, 2007). Suzuki (2014) argues that the efficiency of an organization is negatively associated with a greater degree of organizational ambidexterity, which is mitigated when the organization relies on its capacity for innovation, learning, or specialization.

Transactional leadership behavior has a negative relationship with disruptive innovation, but a positive relationship with incremental innovation processes. Transformational leadership is strongly related to disruptive innovation when the organization's environment is perceived as dynamic. Conversely, transformational leadership is minimally related to disruptive innovation when the organization's environment is perceived to be stable, and vice versa when transactional leadership is applied (Jansen, Vera, & Crossan, 2009; Pandey & Sharma, 2009; Simsek, 2009).

From the structural or institutional perspective, stakeholders prefer efficiency-oriented organizations over those based on innovation capacity because a focus on efficiency is more reliable and accountable (Hannan & Freeman, 1984). Efficiency-oriented organizations are characterized by greater changes in choices related to activities, policies, and organizational structures, capacities, and resources (Siggelkow, 2001). Stakeholder influences force the organization to abandon seemingly attractive and promising business opportunities because these opportunities sometimes appear to be overly disruptive (Christensen & Bower, 1996).

The tensions arising from the pursuit of ambidexterity, as interpreted and managed by the agents themselves, remain largely unexplored. In the context of an ambidextrous strategy, agents are actively involved in the management of emerging tensions, influenced by their strategic orientation and organizational level. The relationship between exploration and exploitation, which individuals identify as complementary, conflicting, or interrelated, allows for differing perceptions, which results in different management approaches, identified as integration, temporal balance, or separation from the perspective of the organization (Papachroni et al., 2016). As ambidextrous tensions are interpreted and managed by different organizational groups, identifying a dependent path process contributes to the debate about how ambidexterity is pursued in practice and how organizations attempt to build ambidextrous abilities (Bledow et al., 2009; Cantarello et al., 2012).

The contextual approach conceives ambition as emerging through the organizational context of a business unit, involving a combination of performance management with processes and values to help individuals achieve those goals (Gibson & Birkinshaw, 2004). Brion, Mothe, and Sabatier (2010) and Güttel and Konlechner (2009) emphasize the importance of risk-taking and creativity in establishing an organizational context that balances short-term focus and long-term adaptability. An ambidextrous organization recognizes the central role of individuals. Ambidextrous behavior is characterized by individuals' ability to take initiative, recognize opportunities outside their field of activity, seek co-operation, perform multiple functions, and identify potential synergies (Birkinshaw & Gibson, 2004). Mom, van den Bosch, and Volberda (2009) suggest that ambidextrous managers identify their role and functions as multitasking, with an ability to accept contradictions, and improving and renewing their knowledge, skills, and experiences. The development of cognition that uses mechanisms to manage contradictory situations at the individual level (paradox) may allow experienced managers to deal with the contradictions of exploration and exploitation (Eisenhardt, Furr, & Bingham, 2010; Lewis, Andriopoulos, & Smith, 2014).

Hafkesbrink and Schroll (2014) observe the different phases of

ambidextrous organizations that develop according to the need for increasingly disruptive forms of organizational design to provide maximum flexibility and absorption of knowledge in the process of innovation and use of foreground. Forms of organizational design are developed in the organization to ensure maximum efficiency in the incremental application of this new knowledge. There are strong differences between the flexible and decentralized organic structures that support disruptive innovation and the mechanistic, centralized, and stable structures that support incremental innovation (Hafkesbrink & Schroll, 2014). Organizations that manage both modes of organizational design adapt more effectively and efficiently to changing environments (Güttel & Konlechner, 2007). Hafkesbrink, Bachem, and Kulenovic (2013) hold that disruptive innovation and incremental innovation depend on organizational antecedents, contextual ambidexterity, individual competencies, and organizational skills. Consequently, the following hypotheses are formulated:

Hypothesis 1 (H1). Disruptive innovation is identified by a flexible structure, organizational dynamics, heuristic rules, a transformational leader, horizontal communication, disruptive learning, and relational flexibility.

Hypothesis 2 (H2). Incremental innovation is identified by a centralized structure, organizational stability, routinization of rules, a transactional leader, vertical communication, hierarchical accountability, and relational formality.

2.2. Performance and innovation capacity

An organization is generally evaluated using different performance indicators – economic, financial, activity, and others. The concept of organizational performance has many operationalizations (e.g., Richard, Devinney, Yip, & Johnson, 2009; Spanos, Zaralis, & Lioukas, 2004; Stavrou, 2005). Ambidexterity involves the ability of the organization to develop disruptive innovation, which requires a dynamic, creative environment with flexible rules and, at the same time, ensure incremental innovation in its current activities. Organizational performance indicators need to be defined, not in the manner of innovation performance indicators, but to allow identification of the capacity to apply innovations to products, sales of products or services, or the size of the investment made in innovation. Organizational performance indicators include the company's results (Shaw, Gupta, & Delery, 2005; Van Iddekinge et al., 2009), sales growth (Batt, 2002; Richard et al., 2009), and efficiency (Miller & Swope, 2007). Innovation capability represents a higher-order integration capability, with the ability to adapt and manage multiple capabilities (Fuchs, Mifflin, Miller, & Whitney, 2000). Bets on innovation have led to new product development (Sivadas & Dwyer, 2000) and innovative outcomes (Tripsas & Gavetti, 2000). The profitability and sales of innovation are two other variables chosen to support innovation capacity. Consequently, the following hypotheses are formulated:

Hypothesis 3 (H3). : Incremental innovation has a greater effect on organizational performance than on innovation capacity.

Hypothesis 4 (H4). : Similarly, I would suggest revising this hypothesis as follows: “Disruptive innovation has a greater effect on innovation capacity than on organizational performance”.

3. Methods

3.1. Research model

Organizational ambidexterity is identified with disruptive and incremental innovations, which have different organic structures, organizational states, heuristics and routinization, leadership, communication, learning and accountability, and relational states. Performance is

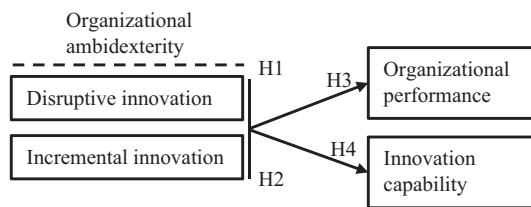


Fig. 1. Research model and hypotheses.

measured by organizational performance and innovation capability (Fig. 1).

3.2. Constructs and variables

Disruptive innovation is operationalized with seven factors (Hafkesbrink & Schroll, 2014): a flexible and decentralized organizational structure (flexible structure) (Devins & Kähr, 2010; McCarthy & Gordon, 2011), an organizational culture of dynamic adaptation of structures and processes (organizational dynamic) (Tsai, 2002), heuristic rules of the absorptive capacity of low bureaucracy (heuristic rules) (Zahra & George, 2002), implicit leadership of a transformed nature (transformational leader) (Pandey & Sharma, 2009; Simsek, 2009), horizontal communication and empowerment (horizontal communication) (Hafkesbrink & Schroll, 2010), disruptive counseling and learning (disruptive learning) (Hess & Rothaermel, 2008), and relational skills and capabilities (relational flexibility) (Table 1).

Incremental innovation is operationalized with seven factors (Hafkesbrink & Schroll, 2014): a centralized mechanistic structure (centralized structure), organizational culture of stable structures and processes (organizational stability), rules and routines of absorptive capacity (routinization rules), explicit leadership of a transactional nature (transactional leader), vertical communication of commands (vertical communication), decisions based on responsibility levels (hierarchical accountability), and hierarchical relational formality (relational formality).

Factors that characterize organizational performance are firm results and sales growth compared to the average of the last three years (results, sales). Efficiency is determined by the ability to respond to orders or contracts, the quality of the internal processes followed in the company, and level of perceived internal control and coordination of operations (efficiency).

Innovation capacity is based on the level of investment in innovation that result in new products and/or services (bet on innovation), the profitability of investing in innovation (profitability of innovation), and sales of products and/or services from innovation (sales from innovation).

3.3. Data and sample

Qualitative data are collected using a survey questionnaire sent to 2991 Portuguese SMEs. Each of the 48 variables concerning organizational ambidexterity (42 variables) and performance measures (6 variables) are addressed by an item on the questionnaire, which was submitted online in January 2018; 202 valid answers were obtained. The questions are adjusted to each of the variables. For example, the variable A1ADJUSTSTRUCTURE is linked to question A1, namely, “The company has the ability to adjust its structure and reorganize to meet the challenges of new products and services.” After the data were collected, the research model was operationalized.

3.4. Measures and methodology

The survey is carried out using a 7-point Likert scale for measurement, which allow capturing the information and obtaining data on the

observed variables. The methodology used is a structural equation model (SEM), supported by the Analysis of Moment Structures 24 (AMOS24) software, with factor analysis used to reduce the constructs. The observed variables are used to obtain latent variables or exogenous constructs that are related through the SEM methodology to the endogenous constructs, also obtained from the observed variables.

4. Analysis and results

4.1. Descriptive statistics

The sample characterization describes the types of respondents. Of the respondent organizations, 64.4% are family enterprises and 35.6% are public limited liability corporations; 55.9% are other limited liability companies, and 44.1% are other private corporations. Of the individual respondents, 6.4% are presidents, 25.7% are board members, 20.8% are managers, 36.1% are experts, and 10.9% are classified as other. The respondents' ages are mainly between 36 and 60 years (77.2%). More than 76.2% have graduated or held master's degrees; most have > 5 years of experience, and 89 respondents (44.1%) have > 15 years of experience. The majority of the respondents considered their companies as slightly disruptive innovators and incremental innovators, and as having innovative or totally innovative structures (Tables 2 & 3).

4.2. Confirmatory analysis

The models are tested for internal consistency, reliability, and convergent and unidimensional validity (Hair, Anderson, Tatham, & Black, 1998). The analysis is conducted in two phases. First, the observed variables are grouped by latent input variables and related to the latent output variables of the initial model. The variables that did not fit the model were eliminated.

Significant overall results are obtained with the following indicators of goodness-of-fit (GoF) of the model: Minimum discrepancy divided by its degrees of freedom (CMIN/DF): 3.15, incremental fit index (IFI): 0.82, comparative fit index (CFI): 0.82 (> 0.8), and root mean square error of approximation (RMSEA): 0.10; these indicate an adequate fit for the structural confirmation model (Fig. 2). The model explains organizational performance (coefficient of determination $R^2 = 0.22$) by flexible structure ($\beta = 0.44$), heuristic rules ($\beta = 0.35$), centralized structure ($\beta = 0.15$), routinization of rules ($\beta = -0.20$), and hierarchical accountability ($\beta = 0.36$). The model explains innovation capacity ($R^2 = 0.33$) by flexible structure ($\beta = 0.54$), heuristic rules ($\beta = 0.25$), transformative leader ($\beta = 0.41$), horizontal communication ($\beta = 0.15$), disruptive learning ($\beta = -0.12$), centralized structure ($\beta = 0.36$), hierarchical accountability ($\beta = -0.31$), and relational formality ($\beta = 0.21$).

The average variance extracted (AVE) is found for flexible structure (0.63), heuristic rules (0.67), transformative leader (0.82), horizontal communication (0.74), disruptive learning (0.76), centralized structure (0.54), routinization of rules (0.75), hierarchical accountability (0.57), and relational formality (0.64).

Organizational performance ($R^2 = 0.22$) is influenced by flexible structure ($\beta = 0.44$) and heuristic rules ($\beta = 0.35$), which integrate disruptive innovation, and centralization structure ($\beta = 0.15$), routinization of rules ($\beta = -0.20$), and hierarchical accountability ($\beta = 0.36$), which integrate incremental innovation. In a special situation, routinization rules are influenced by organizational performance.

Innovation capacity ($R^2 = 0.33$) is influenced by flexible structure ($\beta = 0.54$), heuristic rules ($\beta = 0.25$), transformative leader ($\beta = 0.41$), horizontal communication ($\beta = 0.15$), and disruptive learning ($\beta = 0.12$), which integrate disruptive innovation, and centralization structure ($\beta = 0.36$), and hierarchical accountability ($\beta = -0.36$), which integrate incremental innovation. In a special situation, disruptive learning and hierarchical accountability (i.e.,

Table 1
Constructs, variable, and authors.

Construct	Latent variables	Variables	Estimated	Authors
Disruptive innovation	Flexible structure	A3ADAPTSORGANIZ2INOV	0,80	Devins & Kähr, 2010, McCarthy & Gordon, 2011, Tsai, 2002
		A2PRACTICES2INOV	0,82	
		A1ADJUSTSTRUCTURE	0,76	
	Organizational dynamic	B1FLEXIBLECULTURE		Tsai, 2002
		B2DINAMICPROCESS		
		B3PROMOTEOPEN2INOV		
	Heuristic rules	C1CREATENEWRULES	0,84	Zahra & George, 2002
		C2ADPTNEWROUTINES	0,95	
		C3NEWRULESBYORGANIZ	0,88	
	Transformation leader	D1LEADERADOPTSINOV	0,91	Simsek, 2009, Pandey & Sharma, 2009
		D2LEADERDINAMIC	0,91	
		D3LEADERCONCERNTRAINING	0,90	
	Horizontal communication	E1STRONGCOMMUNICATION	0,94	Hafkesbrink & Schroll, 2010
		E2STIMULATESOCIALRELATIONS	0,88	
		E3EASYCOMMUNICATION	0,76	
	Disruptive learning	F1GETADVICEFROMSTAKEHOLDER	0,77	Hess & Rothaermel, 2008
		F2ACCEPTCHANGE	0,90	
		F3SEEKNOELEDGE	0,93	
	Relational flexibility	G1STRONGRELATIONAL		Güttel & Konlechner, 2007
		G2STRONGCOOPERATION		
		G3IDENTIFYNEWINOV		
Incremental innovation	Centralized structure	AA1STRUCTURESTABILITY	0,60	Papachroni et al., 2016
		AA2CENTRALIZATION	0,78	
		AA3MANTAINSSSTRUCTURE	0,80	
	Organizational stability	BB1RESTRICTION2INOV		Tsai, 2002
		BB2ROUTINESSTABILITY		
		BB3SPIRITOPENS2INOV		
	Routinization rules	CC1ROULEFORMAL2INOV	0,81	Jansen et al. (2006)
		CC2RULESSEEKINOV	0,93	
		CC3MANTAINRULE2EFFICIENCY	0,85	
	Transactional leader	DD1LEADEREFFECTIVENESS2INOV		Simsek, 2009
		DD2LEADEREFFECTIVE2ACTION		
		DD3LEADERCARESSKILLS		
	Vertical communication	EE1FORMALCOMMUNICATION		Hafkesbrink & Schroll, 2010
		EE2NOINFORMALRELATIONS		
		EE3COMMUNICATIONRULES		
	Hierarchical accountability	FF1UPPERDECISIONS	0,64	Hafkesbrink & Schroll, 2014
		FF2INOVBYUPPERDECISION	0,75	
		FF3WEIGHTEDNEWKNOWLEDGE	0,85	
	Relational formality	GG1MANAGERATTENTION2RELATIONS	0,59	Güttel & Konlechner, 2007
		GG2INSTITUTIONALIZEDRULES	0,90	
		GG3RULES2INOV	0,87	
Output	Organizational performance	RVE1PAST3TEARSRESULTS	0,92	He & Wong, 2004; Jansen, Vera, & Crossan, 2009, Tushman & O'Reilly III, 1996; O'Reilly III & Tushman, 2004; Raisch et al., 2009
		RVE2LAST3YEARSSALES	0,87	
		RVE3LAST3YEARSEFFICIENCY	0,69	
	Innovation capacity	CI1LAST3YEARSINOV BET	0,83	Birkinshaw & Gupta, 2013, Nosella et al., 2012, O'Reilly & Tushman, 2008
		CI2LAST3YEARSINOV PROFIT	0,82	
		CI3LAST3YEARSINOVSALES	0,82	

Table 2
Company innovation typology.

	Min	Max	Average	Std. deviation
Disruptive innovation	2	7	5.11	1.3
Incremental innovation	2	7	5.40	1.2
Innovation structures	2	7	5,26	1.4

Table 3
Company innovation score.

Percentage	1	2	3	4	5	6	7	Total
Disruptive innovation	1.5	4.0	6.9	13.4	28.7	35.1	10.4	
Incremental innovation	1.0	3.5	3.0	9.4	30.2	36.6	16.3	
Innovation structures	2.0	2.5	7.4	10.9	24.3	38.6	14.4	

Legend: 1- totally disagree; 2- I disagree moderately; 3- I disagree slightly; 4- do not agree nor disagree; 5- agree slightly; 6- I agree moderately; 7- totally agree.

decisions based on accountability levels) are influenced by innovation capacity.

In this research model, disruptive innovation is explained by a flexible structure, heuristic rules, transformative leader, horizontal communications, and disruptive learning. At the same time, innovation capacity is explained by a centralized structure, routinization of rules, hierarchical accountability, and relational formality. In short, the innovation capacity of SMEs is mainly ensured by conditions that enable disruptive innovation, while organizational performance is ensured by different conditions – those that allow them to perform incremental innovation.

In the second phase, the disruptive and incremental innovation constructs are used together. A relationship model is adjusted between each of these constructs and the observed output variables: bet on innovation, profitability of innovation, and sales from innovation for the innovation capacity construct and company results, volume of sales, and company efficiency for the organizational performance construct. Significant overall results are obtained, with the following indicators of the model's GoF: CMIN/DF: 4,12, IFI: 0.79, CFI: 0.79, and RMSEA: 0.124 (< 0.15); these indicate a sufficient fit for the structural

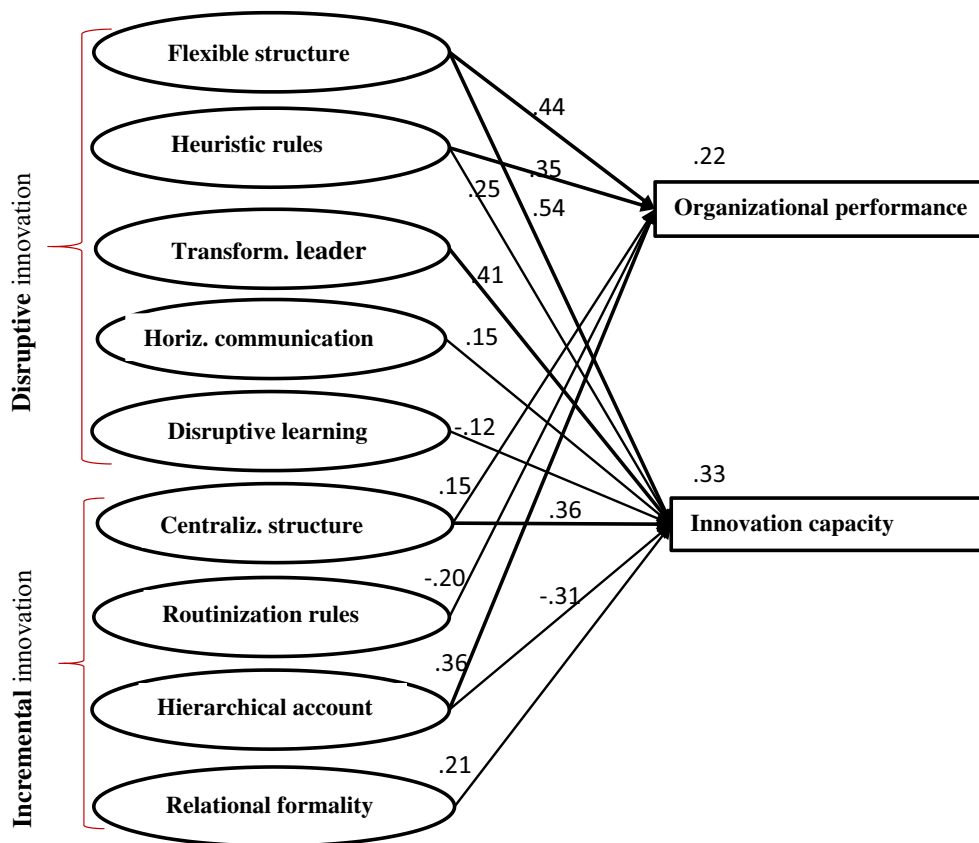


Fig. 2. Confirmation model.

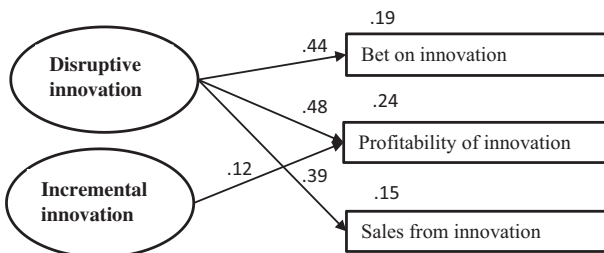


Fig. 3. Innovation capacity variables model.

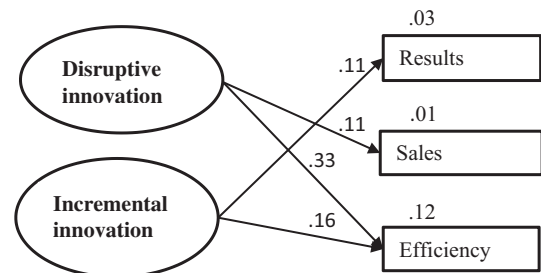


Fig. 4. Organizational performance variables model.

confirmation model (Fig. 3). The model explains bet on innovation ($R^2 = 0.19$) by disruptive innovation ($\beta = 0.44$), profitability of innovation ($R^2 = 0.24$) by disruptive innovation ($\beta = 0.48$), and incremental innovation ($\beta = 0.12$) and sales from innovation ($R^2 = 0.15$) by disruptive innovation ($\beta = 0.39$). Disruptive innovation has an AVE of 0.51, while incremental innovation has an AVE of 0.51.

The results show that innovation capacity is influenced by disruptive innovation in terms of innovation, profitability of investment in innovation, and sales volume from innovation. However, innovation capacity is weakly influenced by incremental innovation.

The influence of disruptive innovation and incremental innovation on output variables is determined: company results, sales volume, and company efficiency levels. Significant overall results are obtained with the following indicators of the model's GoF: CMIN/DF: 4,22, IFI: 0.78, CFI: 0.78, and RMSEA: 0.13 (< 0.15); these indicate a sufficient fit for the structural confirmation model (Fig. 4). The model explains efficiency ($R^2 = 0.12$) by disruptive innovation ($\beta = 0.33$), and incremental innovation ($\beta = 0.16$).

The results demonstrate that both enterprises results and sales volume variables, which identify organizational performance, have high variance with very poor representation. The efficiency variable, with

low variance, is influenced more by disruptive innovation than by incremental innovation.

5. Discussion

The objective of the study is to understand the organizational ambidexterity of SMEs and its relationship with organizational performance and innovation capacity. The analysis shows that disruptive innovation develops in organizational environments with flexible structures that are adaptable and open to learning, where communication is implicit, with informal and easy social relations between workers. Such an environment stimulates new rules when necessary for better adaptation of new routines, based on confidence and the ability to assimilate knowledge, which contributes to the leaders' inspirational and participative attitude. Hypothesis 1 (H1) is partially confirmed. The organizational dynamics expressed by flexibility and a culture of adaptation, ensuring development, the dynamic conditions of structures and processes, and the spirit of trust were not found. The same occurred with relational flexibility, involving interpersonal skills within the company among employees, particularly in its collaborative and

cooperative capacity at various levels of command. The literature refers to the importance of organizational ambidexterity to organizational performance through the ability to achieve innovation objectives without affecting the performance of existing businesses (He & Wong, 2004; Jansen, Vera, & Crossan, 2009; O'Reilly III & Tushman, 2004; Raisch et al., 2009). On the other hand, there is a need to separate the structures within the organization, because parallel structures are a solution to avoiding isolation between structurally separate units (Devins & Kähr, 2010; Tushman & O'Reilly III, 1996). Hafkesbrink and Schroll (2014) note the need to develop more disruptive forms of organizational design to provide maximum flexibility and absorption of knowledge in the process of innovation and the use of new knowledge. For example, in this study, disruptive innovation is strongly related to transformational leadership rather than transactional leadership (Jansen, Vera, & Crossan, 2009; Pandey & Sharma, 2009; Simsek, 2009).

SMEs adopt development strategies based on incremental innovation when they choose centralized structures for strong stability and easier control, defending against confrontations that jeopardize the development and productivity conditions. These companies adopt strong routines, through formalization of control rules, to ensure the assimilation of knowledge and conditions of efficiency. This strongly contributes to the hierarchical responsibilities established as the ability to make decisions at various levels, primarily involving difficulties with the adoption of new knowledge. Relational formality between employees and the need to establish trust conditions provide relevant support to ensure access to new technological knowledge, although conditioned by established rules. Hypothesis 2 (H2) is partially confirmed. Organizational stability, ensured by the company's structures and processes that guarantee routines, and the spirit of openness to innovation, regarded as a support for the activity, did not contribute to incremental innovation. The attitude of the leader focused on effectiveness and results based on innovation did not contribute either, although this type of leader is perceived by employees as very effective, competent, committed to the company and a defender of the practical fitness of workers. Incremental innovation does not benefit from communication between workers that is formal, or rule based, which strongly discourages informal tacit knowledge and informal social relationships.

The literature reports that formalization and centralization positively influence an organization's incremental innovation (Jansen et al., 2006; Tsai, 2002), which confirms this result. The use of functional expertise is important (Ketokivi, 2008); thus, the top-down knowledge inflows of a manager are positively engaged in incremental innovation activities (Bledow et al., 2009; Mom et al., 2007). Suzuki (2014) argues that the efficiency of an organization is negatively associated with a greater degree of organizational ambidexterity, which is mitigated when the organization relies on its capacity for innovation, learning, or specialization. In an environment of incremental innovation, transactional leadership is applied, (Jansen, Vera, & Crossan, 2009; Pandey & Sharma, 2009), which was not evident.

The results of the analysis demonstrate that incremental innovation and disruptive innovation have similar effects on the organizational performance of SMEs, with emphasis on efficiency. The company results, and volume of sales, are not relevant. Hypothesis 3 (H3) is not confirmed. Some authors (e.g., Hannan & Freeman, 1984; Siggelkow, 2001) observe that in efficiency-oriented organizations, the bet on efficiency concentration is more reliable and accountable, and the organizations are characterized by greater changes in choices relative to organizational structure, capacity, and resources.

A focus on innovation, return on investment, and sales volume from innovation are strongly influenced by disruptive innovation, in contrast with incremental innovation. Hypothesis 4 (H4) is confirmed. The literature reports that the ability of individuals to take initiative and recognize opportunities outside their field of activity creates potential synergies (Birkinshaw & Gibson, 2004).

6. Conclusions and contributions

This study demonstrates the importance of organizational ambidexterity. However, it is difficult to deal with disruptive innovation, which requires great flexibility of rules and routines to develop the ease of informal communication and cultivate new knowledge while also dealing with the need to ensure application of the processes of incremental innovation. This requires greater rigidity of hierarchical structures, greater formality in communications, and a more centralized and formal leadership. Incremental innovation has greater effects on organizational performance, but the preponderant influence in this research is from disruptive innovation to innovation capacity. Disruptive learning and hierarchical accountability have a negative influence on innovation capacity, and routinization of rules has a negative influence on organizational performance.

This study makes a significant contribution to the literature by confirming the importance of ambidexterity in small and medium enterprises and stressing the difficulties in developing the conditions for disruptive innovation and realizing its practical application. The role of managers' behaviors in ambidextrous organizations is a relevant area for future research.

This study is subject to limitations related to sample size and geographical coverage, so it is important that future research validate the model with results from countries other than Portugal.

References

- Andriopoulos, C., & Lewis, M. W. (2010). Managing innovation paradoxes: Ambidexterity lessons from leading product design companies. *Long Range Planning*, 43(1), 104–122.
- Batt, R. (2002). Managing customer services: Human resource practices, quit rates, and sales growth. *Academy of Management Journal*, 45, 587–597.
- Birkinshaw, J., & Gibson, C. (2004). Building ambidexterity into an organization. *MIT Sloan Management Review*, 45(4), 47–55.
- Birkinshaw, J., & Gupta, K. (2013). Clarifying the distinctive contribution of ambidexterity to the field of organization studies. *Academy of Management Perspectives*, 27(4), 287–298.
- Bledow, R., Frese, M., Anderson, N., Erez, M., & Farr, J. (2009). A dialectic perspective on innovation: Conflicting demands, multiple pathways, and ambidexterity. *Industrial and Organizational Psychology*, 2(3), 305–337.
- Boumgarden, P., Nickerson, J., & Zenger, T. R. (2012). Sailing into the wind: Exploring the relationships among ambidexterity, vacillation, and organizational performance. *Strategic Management Journal*, 33(6), 587–610.
- Breitzman, A., & Hicks, D. (2008). *An analysis of small business patents by industry and firm size*. Washington, D.C.: SBA Office of Advocacy.
- Brion, S., Mothe, C., & Sabatier, M. (2010). The impact of organizational context and competences on innovation ambidexterity. *International Journal of Innovation Management*, 14(2), 151–178.
- Burgelman, R. A. (1991). Intraorganizational ecology of strategy making and organizational adaptation: Theory and field research. *Organization Science*, 2(3), 239–262.
- Burns, T., & Stalker, G. M. (1961). *The management of innovation*. London: Tavistock.
- Cantarello, S., Martini, A., & Nosella, A. (2012). A multi-level model for organizational ambidexterity in the search phase of the innovation process. *Creativity & Innovation Management*, 21(1), 28–48.
- Cao, Q., Gedajlovic, E., & Zhang, H. (2009). Unpacking organizational ambidexterity: Dimensions, contingencies, and synergistic effects. *Organization Science*, 20(4), 781–796.
- Christensen, C. M., & Bower, J. L. (1996). Customer power, strategic investment, and the failure of leading firms. *Strategic Management Journal*, 17(3), 197–218.
- Cohen, W. M., & Levinthal, D. A. (1990). Absorptive capacity: A new perspective on learning and innovation. *Administrative Science Quarterly*, 35, 128–152.
- Cyert, R., & March, J. G. (1963). *Behavioral theory of the firm*. Englewood Cliffs, NJ: Prentice Hall.
- Devins, G., & Kähr, C. (2010). Structuring ambidextrous organizations: Exploitation and exploration as a key for long-term success. In L. Stadler, A. Schmitt, P. Klarner, & T. Straub (Eds.), *More than bricks in the wall: Organizational perspectives for sustainable success* (pp. 60–67). Springer-Gabler: Wiesbaden.
- Eisenhardt, K. M., Furr, N. R., & Bingham, C. B. (2010). Micro foundations of performance: Balancing efficiency and flexibility in dynamic environments. *Organization Science*, 21(6), 1263–1273.
- Fang, C., Lee, J., & Schilling, M. A. (2010). Balancing exploration and exploitation through structural design: The isolation of subgroups and organizational learning. *Organization Science*, 21(3), 625–642.
- Fuchs, P. H., Miffin, K. E., Miller, D., & Whitney, J. O. (2000). Strategic integration: Competing in the age of capabilities. *California Management Review*, 42(3), 118–147.
- Geerts, A., Blindenbach-Driessen, F., & Gemmel, P. (2010). Achieving a balance between exploration and exploitation in service firms: A longitudinal study. *Academy of Management Proceedings*, 2010(1), 1–6.

- Gibson, C. B., & Birkinshaw, J. (2004). The antecedents, consequences, and mediating role of organizational ambidexterity. *Academy of Management Journal*, 47(2), 209–226.
- Gupta, A. K., Smith, K. G., & Shalley, C. E. (2006). The interplay between exploration and exploitation. *Academy of Management Journal*, 49(4), 693–706.
- Gupta, A. K., Tesluk, P. E., & Taylor, M. S. (2007). Innovation at and across multiple levels of analysis. *Organization Science*, 18(6), 885–897.
- Güttel, W. H., & Konlechner, S. W. (2007). Dynamic capabilities and competence obsolescence: Empirical data from research-intensive firms. *Proceedings of OLKC – Learning fusion* (pp. 357–374).
- Güttel, W. H., & Konlechner, S. W. (2009). Continuously hanging by a thread: Managing contextually ambidextrous organizations. *Schmalenbach Business Review*, 61(2), 150–172.
- Hafkesbrink, J., Bachem, C., & Kulenovic, D. (2013). Contextual ambidexterity and individual competencies for exploration and exploitation in small and medium sized enterprises. In, Hafkesbrink, J. & Shire, K. (2013). *Flexibilität und Stabilität in der verlags- und medienbranche – Konzepte beidhändiger Unternehmensstrategien*. Schriften zu Kooperations- und Mediensystemen. Band, 34, 65–170.
- Hafkesbrink, J., & Schroll, M. (2010). Organizational competences for open innovation in small and medium sized enterprises of the digital economy. In, Hafkesbrink, J., Hoppe, H.-U., and Schlichter, J. (2010) Eul Verlag: Competence management for open innovation – tools and IT-support to unlock the potential of open innovation.
- Hafkesbrink, J., & Schroll, M. (2014). Ambidextrous organizational and individual competencies in open innovation: The dawn of a new research agenda. *Journal of Innovation Management*, 2(1), 9–46.
- Hair, J. F., Anderson, R. E., Tatham, R. L., & Black, W. C. (1998). *Multivariate data analysis* (5th ed.). Prentice-Hall: New Jersey.
- Hannan, M. T., & Freeman, J. (1984). Structural inertia and organizational change. *American Sociological Review*, 49(2), 149–164.
- He, Z. L., & Wong, P. K. (2004). Exploration vs. exploitation: An empirical test of the ambidexterity hypothesis. *Organization Science*, 15(4), 481–494.
- Hess, A. M., & Rothaermel, F. T. (2008). *Ambidexterity and innovative performance: The role of intellectual human capital and strategic alliances*. Georgia Institute of Technology: Working Paper.
- Jansen, J., van den Bosch, F., & Volberda, H. (2006). Exploratory innovation, exploitative innovation, and performance: Effects of organizational antecedents and environmental moderators. *Management Science*, 52(11), 1661–1674.
- Jansen, J., Vera, D., & Crossan, M. (2009). Strategic leadership for exploration and exploitation: The moderating role of environmental dynamism. *Leadership Quarterly*, 20, 5–18.
- Jansen, J. P., van den Bosch, F. J., & Volberda, H. W. (2005). Exploratory innovation, exploitation innovation, and ambidexterity: The impact of environmental and organizational antecedents. *Schmalenbach Business Review*, 57(4), 351–363.
- Jansen, J. P., van den Bosch, F. J., & Volberda, H. W. (2009). Structural differentiation and ambidexterity: The mediating role of integration mechanisms. *Organization Science*, 20(4), 797–811.
- Ketokivi, M. (2008). *Contesting functional specialization: The case of ambidextrous manufacturing*. Finland: Helsinki University of Technology. Department of Industrial Engineering and Management. Helsinki University of Technology.
- Konlechner, S., & Güttel, W. (2010). Die evolution von replikationsstrategien im spannungsfeld von exploration und exploitation. *Stephan & Kerber*, 27–56.
- Lavie, D., Stettner, U., & Tushman, M. L. (2010). Exploration and exploitation within and across organizations. *The Academy of Management Annals*, 4(1), 109–155.
- Lawrence, P. R., & Lorsch, J. W. (1967). Differentiation and integration in complex organizations. *Administrative Science Quarterly*, 12(1), 1–47.
- Lewis, M. W., Andriopoulos, C., & Smith, W. K. (2014). Paradoxical leadership to enable strategic agility. *California Management Review*, 56(3), 58–77.
- Lubatkin, M. H., Simsek, Z., Yan, L., & Veiga, J. F. (2006). Ambidexterity and performance in small to medium-sized firms: The pivotal role of top management team behavioral integration. *Journal of Management*, 32(5), 646–672.
- March, J. G. (1991). Exploration and exploitation in organizational learning. *Organization Science*, 2(1), 71–87.
- Martini, A., Laugen, B. T., Gastaldi, L., & Corso, M. (2013). Continuous innovation: Towards a paradoxical, ambidextrous combination of exploration and exploitation. *International Journal of Technology Management*, 61(1), 1–22.
- McCarthy, I. P., & Gordon, B. R. (2011). Achieving contextual ambidexterity in R&D organizations: A management control system approach. *R&D Management*, 41(3), 240–258.
- Miller, B. A., & Swope, S. (2007). Assessing organizational performance in higher education. *International Journal of Educational Advancement*, 16(3), 258–263.
- Miller, D., & Friesen, P. H. (1983). Strategy-making and environment: The third link. *Strategic Management Journal*, 4, 221–235.
- Mom, T. M., van den Bosch, F. J., & Volberda, H. W. (2007). Investigating managers' exploration and exploitation activities: The influence of top-down, bottom-up, and horizontal knowledge inflows. *Journal of Management Studies*, 44(6), 910–931.
- Mom, T. M., van den Bosch, F. J., & Volberda, H. W. (2009). Understanding variation in managers' ambidexterity: Investigating direct and interaction effects of formal structural and personal coordination mechanisms. *Organization Science*, 20(4), 812–828.
- Nosella, A., Cantarello, S., & Filippini, R. (2012). The intellectual structure of organizational ambidexterity: A bibliographic investigation into the state of the art. *Strategic Organization*, 10(4), 450–465.
- O'Reilly, C. A., & Tushman, M. L. (2008). Ambidexterity as a dynamic capability: Resolving the innovator's dilemma. *Research in Organizational Behavior*, 28, 185–206.
- O'Reilly, C. A., II, & Tushman, M. L. (2011). Organizational ambidexterity in action: How managers explore and exploit. *California Management Review*, 53(4), 5–22.
- O'Reilly, C. A., III, & Tushman, M. L. (2004). The ambidextrous organization. *Harvard Business Review*, 82(4), 74–81.
- Pandey, S., & Sharma, R. K. (2009). Organizational factors for exploration and exploitation: A conceptual review. *Journal of Technology Management Innovation*, 4(1), 48–58.
- Papachroni, A., Heracleous, L., & Paroutis, S. (2016). In pursuit of ambidexterity: Managerial reactions to innovation–efficiency tensions. *Human Relations*, 69(9), 1791–1822.
- Raisch, S., & Birkinshaw, J. (2008). Organizational ambidexterity: Antecedents, outcomes, and moderators. *Journal of Management*, 34(3), 375–409.
- Raisch, S., Birkinshaw, J., Probst, G., & Tushman, M. L. (2009). Organizational ambidexterity: Balancing exploitation and exploration for sustained performance. *Organization Science*, 20(4), 685–695.
- Richard, P. J., Devinney, T. M., Yip, G. S., & Johnson, G. (2009). Measuring organizational performance: Towards methodological best practice. *Journal of Management*, 35(3), 718–804.
- Sarkees, M., & Hulland, J. (2009). Innovation and efficiency: It is possible to have it all. *Business Horizons*, 52(1), 45–55.
- Shaw, J. D., Gupta, N., & Delery, J. E. (2005). Alternative conceptualizations of the relationship between voluntary turnover and organizational performance. *Academy of Management Journal*, 48, 50–68.
- Siggelkow, N. (2001). Change in the presence of fit: The rise, the fall, and the renaissance of Liz Claiborne. *Academy of Management Journal*, 44(4), 838–857.
- Siggelkow, N., & Levinthal, D. A. (2003). Temporarily divide to conquer: Centralized, decentralized, and reintegrated organizational approaches to exploration and adaptation. *Organization Science*, 14(6), 650–669.
- Simsek, Z. (2009). Organizational ambidexterity: Towards a multilevel understanding. *Journal of Management Studies*, 46(4), 597–624.
- Sivadas, E., & Dwyer, R. F. (2000). An examination of organizational factors influencing new product success in internal and alliance-based processes. *Journal of Marketing*, 64(1), 31–49.
- Spanos, Y. E., Zaralis, G., & Lioukas, S. (2004). Strategy and industry effects on profitability: Evidence from Greece. *Strategic Management Journal*, 25(2), 139–165.
- Stavrou, E. T. (2005). Flexible work bundles and organizational competitiveness a cross-national study of the European work context. *Journal of Organizational Behavior*, 26, 923–947.
- Suzuki, O. (2014). How innovators resolve the exploitation-exploration trade-off? Evidence from the Japanese pharmaceutical industry. *Journal of Innovation Management*, 2(1), 47–68.
- Tripsas, M., & Gavetti, G. (2000). Capabilities, cognition, and inertia: evidence from digital imaging. *Strategic Management Journal*, 21(10–11), 1147–1161.
- Tsai, W. (2002). Social structure of “cooperation” within a multiunit organization: Coordination, competition, and intraorganizational knowledge sharing. *Organization Science*, 13(2), 179–190.
- Turner, N., Swart, J., & Maylor, H. (2013). Mechanisms for managing ambidexterity: A review and research agenda. *International Journal of Management Reviews*, 15(3), 317–332.
- Tushman, M. L., & O'Reilly, C. A., III (1996). Ambidextrous organizations: Managing evolutionary and revolutionary change. *California Management Review*, 38(4), 8–30.
- Uotila, J., Maula, M., Keil, T., & Zahra, S. A. (2009). Exploration, exploitation, and financial performance: Analysis of S&P 500 corporations. *Strategic Management Journal*, 30(2), 221–231.
- Van Iddekinge, C. H., Ferris, G. R., Perrewé, P. L., Perryman, A. A., Blass, F. R., & Heetderks, T. D. (2009). Effects of selection and training on unit-level performance over time: A latent growth modeling approach. *Journal of Applied Psychology*, 94, 829–843.
- Zahra, S. A., & George, G. (2002). Absorptive capacity: A review, reconceptualization, and extension. *Academy of Management Review*, 27(2), 185–203.
- Zollo, M., & Singh, H. (2004). Deliberate learning in corporate acquisitions: Post-acquisition strategies and integration capability in U.S. bank mergers. *Strategic Management Journal*, 25, 1233–1256.
- Zollo, M., & Winter, S. G. (2002). Deliberate learning and the evolution of dynamic capabilities. *Organization Science*, 13(3), 339–351.