

UDC: 334.06
JEL: O30; O32; O39; L20

MOVING TO AMBIDEXTROUS ORGANIZATION: A SYSTEMATIC LITERATURE REVIEW

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For citation: Smara R., Bogatyreva K. A. 2023. Moving to ambidextrous organization: A systematic literature review. *Vestnik of Saint Petersburg University. Management* 22 (2): 191–225.
<https://doi.org/10.21638/11701/spbu08.2023.203>

The existing studies support the positive impact of organizational ambidexterity on a firm's performance and its ability to succeed in the dynamic environments resulted from the COVID-19 pandemics or contexts characterized by a variety of rising tensions. In business organizations, ambidexterity manifests itself in maintaining a balance between exploration and exploitation strategies. Achieving ambidexterity is a challenging managerial task. The purpose of this paper is to identify behaviours of firms to increase their ability to develop and maintain ambidexterity as well as specify organizational systems and processes that induce and balance both exploitation and exploration. The authors develop an integrative framework that provides a comprehensive understanding of the path towards ambidexterity in organizations. This review reveals the fact that with the purpose to meet the conflicting demands of the ambidexterity agenda, managers should adapt the organizational culture, strategic goals and structure in order to implement two incompatible innovation strategies. The study identifies three closely related ambidexterity support systems and their underlying mechanisms, procedures, and leadership styles. Also, the main gaps in the literature and relevant directions for further empirical research are outlined.

Keywords: ambidexterity, balance, exploration, exploitation.

INTRODUCTION

Extant research has confirmed the positive impact of ambidexterity on firm performance and there is a consensus that businesses that are ambidextrous in dynamic contexts, such as COVID-19 pandemic or economic and political crises, are those that succeed. The ability of an organization to pursue both exploratory and exploitative innovation is referred to as organizational ambidexterity [Tushman, O'Reilly, 1996]. The benefits of ambidexterity are widely acknowledged and achieving both exploitation and exploration can be beneficial for sustainable performance [Jansen et al., 2006; Lubatkin et al., 2006], competitive advantage [Gonzalez, De Melo, 2018; O'Reilly, Tushman, 2013], survival, and resilience [Iborra, Safón, Dolz, 2020]. Recent evidence suggests that ambidexterity is a key construct in context of crisis due to its strong empirical link with survival [Dolz, Iborra, Safón, 2019], level and variability of firm performance [Smara et

This research has been conducted with financial support from the Russian science foundation grant (project No. 21-78-10024), <https://rscf.ru/en/project/21-78-10024/>

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al., 2022], and organizational resilience [Iborra, Safón, Dolz, 2020]. New organizational antecedents of ambidexterity have been identified in crisis periods [Alcalde-Heras, Iturrioz-Landart, Aragon-Amonarriz, 2019; Dolz, Iborra, Safón, 2019]. Ambidexterity was also investigated in novel contexts such as the Internet of Things, Big Data Analytics, and Industry 4.0 technologies [Gastaldi et al., 2022; Bresciani, Ferraris, Del Giudice, 2018; Rialti et al., 2019].

An ambidextrous innovation orientation is a challenging task, as exploration and exploitation are two contrasting agendas that raise mutual tensions [Raish et al., 2009]. Thus, only a limited number of businesses are successful in fostering the dual objectives. Successfully implementing an innovative ambidexterity strategy has drawn substantial interest from scholars, which leads to a veritable deluge of studies. Prior research has identified three generic mechanisms for reconciling the competing demands of exploration and exploitation.

First, ambidexterity can be achieved sequentially through temporal shifting that oscillates back and forth between cycles of exploration and exploitation [Duncan, 1976]. The main challenge of this approach is to effectively manage transitions between periods of exploration and exploitation. Within the second approach, organizations must simultaneously explore and exploit in order to survive times of fast change because sequential ambidexterity may be unsuccessful [Tushman, O'Reilly, 1996]. Then, the third approach implies that ambidexterity is achieved by creating very distinct units for exploration and exploitation, each unit having its own alignment of staff, structure and cultural settings while integrating structurally in a targeted manner [Tushman, O'Reilly, 1996]. Each of these generic mechanisms that have been the focus of the literature has its merits and limitations. As a result, the consensus regarding ways to effectively achieve organizational ambidexterity is yet to be achieved.

To date, there has been significant advancement in understanding the way to achieve ambidexterity, considering organizational culture [Wang, Rafiq, 2014], the pivotal role of top management team (TMT) [Lubatkin et al., 2006], and transformational leadership styles [Jansen et al., 2008]. At the same time, antecedents have mostly been addressed on an isolated basis. Recent evidence suggests that the management of paradoxes has become a shared responsibility, not only by top management, but also by all levels of the organization [Andriopoulos, Lewis, 2009]. The three approaches to ambidexterity are covered in-depth in earlier research, but recent literature tries to combine them and shows that they can be considered as co-existing drivers and may be related in practice. According to [Ossenbrink, Hoppmann, Hoffmann, 2019], companies can adapt to contexts marked by uncertain opportunities requiring novel capabilities when they combine elements of structural and contextual ambidexterity. To manage exploration/exploitation paradox, organizations must combine the concepts and strategies of all three types of ambidexterity [Chen, 2017].

The understanding of how organizations attain ambidexterity has grown and deepened as a result of the surge in interest, but it has also led in a lack of agreement about the ways that facilitate the pursuit of an ambidextrous innovation portfolio. Considering

the lack of a unified framework due to the dynamic nature of ambidexterity, the purpose of this paper is to organize the fragmented literature, to synthesize the present rich body of research on ambidexterity and to identify the mechanisms (processes, systems and structures) of ambidexterity, resources and capabilities that are behind at all level of organization and in different context, which can be applied in an isolated or combined basis to sustain organizational ambidexterity over time. The study also pinpoints areas that require additional research.

As a result, the following research question was formulated: *how do organizations attain and maintain ambidexterity?*

To answer the research question, this article involves a systematic collection and analysis of relevant research on organizational ambidexterity based on an in-depth study of 80 peer-reviewed journal articles published between 2000 and January 2022. The review highlights the need to move beyond processes to achieve the balanced view of ambidexterity and reveals that pursuing the dual objective of supporting exploration and exploitation necessitates changing the organizational structure and building support systems, control, R&D and information technology systems to fulfill the competing demands. This study provides richer insight of the role of frontline, middle, and senior managers, as well as their behavior toward organizational ambidexterity. An organizational culture and supportive contextual factors can help accomplish everyday duties while also encouraging risk-taking and innovation, achieving a balance between the two conflicting goals of ambidexterity. Furthermore, the results suggest that the development of new organizational capabilities play a pivotal role in promoting ambidexterity at all times. This systematic literature review not only offers a comprehensive overview of the literature on organizational ambidexterity, but also addresses systems, processes and capabilities and how they are related to fulfill the competing demands of exploration and exploitation.

The paper is organized as follows. In the first section, the description of key basic notions of organizational ambidexterity are presented. In the second section, the explanation of the methodological process and the description of some characteristics of the studies reviewed are provided. In the third section, the theoretical underpinnings of ambidextrous organization are elaborated. In the fourth section, the main results related to the categorization of the literature in terms of organizational and management antecedents are reported. In the fifth section, these results along with the future research directions are discussed. Finally, in the sixth section, the theoretical and practical implications are discussed. In conclusion, the main outcomes of the study are highlighted.

THE CONCEPT OF AMBIDEXTERITY

In his seminal article, J. G. March emphasized that exploration and exploitation are essential for survival and prosperity [March, 1991]. Since that time, this topic has attracted a great deal of attention [He, Wong, 2004; Randhawa et al., 2021]. According to March, exploitation involves “refinement, choice, production, efficiency, selection, implementation, and execution”, while exploration entails “search, variation, risk-taking, exper-

imentation, play, flexibility, discovery, and innovation” [March, 1991]. Most studies have argued that organizations need to become ambidextrous and maintain a high degree of balance between exploitation and exploration [Simsek, 2009]. Z. He and P. Wong expanded on this concept to encompass two aspects of innovation: 1) explorative innovation, which equates to radical innovation targeted at meeting the demands of newly emerging markets or customers, and 2) exploitative innovation, which equates to incremental innovation aimed at meeting the needs of existing markets or customers [He, Wong, 2004].

Innovative exploration and exploitation are contrasting activities which can create internal strategic tensions [He, Wong, 2004; Lavie, Stettner, Tushman, 2010]. Excessive exploitation produces inertia, which hinders adaptation and could harm long-term company performance. Similar to over exploring, underexploiting opportunities means losing out on opportunities and could have a negative impact on organizational performance in the short term [Lavie, Stettner, Tushman, 2010; Senaratne, Wang, 2018]. More and more, it is believed that the successful businesses are those that can balance both exploratory and exploitative innovation. In truth, ambidexterity is a complex phenomenon and organizations have to manage the paradox of efficiency and flexibility [Adler, Goldoftas, Levine, 1999], adaptability and alignment [Gibson, Birkinshaw, 2004], incremental and radical innovation [Raisch, Birkinshaw, 2008], as well as incremental and evolutionary change [Tushman, O’Reilly, 1996].

Ambidexterity has been examined from both operational and strategic perspectives at the organizational level [Lubatkin et al., 2006]. The requirement for ambidexterity is the implementation of operational processes that must be flexible enough while maintaining high levels of efficiency to adapt and enhance over time [Adler et al., 2009]. Operational ambidexterity is therefore defined by [Patel, Terjesen, Li, 2012] as the simultaneous pursuit of exploration and exploitation by an operational unit. According to [Raisch, Birkinshaw, 2008], strategic ambidexterity is the capacity to simultaneously manage the needs of today’s business while being adaptable to changes in the environment. This is related to the strategic capability of simultaneously pursuing the twin objectives of exploration and exploitation. Organizations that have both high levels of strategic flexibility and commitment to product-market strategy also demonstrate high levels of strategic ambidexterity, according to [Kouropalatis, Hughes, Morgan, 2012].

In sum, there is broad consensus among academics regarding the necessity of a balance between exploitative and exploratory innovation; they contend that doing so is crucial for survival and prosperity. The contrasting demands of short-term efficacy and long-term effectiveness are thus attempted to be balanced by organizations, however, in practice a perfect balance of the conflicting goals is challenging.

METHODOLOGY

A systematic review is a multi-stage review process that provides a rigorous methodology for evaluating current state of the art in the literature on a specified topic [Pit-taway et al., 2004]. To identify and extract relevant information about the area of interest

from all published research, the methodology proposed in [Tranfield, Denyer, Smart, 2003] was followed along with assessment of the large body of literature with the following key points: establishment of goals and objectives; a comprehensive search of all relevant studies using explicit inclusion/exclusion criteria; summary of studies using an explicit framework; and understandable presentation of results.

In January 2022, the search was conducted using the terms “ambidext*” OR “exploration and exploitation” OR “exploration vs. exploitation” OR “exploration, exploitation” in the Web of Science database to conduct a preliminary literature search. The search was limited to journal articles exclusively, leaving out conference papers, book chapters, journals, and conference proceedings. The search yielded a total of 2 152 items. Therefore, 270 records were excluded because they were not from the Chartered Association of Business Schools Academic Journals Guide (ABS list), and 783 records were excluded below the ABS list 3. This process identified 1 099 articles. The authors examined the title, abstract, and keywords of each publication to find relevant articles, and only empirical and conceptual papers specifically addressing how to achieve ambidexterity were retained. During this process, certain papers were excluded, such as studies that did not incorporate ambidexterity (or the equivalent of the combination of exploration and exploitation) or publications that used ambidexterity in fields other than management. After applying this approach, there were 80 studies left to consider.

Of the 80 studies, 7 were classified as conceptual or theoretical papers, while 73 were based on empirical field research, including 14 qualitative (based on cases and/or interviews) and 59 quantitative (based on survey data and statistical analysis). The distribution of articles by type of research design shows that 91,25% are empirical studies and 8,75% are conceptual ones.

Table 1 lists the 35 journals in which these papers were published, along with the ABS 2021 journal rankings covering the field of marketing, management, international business and organization science.

Table 1. Journal sources of referenced papers

Journal	Number of papers
1	2
<i>Organization Science</i> (4*)	8
<i>Journal of Management Studies</i> (4)	6
<i>Technological Forecasting and Social Change</i> (3)	5
<i>Journal of Product Innovation Management</i> (4)	5
<i>Research Policy</i> (4*)	5
<i>Journal of Management</i> (4*)	4

Continuation of Table 1

1	2
<i>Academy of Management Journal</i> (4*)	4
<i>Journal of Business Research</i> (3)	3
<i>Long Range Planning</i> (3)	3
<i>Strategic Management Journal</i> (4*)	3
<i>California Management Review</i> (3)	3
<i>IEEE Transactions on Engineering Management</i> (3)	3
<i>Academy of Management Perspectives</i> (4)	3
<i>International Journal of Human Resource Management</i> (3)	2
<i>Leadership Quarterly</i> (4)	2
<i>Management Accounting Research</i> (3)	2
<i>Journal of Operations Management</i> (4*)	1
<i>Management and Organization Review</i> (3)	1
<i>Business Strategy and the Environment</i> (3)	1
<i>British Journal of Management</i> (4)	1
<i>Accounting, Organizations and Society</i> (4*)	1
<i>Journal of Strategic Information Systems</i> (4)	1
<i>European Management Review</i> (3)	1
<i>International Journal of Contemporary Hospitality Management</i> (3)	1
<i>R and D Management</i> (3)	1
<i>Journal of the Association for Information Systems</i> (4*)	1
<i>Research in Organizational Behavior</i> (3)	1
<i>Human Relations</i> (4)	1
<i>European Journal of Work and Organizational Psychology</i> (3)	1
<i>Academy of Management Annals</i> (4*)	1
<i>Management Learning</i> (3)	1
<i>International Journal of Management Reviews</i> (3)	1

1	2
<i>Human Resource Management</i> (4)	1
<i>Industrial Marketing Management</i> (3)	1
<i>Academy of Management Review</i> (4*)	1

Note: in the round brackets Journal Rating is placed: 4* — A+ level; 4 — A level; 3 — B level; 2 — C level; 1 — D level.

The richness of the contributions reveals the multidisciplinary nature of the concept of ambidexterity, which attracts experts from various disciplines. As such, the notion of ambidexterity has received much attention in management research and has also gained considerable attention from scholars researching organizational learning, innovation, and adaptation.

THEORETICAL FOUNDATION FOR ORGANIZATIONAL AMBIDEXTERITY

The late 1970s are when ambidexterity first emerged as an organizational concept [Duncan, 1976]. Twenty years later, connection between the implementation of evolutionary and revolutionary change and ambidextrous organizations was made [Tushman, O'Reilly, 1996]. On the basis of March's study, exploration and exploitation in organizational learning as stream of research had started to develop [March, 1991]. And as researchers began to consider the idea of ambidexterity in organizations, March's theoretical concepts served as a helpful compass. A wide range of literatures, including those on organizational learning [March, 1991], organizational innovation [He, Wong, 2004; Wei, Yi Guo, 2014], design [Tushman, O'Reilly, 1996], behavior [Simsek, 2009], and adaptation [Benner, Tushman, 2003; Birkinshaw, Zimmermann, Raisch, 2016] have studied the concept of ambidexterity. The ambidexterity construct has been employed in the context of technological innovation [He, Wong, 2004] and extended to define a new typology of ambidexterity in terms of technological innovation strategy. Since then, theoretical underpinnings have been elaborated to explain the concept of ambidextrous organization.

As the nature of the concept of ambidexterity is complex, there have been a number of theories used by researchers to explain both the concept and the multiple pathways leading to it. Typically, a theory can explain and describe how concepts are related to each other (cause and effect) and justify the nature of the relationship [Saunders, Lewis, Thornhill, 2009]. According to extant literature, context is the largely invisible collection of influences and pressures that might mold people's behaviour toward ambidexterity on an individual and collective level [Andriopoulos, Lewis, 2009]. The theory can be applied in this case to predict new outcomes if the factors on which it is based are changed, in addition to explaining why the relationship has changed [Kivunja, 2018].

The main theories used by the authors of the selected empirical studies are represented in Table 2.

Table 2. Main theories in the selected papers

Theory	Examples of studies using the theory
Resource-based view	[Gibson, Birkinshaw, 2004; Auh, Menguc, 2005; Filippetti, Archibugi, 2011; Bresciani, Ferraris, Del Giudice, 2018; Gonzalez, De Melo, 2018; Ūbeda-García et al., 2018; Ko, Liu, 2019; Rialti et al., 2019; Swart et al., 2019; Zouaghi, Sánchez, Martínez, 2018; Gastaldi et al., 2022]
Knowledge-based perspective	[Mom, Van Den Bosch, Volberda, 2007; De Clercq, Dimov, 2008; Birkinshaw, Gupta, 2013; Gonzalez, De Melo, 2018]
Organizational learning theory	[Auh, Menguc, 2005; Wei, Yi, Guo, 2014; Božič, Dimovski, 2019]
Upper echelon theory	[Vera, Crossan, 2004; Smith, Tushman, 2005; Cao, Gedajlovic, Zhang, 2009; Lubatkin et al., 2006; Mom, Van Den Bosch, Volberda, 2007; Cao, Simsek, Zhang, 2010; Birkinshaw, Gupta, 2013; Venugopal et al., 2019]
Absorptive capacity theory	[O'Reilly, Tushman, 2008; Lichtenthaler, 2009; Wei, Yi, Guo, 2014; Božič, Dimovski, 2019]
Organizational theory of dynamic capabilities	[Benner, Tushman, 2003; He, Wong, 2004; O'Reilly, Tushman, 2008; Birkinshaw, Zimmermann, Raisch, 2016; Božič, Dimovski, 2019]
Human capital theory	[Lin, McDonough, 2011; Turner, Lee-Kelley, 2013]

The theory that receives the most citations in the articles is resource-based view, which analyzes the resources required to develop ambidexterity capabilities in stable environments and turbulent contexts. The definition of resources in the context of resource-based theory is all the assets, competencies, organizational processes, information, knowledge, etc., that allow the firm to develop and put into practice successful strategies to attain superior competitive advantage [Auh, Menguc, 2005]. Recent research suggests that in order to take advantage of organizational ambidexterity, organizations need dynamically reconfigure their resource portfolios [Wei, Yi, Guo, 2014]. According to the firm's knowledge-based perspective, the cumulative and dependent nature of the knowledge requires companies to build strong internal capabilities to meet their strategic goals [Zouaghi, Sánchez, Martínez, 2018]. The internal knowledge accumulation allows the company to find new productive opportunities and subsequently enhances its ability to seize them [De Clercq, Dimov, 2008]. Inter-organizational alliances provide enterprises with access to external knowledge. Numerous studies have demonstrated

that the combination of the firm's existing knowledge or prior related knowledge and new external knowledge from diverse sources encourages the development of exploratory and exploitative innovations [Limaj, Bernroiderj, 2019; Božič, Dimovski, 2019].

Absorptive capacity [Lichtenthaler, 2009; Božič, Dimovski, 2019; O'Reilly, Tushman, 2008], dynamic capabilities [He, Wong, 2004; O'Reilly, Tushman, 2008] and learning capabilities [Wei, Yi, Guo, 2014] contribute to the formation of ambidexterity. Both incremental and radical innovation can occur thanks to the synergy that is created between the internal knowledge base and fresh external knowledge via absorptive capacity [Lichtenthaler, 2009; Božič, Dimovski, 2019]. Organizations have the ability to modify their knowledge through their dynamic capacities, forming a primary knowledge basis for incremental innovation and renewing the primary knowledge base for radical innovation [Gonzalez, De Melo, 2018]. Sensing, seizing, and reconfiguring capabilities are what businesses need to be successful at ambidexterity because it requires them to have both the operational capabilities and competencies to compete in current markets and the flexibility to combine and reconfigure assets to adapt to emerging markets and technologies [O'Reilly, Tushman, 2008; 2011]. As per [Benner, Tushman, 2003], dynamic capabilities are rooted in both exploitative and exploratory activities. Investing in internal R&D is an important element in the development of intangible capital and boosts a company's learning capacities [Zouaghi, Sánchez, Martínez, 2018].

According to organizational learning theory exploratory and exploitative learning are essential for developing new products [Wei, Yi, Guo, 2014]. Literature on the upper echelons makes connections between organizational ambidexterity and upper echelon characteristics, actions, behaviors, and decisions, emphasizing the crucial role of the upper echelons in achieving ambidexterity [Vera, Crossan, 2004; Venugopal et al., 2019]. In addition, ambidexterity is fueled by TMTs' internal processes that promote the exchange of critical information and cooperative decision-making [Lubatkin et al., 2006]. This line of inquiry was strengthened further with the discussion about the significance of a CEO's continuous network of contacts in gaining access to the timely and diversified information required to develop ambidexterity [Cao, Gedajlovic, Zhang, 2009]. In the same vein, human capital theory claims that the leadership, owner personality, and TMT have emerged as three major factors that influence ambidexterity [Lin, McDonough, 2011; Turner, Lee-Kelley, 2013].

CATEGORIZATION OF THE LITERATURE: ORGANIZATIONAL AND MANAGERIAL ANTECEDENTS TO AMBIDEXTERITY

An examination of the selected papers revealed four groups of organizational and management antecedents of ambidexterity. The tendency to engage in ambidexterity strategy is affected by organizational structure, culture and context, organizational capabilities, resources as well as individual and team related factors. The four enablers of organizational ambidexterity that were found in order to respond to the study question are represented in Figure and covered in more detail in this section.

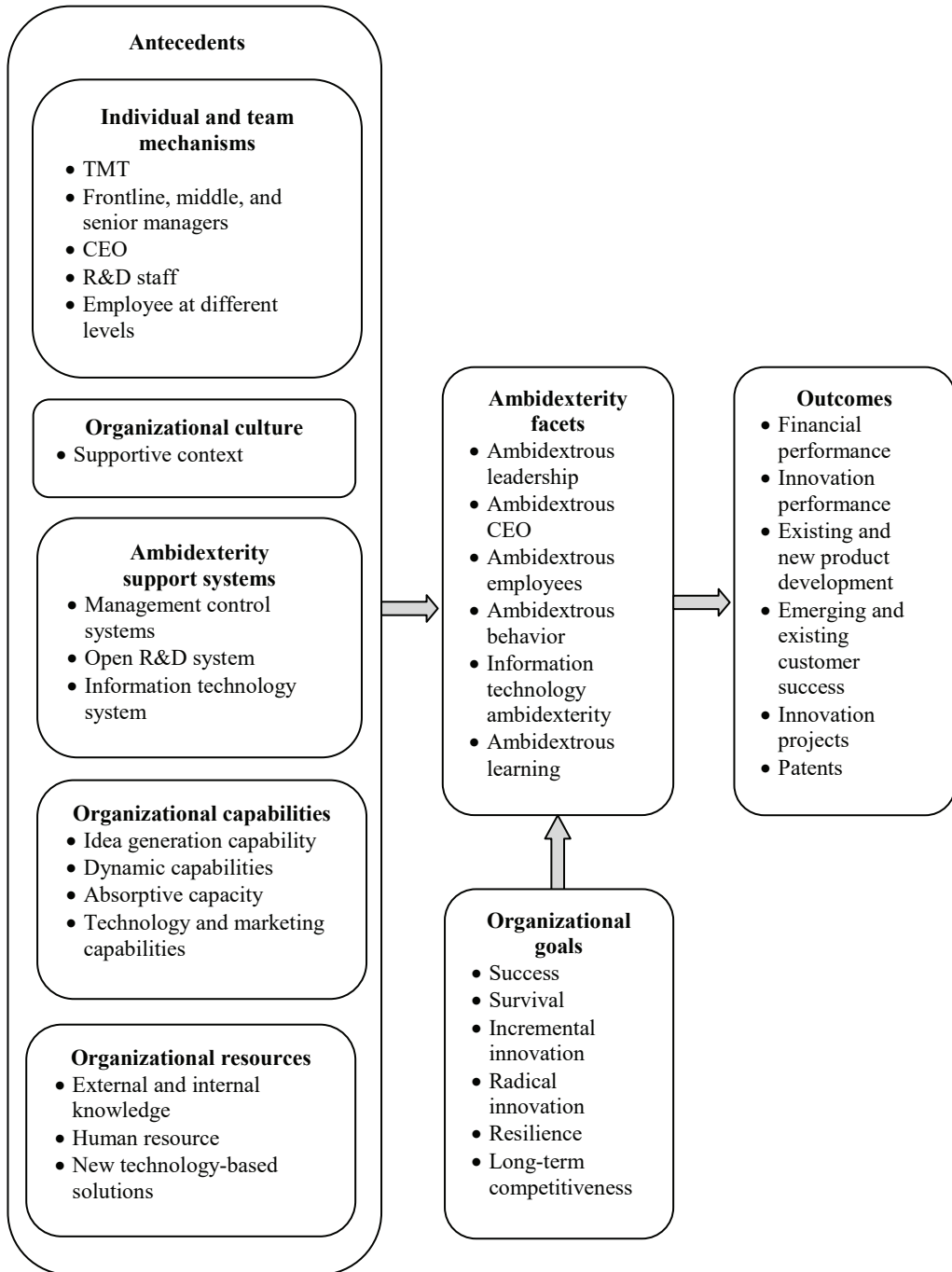


Figure. Enablers and outcomes of ambidexterity

Individual- and team-level mechanisms. Ambidexterity has piqued scholarly interest throughout the last few decades, mainly at the organizational level, due to its importance to business. However, a growing number of studies have found that ambidexterity appears at several levels of analysis [Raisch et al., 2009]: individual [Gibson, Birkinshaw, 2004] and collective [Lubatkin et al., 2006]. Previous researchers found that ambidexterity at the individual and team level promotes not only individual performance but also organizational ambidexterity [Birkinshaw, Gibson, 2005]. Numerous studies hold that individuals are significant sources of organizational ambidexterity and that ambidexterity is anchored in an individual’s capacity to explore and exploit [Gibson, Birkinshaw, 2004].

The literature acknowledges that TMTs are vital in managing the tensions in implementing ambidexterity in organizations. The majority of management team literature focuses on how to handle and manage inertia and implement innovation [García-Granero et al., 2018]. Following [Smith, Tushman, 2005], both differentiating and integrating are two different processes that are necessary to manage the ambidexterity contradictions effectively. Table 3 presents the challenges of differentiation and integration in the TMT.

Table 3. Differentiation and integration in the top management team

TMT integration	TMT differentiation	Source
TMT shared responsibility and CEO cognitive trust	TMT functional and age diversity	[García-Granero et al., 2018]
TMT behavioral integration: collaborative behavior, information exchange, and joint decision making	Team size and team tenure diversity	[Lubatkin et al., 2006]
Collaborative behavior, information exchange, and joint decision making	TMT educational and goal preference diversity	[Simsek et al., 2005]
Transactive memory systems: credibility and coordination	TMT specialization, experience, intrapersonal functional diversity	[Heavey, Simsek, 2017]
Team perspective-taking: share, discussion and integration of the viewpoints	TMT functional and educational background diversity	[Li, 2016]
Metricizing and ranking are used to seek consistency through the gradual integration of these opposing positions	Demarcation is intended to differentiate positions within the leadership team	[Knight, Cuganesan, 2020]

O. Koryak and colleagues [Koryak et al., 2018] highlighted that resolving the paradoxical conflict between exploitation and exploration can be accomplished by finding the proper balance of integration and differentiation. Differentiation in the context of a TMT emanates from the diversity within the team, while integration stems from the team context [Li, 2013]. TMT differentiation comes from functional and age diversity [García-Granero et al., 2018], backgrounds, experiences, tenures, and specializations [Lubatkin et al., 2006; Li, 2016; Heavey, Simsek, 2017], educational and goal preference diversity [Simsek et al., 2005]. Integration comes from TMT shared responsibility and CEO cognitive trust [García-Granero et al., 2018], collaborative behavior, information exchange, and joint decision making [Simsek et al., 2005; Lubatkin et al., 2006]. TMT transactive memory systems are highlighted in [Heavey, Simsek, 2017] as a mechanism that supports the creation, differentiation, and integration of information required to implement organizational ambidexterity. Other studies have emphasized the relevance of leadership behaviors and styles in achieving ambidexterity and the power of leaders to change both individuals and entire organizations.

Several studies thus far have linked behaviorally integrated TMT with organizational ambidexterity and highlighted that senior team behavioral integration is crucial for fostering ambidextrous abilities inside firms [Vera, Crossan, 2004; Venugopal et al., 2019]. The case study [Knight, Cuganesan, 2020] highlights the need of three valuation practices for senior leaders to manage the tensions associated with integration of exploration and exploitation across differentiated units. There have been numerous attempts to connect leadership styles and ambidextrous innovation.

A transformational leader, on the one hand, elevates the interests of the workforce, and inspires their followers to go above and beyond what was expected of them. On the other hand, transactional leadership makes it clear to followers what they must accomplish in order to be rewarded for their efforts, also keep an eye on followers' performance [Rosling, Frese, Bausch, 2011]. Successful strategic leaders are those who can operate most effectively in a transformational and transactional mode to deal with organizational learning [Vera, Crossan, 2004]. Transactional leadership and exploratory innovation have a greater negative association when environmental dynamism is taken into account, as well as there is a negative influence of transformational leadership on pursuing exploitative innovation [Jansen, Vera, Crossan, 2009]. This view was complemented by the analysis of the role of managerial external capabilities in achieving ambidexterity during crisis period [Alcalde-Heras, Iturrioz-Landart, Aragon-Amonarriz, 2019] which claimed that successful ambidextrous strategy development is facilitated by senior executives' perceptions of risk.

Several studies have revealed that CEO plays key role in facilitating ambidexterity. The cognitive flexibility of the CEO through persistent information search activities is highlighted as being particularly critical towards achieving organizational ambidexterity [Kiss et al., 2020]. According to [Cao, Gedajlovic, Zhang, 2009] the CEO's huge information network is crucial for pursuing an ambidextrous orientation since it allows access to quick relevant and accurate information that helps balance the TMT members' willingness. Based on insights from upper-echelons perspective, through reallocating resources

and changing priorities, owners could contribute significantly to achieving ambidexterity [Dolz, Iborra, Safón, 2019].

It has conclusively been shown that top-down processes are not the only way for organizations to undergo change [Mom, Van Den Bosch, Volberda, 2007]. In order to achieve ambidexterity, several studies have shown that the bottom-up process may support the senior executives' design decisions initiated by front-line managers and employees. Since they are directly exposed to unforeseen issues and shifting consumer needs, frontline managers take the initiative to embrace an ambidextrous approach [Zimmermann, Raisch, Birkinshaw, 2015] and reshape their initiatives continuously to adapt their contexts and deal with the paradoxical approach [Zimmermann, Raisch, Cardinal, 2018]. Middle managers are innovation actors that shape a portfolio of ambidextrous innovations in organizations, which is described as the process of evaluating, selecting, and prioritizing innovative initiatives in accordance with the firm's long-term strategic goals [Randhawa et al., 2021]. Recent studies suggest that middle managers play a vital role in bridging between front line employees and the TMT to develop innovations [Heyden, Sidhu, Volberda, 2018]. Furthermore, the relationship between TMT effectiveness and organizational ambidexterity is moderated by the extent of knowledge exchange from middle managers to TMT members [Chen, Liu, 2019].

Organizational culture and supportive context. To successfully manage two contradictory activities at the same time, the organization has to establish a context in which a balance can be achieved and maintained. It is commonly accepted that the context is an important antecedent of organizational ambidexterity [Gibson, Birkinshaw, 2004]. The level of ambidexterity increases in business-unit contexts that interact with stretch, discipline, support, and trust [Gibson, Birkinshaw, 2004]. There is a consensus among scientists that individuals' beliefs and values within an organization, as well as the practices and behaviors that reflect these basic principles constitute organizational culture and the behavior of organizational members is governed by those beliefs and values [Lavie, Stettner, Tushman, 2010]. Ambidextrous organizational culture is regarded as the key characteristic of ambidextrous organizations [Khan, Mir, 2019], it shapes individual's attitude and behaviors [Lee et al., 2019].

Previous research has identified two forms of culture focused either on exploration or on exploitation (Table 4).

Exploration culture values include creativity, flexibility, and risk-taking, whereas exploitation values include control, accuracy, and discipline and ambidextrous organizational culture necessitates the coexistence of the two within a single organization [Moreno-Luzon, Gil-Marques, Arteaga, 2014]. According to [Wang, Rafiq, 2014], organizational diversity and shared vision comprise a higher-order construct of ambidextrous organizational culture that influences contextual ambidexterity. Organizational diversity embodies values and norms that foster creativity, promote differences and helps organizations combat myopic thinking and promote creative solutions. The shared vision fosters discipline and encourage engagement of all organizational members into development and implementation of the set goals [Úbeda-García et al., 2018].

Table 4. Exploration and exploitation organizational cultural values

Exploration cultural value	Exploitation cultural value	Source
Organizational diversity	Shared vision	[Wang, Rafiq, 2014; Úbeda-García et al., 2018]
Discipline, support and trust	Stretch, support and trust	[Gibson, Birkinshaw, 2004]
Knowledge sharing	Knowledge sharing	[Lin, McDonough, 2011]
Innovation orientation	Performance orientation	[Khan, Mir, 2019]
Flexibility	Control	[Khazanchi, Lewis, Boyer, 2007]

The four behavioral attributes of the organizational context — discipline, stretch, support, and trust — are interactive and complementary aspects and must be present for a business unit to become ambidextrous [Gibson, Birkinshaw, 2004]. Individuals participate in both exploitation- and exploration-oriented actions when a favorable organizational context is formed. Organizations that foster a knowledge-sharing culture emphasize tolerance for ambiguity, an open attitude toward challenge, and trust benefit from greater exploitation of current knowledge as well as the exploration of new capabilities [Lin, McDonough, 2011]. On related note, S. Khan and A. Mir highlighted that performance-oriented and innovation-oriented culture form a higher-order construct of ambidextrous organizational culture that enables contextual ambidexterity [Khan, Mir, 2019]. The amount to which an organization motivates and compensates members for improved performance, improving the organization's potential to exploit, is referred to as a performance-oriented culture. The creativity and risk-taking behavior required to investigate opportunities are characteristics of an innovation-oriented culture. Because of the coexistence of flexibility and control in underlying attitudes and practices, an innovation-supportive culture may look paradoxical. Control values provide boundaries that promote managerial trust and evaluation, whereas flexibility values foster a culture of experimentation and empowerment [Khazanchi, Lewis, Boyer, 2007]. In sum, there is a consensus among scholars that the tight-loose aspect of the culture is crucial for ambidextrous organizations.

Numerous studies have established a connection between strategic leadership and organizational culture. Some argue that culture is an intangible process put in place by leaders when they communicate values to their employees [Gibson, Birkinshaw, 2004], while others highlight that promoting a certain type of culture requires support and cooperation of senior leaders [Tushman, O'Reilly, 1996]. In order to successfully generate innovation-focused ambidexterity, organizational leadership and culture must work hand in hand.

Ambidexterity support systems. Managing innovation involves making changes in the organizational structures, processes and management practices to improve the way organization operates [Lavie, Stettner, Tushman, 2010; Heyden, Sidhu, Volberda, 2018]. Building on this stream of literature and drawing on the individual, team, and organizational ambidexterity, this review identified a number of ambidexterity support systems that can help successfully manage organizational tensions in the short and long term.

Management control systems. Evidence from the organizational literature on paradoxes, tensions, and contradictions helps address the dilemma of balancing exploration and exploitation. This literature offers a valuable perspective on how to deal with collisions and states that the best way to manage a paradox in the organization is to accept it and use constructively. The use of management control systems in organizations attempting to meet competing strategic objectives has been the subject of extensive investigation [Mundy, 2010]. Significant evidence suggests that management control systems can promote innovative processes by establishing the control necessary to ensure consistent behaviors while also encouraging adaptation, and innovation. As such, the usage of management control systems can be crucial to attain the balanced view of ambidexterity [McCarthy, Gordon, 2011; Bedford, 2015]. Therefore, it is appropriate to examine management control systems, which involve the use of a number of diverse but interrelated frameworks, such as belief systems, boundary systems, diagnostic systems and interactive systems. The purpose of interactive systems is to search, investigate, and gather information about threats and opportunities in the external environment. Diagnostic systems, on the other hand, are responsible for tracking the organizational outcomes and bringing managerial attention to negative variations and potential errors made in the execution of intended strategies. While boundary systems prevent and limit strategically undesirable actions or effects, belief systems usually take the shape of value statements that encourage employees to participate in actions vital to the organization's principles, purpose, and direction [McCarthy, Gordon, 2011; Bedford, 2015].

According to several studies on management control systems, various forms of them may be required to properly establish and manage organizational ambidexterity. The appropriate balance of the different uses of management control systems plays the crucial part in the generation of dynamic tension [Mundy, 2010]. However, a study of management control systems across various innovation modes found the different control systems must work simultaneously and in balance to allow for the generation of the dynamic tension and efficiently manage the conflicting forces of exploitation and exploration [Bedford, 2015]. Using a combination of the various control systems is recommended to attain ambidexterity [McCarthy, Gordon, 2011]. In sum, combining and balancing control levers is essential to handle the tensions between exploitation and exploration efficiently.

The individual and the combined effects of management control systems were examined by D. Bedford who reports that for exploitation firms diagnostic systems encourage the standard learning required for exploitation businesses to exploit today's technology paths, while boundary system enables staff to concentrate on the tasks deemed essential

to finish present operations [Bedford, 2015]. The author asserted the need to jointly use levers that reflect the antagonistic and opposing nature of the forces in an ambidextrous context, and he found evidence to support the claim that the balanced and combined usage of diagnostic and interactive systems that depict positive and negative forces aids in the creation of dynamic tension to handle competing pressures. A study that aimed to identify the management control systems employed in R&D organizations to achieve ambidexterity revealed that in terms of exploration, beliefs and interactive systems collaborate to produce search and discovery, and in terms of exploitation, boundary and diagnostic systems cooperate to limit the scope of search and increase existing competencies [McCarthy, Gordon, 2011]. With a sample of medium-sized German firms, A. Heinicke and colleagues conclude that company cultures may be both controlled and flexible, that beliefs control is a crucial component when businesses run with a flexible culture and drives the control system, and that the four levers work in tandem to further control [Heinicke, Guenther, Widener, 2016]. In a sample of 119 projects, M. Ylinen and B. Gullkvis used the mechanistic (diagnostic) and organic (interactive) forms in two different innovation settings and came to the conclusion that the main form of control in both exploratory and exploitative innovation is organic control, while the interaction effect of organic and mechanistic types improves performance in both types of projects [Ylinen, Gullkvis, 2014].

In conclusion, ambidexterity within an organization may be encouraged by the complementary effect of the combined and balanced use of opposing management controls.

Open R&D system. It has been stated that in order for businesses to maintain a sustainable competitive advantage, exploration and exploitation based on R&D are required [McCarthy, Gordon, 2011]. In general, businesses that make significant R&D investments are better at ambidexterity [Revilla, Rodriguez-Prado, 2018]. Following [Lucena, Roper, 2016], the ability to integrate exploration- and exploitation-related research and technological development activities is known as ambidexterity in R&D. R&D activities fluctuate across the exploitation-exploration spectrum [McCarthy, Gordon, 2011]. R&D exploration is described as actions and outputs focused on emerging, and revolutionary technologies, whereas R&D exploitation is defined as activities that focus on mature, well-known, and well-positioned technologies. T. Swift found that greater absorptive capacity firms are better able to make the transition from R&D-based exploration to exploitation and the transition from exploration to exploitation is more likely to be survived by businesses that do not manipulate short-term results by cutting back on R&D spending [Swift, 2016]. A theoretical study [Petruzzelli, 2019] comes to a different conclusion, stating that two organizations involved in R&D hetero-status alliance (different levels of status), one with high status and the other with low status, explore and exploit, respectively. However, if two high status partners are engaged in R&D alliance, they will both explore or exploit. On the other hand, diversifying technology alliances helps firms to enhance their R&D ambidexterity [Lucena, Roper, 2016]. This view is supported by L. Berchicci who argues that switching from an internal R&D structure to an open R&D structure with the selection of suitable R&D partners is beneficial for the innovative

performance because internal R&D alone is no longer sufficient to deal with an environment that is changing more quickly, and greater technological complexity [Berchicci, 2013]. New product teams with the ability to exploit and investigate knowledge can turn knowledge into creative products, services, and processes. Furthermore, team members can reduce the time it takes to complete project tasks and speed up the time to market by using effective ambidexterity [Li, Huang, 2012].

Information technology systems. Organizations employ an information technology system to store, organize and exchange relevant knowledge thanks to the expanding volume of information and knowledge flow [Gonzalez, De Melo, 2018]. Previous studies have reported that information technology can help foster innovation. Data from 248 SMEs in the manufacturing sector in the United Kingdom revealed that information technology competence emerges as a key resource for implementing contextual ambidexterity in a way that positively impacts exploratory and exploitative innovation [Ko, Liu, 2019]. It has been unequivocally shown that increasing knowledge base and developing personal abilities are prerequisites for the successful deployment of these technologies. R. Gonzalez and T. Melo's study, which looked at the interaction between contextual factors and the knowledge exploration and exploitation process, demonstrated how innovative businesses rely on the availability of information technology systems to support the process of retaining explicit knowledge, facilitating its exploitation, and facilitating the exchange of knowledge and information to maximize the process of exploring new information [Gonzalez, De Melo, 2018].

Short-term and long-term goals. In a single longitudinal case study, M. Yan and colleagues examined the contribution of organizational learning at multiple levels for the development of organizational ambidexterity [Yan, Yu, Dong, 2016]. They come to the conclusion that in order to attain ambidexterity, it is vital to place equal focus on business and strategic learning, which examines respectively short-term and long-term goals with focus on overall and local impact. Firms must pursue both short- and long-term goals at the same time in order to survive and grow in a constantly changing competitive and institutional environment [Luo, Rui, 2009] (Table 5).

Numerous research show that simultaneously pursuing exploration and exploitation improves performance [He, Wong 2004]. Long-term profitability and survival are reliable proxy indicators of superior firm performance. Sustained sales growth and short-term revenue growth can reflect core product success and be a sign of an exploitative strategy [He, Wong, 2004; Lubatkin et al., 2006; Cao, Gedajlovic, Zhang, 2009]. M. Iborra and colleagues argued that adopting ambidexterity and strategic coherence leads to resilience [Iborra, Safón, Dolz, 2020; Stokes et al., 2019]. Innovation goals define the kinds of outcomes that ambidextrous organizations seek to produce. In the same vein, ambidexterity supports short-term survival in the context of the global enterprise and counteracts competitive disadvantages for long-term growth [Luo, Rui, 2009]. Numerous studies have indicated that seeking ambidexterity leads to the development of new product innovation capabilities that can be advantageous in the long run [Wang, Rafiq, 2014; Khan, Mir, 2019].

Table 5. Short- and long-term goals

Goal	Source
<i>Short-term</i>	
Success	[Wang et al., 2019; Osiyevskyy et al., 2020]
Survival	[Luo, Rui, 2009; Hill, Birkinshaw, 2014]
Short-term profitability	[He, Wong, 2004; Jansen et al., 2006; Lubatkin et al., 2006]
Incremental innovation goals	[McCarthy, Gordon, 2011; Lin et al., 2013; Zouaghi, Sánchez, Martínez, 2018]
<i>Long-term</i>	
Resilience	[Stokes et al., 2019; Iborra, Safón, Dolz, 2020]
Future long-term growth	[Lubatkin et al., 2006; Cao, Gedajlovic, Zhang, 2009; Luo, Rui, 2009;]
Long-term competitiveness	[Luo, Rui, 2009; Jansen et al., 2006]
Radical innovation goals	[McCarthy, Gordon, 2011; Lin et al., 2013; Zouaghi, Sánchez, Martínez, 2018]
New product innovation	[Wang, Rafiq, 2014; Wei, Yi, Guo, 2014; Khan, Mir, 2019].

Furthermore, the pursuit of radical innovation and incremental innovation goals are essential to attaining organizational ambidexterity [McCarthy, Gordon, 2011; Zouaghi, Sánchez, Martínez, 2018; Lin et al., 2013]. Whether deciding how much exploration vs exploitation is desirable, as well as when to adjust the strategic goals, the senior-management team may rely on performance feedback [Lavie, Stettner, Tushman, 2010]. Many studies have taken into account the effects of exploration and exploitation on both short- and long-term performance [Auh, Menguc, 2005; Lavie, Stettner, Tushman, 2010] with net profit and market value as corresponding proxies.

Organizational capabilities and resources. In a turbulent and dynamic environment, organizations face a major challenge of balancing the need to exploit existing capabilities and resources with the search for new ones [Yan, Yu, Dong, 2016]. Organizational capabilities and resources are important antecedents of innovation ambidexterity [O'Reilly, Tushman, 2008].

Idea generation capability and knowledge creation ability. Both the exploitation of already available resources and the development of new ones necessary for exploration depend on new information [Kiss et al., 2020]. In-depth and continuous search activities for information can contribute to higher degrees of organizational ambidexterity. Idea generation has been clearly illustrated to be a critical part of the front end of innovation and to be a fundamental starting point for both radical and incremental innovation [Gurtner, Reinhardt, 2016].

Furthermore, ambidexterity begins with the system that supports search for creative ideas in order to develop new product and to improve existing products or processes, concurrently working on exploitative and explorative innovation mission [Katila, Ahuja, 2002; Randhawa et al., 2021]. Successful industrial products come from customer ideas and customer interaction in the new product development processes wherein customers come up with solutions to the problems [Govindarajan, Kopalle, Danneels, 2011]. Disruptive innovation is positively influenced by emerging customer orientation whereas radical innovations are driven by mainstream customer orientation. Additionally, the two customer orientation can exist side by side and be pursued concurrently.

An investigation of market orientation and ambidexterity revealed that proactive and responsive market orientations induce different managerial strategies to generate new innovation abilities and promote existing ones respectively [Li, Lin, Chu, 2008]. Following [Mascareño, Rietzschel, Wisse, 2021], leadership opening behaviors motivate experimentation, risk-taking and inspire exploration. In contrast, closing behaviors manage the accomplishment of objectives and permit precise regulations, which result in exploitative actions. In sum, customer engagement, market orientation, and leadership style are crucial in generating both incremental and radical ideas to create new products and improve existing ones (Table 6). These factors also encourage ambidextrous idea generation, which increases an organization's propensity to innovate.

Table 6. Ambidextrous idea generation

Basis of ambidextrous idea generation	Radical innovation	Incremental innovation	Source
Customer problems	Emerging customer needs and mainstream customer orientation	Existing customer needs and emerging consumer orientation	[Govindarajan, Kopalle, Danneels, 2011]
Market demand	Market trend firms and proactive market orientation	Market insight knowledge and responsive market orientation	[Li, Lin, Chu, 2008; Herhausen, 2016]
Leadership	Opening behaviours	Closing behaviours	[Mascareño, Rietzschel, Wisse, 2021]

The idea generation system needs staff members to think out of the box and solve problems like a designer. Many studies have attempted to move to the concept of design thinking to minimize inertia and promote ambidextrous innovation. According to [Randhawa et al., 2021], design thinking is an essential methodology for sustaining and supporting successful innovative initiatives. Based on an in-depth longitudinal case study, they showed that to support the idea generation phase of the innovation value chain in organization, middle manager recruit innovation champions (frontline employees) from across the firm, who were trained in design thinking. The relevant tools are used for understanding customer needs and developing ideas for potential new products/services and in order to find creative solutions to current and emerging user needs that simultaneously supports exploration and exploitation.

Ambidexterity as a dynamic capability. Organizational ambidexterity is considered by some academics to be a dynamic capability [O'Reilly, Tushman, 2008], while others suggest that dynamic capabilities are essential building blocks for developing organizational ambidexterity [Raisch et al., 2009]. Both concepts suggest similar capabilities, and it seems that dynamic capabilities and organizational ambidexterity are closely related concepts. Consequently, organizational ambidexterity entails the development of capabilities for sensing, seizing, reconfiguring and reallocating organizational resources to integrate the competing demands of exploration and exploitation [O'Reilly, Tushman, 2008]. A number of studies have reported that the development of these capabilities is rooted in senior team cognitions and processes.

Sensing capability. The identification and assessment of opportunities and threats is made possible by monitoring environmental changes, assessing rapidly changing markets, and following technological changes [Birkinshaw, Zimmermann, Raisch, 2016]. Organizations require sensing capabilities that let them gather, analyze, and reshape data in novel ways. Since leaders are more responsive to threats than opportunities, a leadership team that supports learning, questions the status quo, and tolerates failure is required to drive ambidexterity [O'Reilly, Tushman, 2008].

Seizing capability involves making the right decisions, making important decisions faster, and mobilization of resources to address opportunities and threats. According to [O'Reilly, Tushman, 2008], businesses that have the ability to seize opportunities will be more adept and quick to act when they sense the threat and changes of an impending financial or economic crisis. Conversely, businesses that lack the ability to seize opportunities may be aware of opportunities and dangers but unable to act quickly. In a study [Birkinshaw, Zimmermann, Raisch, 2016] that linked dynamic capabilities to ambidexterity, the researchers found that for structural ambidexterity, the development of sensing capabilities occurs in exploitation-oriented units and the development of seizing capabilities occurs in exploration-oriented units; in the case of contextual ambidexterity, sensing and seizing opportunities occur simultaneously; and finally, for sequential ambidexterity, the primary focus of sensing and seizing activities shifts over time.

Reconfiguring capability. After sensing and seizing, ambidexterity requires reconfiguring internal and external competencies, resources, tangible and intangible assets as

markets and technologies change as well as modifying priorities in order to explore and exploit under a changing environment. This orchestration calls for a breakaway from the organization's past, a change in the stakeholders' identities, a commitment of resources to long-term projects, and the ability to divide up firm resources among alternatives and maintain them over time [O'Reilly, Tushman, 2008; Birkinshaw, Zimmermann, Raisch, 2016]. In [Birkinshaw, Zimmermann, Raisch, 2016] the authors described sensing and seizing capabilities and noted that these abilities were indeed generally front-line capabilities developed and carried out by front-line managers and employees, whereas reconfiguring seems to be a higher-order capability put in place by senior executive level staff.

Absorptive capacity for ambidexterity. Innovation does not arise from the acquisition of new knowledge; rather, firms must be able to use this knowledge through the sequential processes of exploratory, transformative, and exploitative learning to create new products, processes and routines [Lichtenthaler, 2009]. Absorptive capacity has been theorized as a dynamic capacity and divided into four underlying capacities: knowledge acquisition, knowledge assimilation, knowledge transformation, and knowledge exploitation [Božič, Dimovski, 2019]. After analyzing data from 175 medium-sized and large industrial companies in Germany, U. Lichtenthaler came to the conclusion that, in both stable and dynamic situations, absorptive capacity and the balanced development of learning processes are essential to innovation [Lichtenthaler, 2009]. According to a number of studies, absorptive capacity is necessary to transform one's internal knowledge base and newly learned and absorbed knowledge into new and enhanced products and services, thus enabling both exploratory and exploitative innovation [Limaj, Bernroiderj, 2019; Božič, Dimovski, 2019]. The multilayer organizational learning at both the strategic level and operational level proved highly advantageous for the development of ambidexterity [Yan, Yu, Dong, 2016].

Technology and marketing capabilities. Businesses extensively engage in the development of technological capabilities in order to foster innovation. Data from 192 high-tech companies were analyzed in [Zhou, Wu, 2010]. The authors found that technological capability causes exploitation to accelerate and medium technological capability leads to the highest degree of exploration, while high technological capability impedes the exploration for novel solutions. C. Di Benedetto and colleagues examined how strategic capabilities affected exploration and found evidence indicating that marketing and technological capabilities are strongly associated with radical innovation (exploration) [Di Benedetto, DeSarbo, Song, 2008]. If both types of capabilities are present, organizations can, to some extent, conduct both exploratory and exploitative innovation.

External and internal knowledge. According to the knowledge-based view, knowledge is a vital contributor to the success of the company, which can be viewed as a knowledge database. The cumulative and dependent nature of the knowledge requires companies to build strong internal capabilities to meet their strategic goals, to enhance the learning capabilities of companies, they need to invest in internal R&D, which is an important element in the development of intangible capital and boost a company's learning capacities [Zouaghi, Sánchez, Martínez, 2018]. Inter-organizational alliances,

inter-firm partnerships, external links and external collaboration relationships are also beneficial since they provide enterprises with access to external knowledge [De Clercq, Dimov, 2008].

Numerous studies have demonstrated that the combination of the firm's existing knowledge or prior related knowledge and new external knowledge from diverse sources encourages the development of exploratory and exploitative innovations [Limaj, Bernroiderj, 2019; Božič, Dimovski, 2019]. Strategic partnerships, according to resource-based experts, provide access to a variety of resources, markets, and technological knowledge [Zouaghi, Sánchez, Martínez, 2018]. Building external ties and developing external collaborative relationships, according to the resource-based view, allows enterprises to mitigate resource constraints and risk associated with exploration, as well as facilitate access to a variety of markets and technological knowledge [Zouaghi, Sánchez, Martínez, 2018]. According to Q. Chen and Z. Liu's analysis of open innovation and ambidexterity, outside-in knowledge flows, which group all related to the acquisition of external knowledge, and inside-out knowledge flows, which capture the move of internal innovative knowledge towards the outside, drive organizational ambidexterity [Chen, Liu, 2019].

Human resources. Individual skills, knowledge, and capacities are significant resources and a key source of economic outcomes, according to human capital theory, and these abilities can be developed through education, training, and experience. Technological evolution and rapid change in environment, according to the knowledge accumulation hypothesis, do not always entail new and different abilities and skills. The best way to deal with uncertainties is to keep investing in knowledge and human resources [Filippetti, Archibugi, 2011]. Individuals frequently confront options in their day-to-day employment as to whether they should continue to focus on existing clients or cultivate a new customer in order to accomplish strategic goals of ambidexterity. Individuals are encouraged to make their own decisions and acquire ambidexterity by creating a situation that combines stretch, discipline, support, and trust. These practices foster ambidexterity in firms [Gibson, Birkinshaw, 2004]. In the context of human resource management, R. Gonzalez and T. Melo highlighted the need for approaches including training and problem-solving technique development for incremental improvements, as well as training courses on new technologies and employee exchanges for radical advances [Gonzales, De Melo, 2018]. J. Swart and colleagues claim that employees within an organization at various levels of seniority take part in a range of actions that enhance organizational ambidexterity through human resource practices [Swart et al., 2019].

New technology resources. More recently, emphasis has been placed on the critical role that digital technology can play in resolving the tension between exploitation and exploration. The Internet of Things and smart cities were two novel contexts in which ambidexterity was explored [Bresciani, Ferraris, Del Giudice, 2018]. They showed that to improve ambidexterity performance at the project portfolio level, multinational companies are required to develop knowledge management capabilities alongside information and communication technology capabilities. After analyzing data from 370 businesses

worldwide, L. Gastaldi and co-authors came to the conclusion that smart technologies operate as precursors to structural ambidexterity [Gastaldi et al., 2022]. Organizational Big Data Analytics capabilities, or the ability to mobilize and deploy Big Data Analytics-based resources, are what extant research draws particular attention to [Rialti et al., 2019], highlighting the value of these capabilities in recognizing and seizing opportunities as well as developing ambidexterity.

DISCUSSION AND FUTURE RESEARCH DIRECTION

Summary of the findings. The subject of how organizations might attain ambidexterity has dominated organizational ambidexterity research. The purpose of this study is to explore how the phenomenon of ambidexterity emerges and develops within organization. In other terms, this study is concerned with the mechanisms and systems relevant to a firm's ambidexterity agenda. This review found that achieving organizational ambidexterity involves the culture and context of the organization, systems to support ambidexterity, capabilities and resources within the organization, and individual and team factors.

Focusing on the individual level, it appears that the senior management team is no longer solely responsible for resolving paradoxes and tensions between exploration and exploitation; middle managers, frontline managers, employees, and R&D staff now share this duty. In the context of TMT, the appropriate blend of differentiation and integration processes is required to bring higher levels of ambidexterity. The team's composition and context that support ambidextrous behaviors have been examined in multiple studies [Vera, Crossan, 2004; Smith, Tushman, 2005; Lubatkin et al., 2006; Rosing, Frese, Bausch, 2011; Li, 2013; 2016; Heavey, Simsek, 2017; García-Granero et al., 2018]. Transformational and transactional leadership behaviors contribute strongly to undertake disparate exploratory and exploitative activities in stable times but in a challenging environment, it is important to ensure that the right leadership approaches are used. Numerous studies examine various leadership behaviors and their impact in innovation outcomes [Vera, Crossan, 2004; Jansen, Vera, Crossan, 2009; Rosing, Frese, Bausch, 2011]. For CEOs, it is critical to obtain accurate and reliable information and to give team members promptly and in-depth communication in order to foster organizational ambidexterity.

Recent scholarly attention has been directed toward the cognitive characteristics of senior executives and highlight CEO's cognitive flexibility as important for the successful achievement of organizational ambidexterity [Kiss et al., 2020]. This study provides richer insight of the role of frontline, middle, and senior managers, as well as their behavior toward organizational ambidexterity. An organization's ability to implement ambidexterity strategy may be influenced by the cognitive and behavioral attitude of its top, middle, and frontline management. It is clear from the findings that strategic leadership and culture complement one another. As such, leaders implement exploitative and exploratory processes by building a culture that encourages the sharing of knowledge and ideas [Lin, McDonough, 2011].

This study provides richer insight of the role of support systems (management control, open R&D, and information technology systems) in facilitating organizational ambidexterity. Recent studies have demonstrated that management control systems can also be used to help explore potential resources and new opportunities. While traditionally thought of as tools for the exploitation of existing resources, management control systems are now increasingly being seen as tools for both. The review emphasizes a need for joint use of control systems which take into account the antagonistic and opposing nature of the forces to encourage exploitative and exploratory behavior among employees in an organization [Ylinen, Gullkvist, 2014; Bedford, 2015]. Organizations can enhance their explorative and exploitative learning by reorganizing their R&D system, achieving a balance between internal and external R&D activities, and trying to expand R&D borders.

Focusing on the capabilities and resources, the study revealed that in-depth and continuous search activities for creative ideas from customers problems and market orientation aid in the development of new products and the improvement of existing ones. Furthermore, to adapt to changes in markets, technologies and in crisis context, organizations need to develop capabilities for sensing, seizing, reconfiguring and re-deploying organizational resources. Technologies of Industry 4.0 and crisis were two novel contexts in which ambidexterity was explored by numerous studies and come to the conclusion that the adopting of smart technologies become necessary in environments characterized by changes in technologies, variations in customer needs, and fluctuations in product demand to avoid that current products and services become obsolete and react by creating new products and services or meeting the needs of emerging markets.

In order to achieve this goal, organizations need to develop knowledge management capabilities with technology and marketing capabilities to adapt to changes in the environment in a timely and appropriate manner. The strategy for dealing with unpredictability and complexities is to continue investing in knowledge and human resources. Internal knowledge accumulation helps organizations achieve their strategic goals and improves learning capabilities, while establishing external connections, thus giving organizations access to a wide range of resources, markets, and technological knowledge [Zouaghi, Sánchez, Martínez, 2018; Chen, Liu, 2019].

Future research directions. The results of the current literature review allow formulating a number of promising future research directions (Table 7).

The first direction is related to studying different forms of ambidexterity, since the findings show that ambidexterity has both survival and performance advantages. Previous studies have indicated that structural separation helps businesses of all sizes balance exploration and operations [Lavie, Stettner, Tushman, 2010]. Small businesses may lack the resources to specialize in both exploration and exploitation, therefore contextual ambidexterity may be more beneficial and applicable for them [Lubatkin et al., 2006], wherein to reduce the high demand for resources, exploration and exploitation must occur at different times in the same business unit [Lavie, Stettner, Tushman, 2010].

Table 7. Future research directions and research questions

Theme	Research question
Form of ambidexterity	How does an organization shift from one form of ambidexterity to another? What are the factors and processes that shape the evolution of each form of organizational ambidexterity? What helps to achieve dynamic ambidexterity? How do firms achieve hybrid ambidexterity? What are the appropriate leadership styles to ensure success for different types of ambidexterity?
Control systems	How might control systems help in resolving potential conflicts caused by multiple goals? How to use control systems to achieve high levels of balanced ambidexterity?
Leaders and innovation	How can MMs respond to inertia? What are the challenges to deploying DTI in businesses? How to put DTI into practice in SMEs? How do TMTs address the differentiation-integration challenge of ambidexterity? How do MMs shape ambidexterity in organizations?
Product innovation	How to achieve strategic ambidexterity in product innovation?

Previous literature provides in-depth information on the three approaches to ambidexterity individually, but recent literature tries to combine them. Y. Chang and colleagues argued that structural and contextual ambidexterity are complementary in the patenting and licensing processes [Chang et al., 2009]. In the same vein, J. Ossenbrink and coauthors found that organizations invest in projects that combine components of structural and contextual ambidexterity — a strategy known as hybrid ambidexterity when faced with environments that are marked by uncertain opportunities [Ossenbrink, Hoppmann, Hoffmann, 2019].

Other research advocates for a new type form of ambidexterity called dynamic ambidexterity, which combines the principles and methods of all three forms of ambidexterity. According to [Chen, 2017], businesses must support structural ambidexterity at the firm level, contextual ambidexterity at the business unit level, and sequential ambidexterity at the project level in order to achieve dynamic ambidexterity. To help businesses manage dual objectives, more empirical research is needed on the combined forms of ambidexterity, as well as knowledge of how to shift from one form to another. The second is concerned with investigating the use of management control systems in businesses that jointly pursue numerous competing strategic objectives.

According to several studies, management control systems have the potential to support organizational ambidexterity [McCarthy, Gordon, 2011]. Future studies could concentrate on how control systems can help attain balanced in exploration and exploitation. In addition, the review findings highlighted how crucial it is to apply DT in order to create an ambidextrous idea generation system. Therefore, more research is needed to determine how to implement DT in businesses. P. Sun and M. Anderson's case study highlights the critical role of middle management leadership styles in organizational learning and showed how ambidextrous leaders are able to exhibit both transactional and transformative styles [Sun, Anderson, 2012]. Future studies can concentrate on the key roles that TMTs and MMs play in the successful use of ambidexterity. The fourth one has to do with researching the determinants of new product innovation, which pose a significant strategic conundrum. The review findings suggest that achieving ambidexterity is necessary for successful product creation. How to attain strategic ambidexterity in product creation may be the subject of future research.

THEORETICAL AND PRACTICAL IMPLICATIONS

This study has theoretical implications for the ambidexterity, innovation, management and organizational learning literature. First, it contributes to the ambidexterity literature by offering a better understanding of how ambidexterity emerges within an organization and how organizations should be designed and managed, enhancing the comprehension of the principal drivers of ambidexterity especially in the context of Industry 4.0 and ongoing crises. Studies have looked at the role of TMTs alone in facilitating the processing of various demands that are necessary for developing ambidexterity [Lubatkin et al., 2006]. They also focused on the use of management control systems to enable it [Bedford, 2015], while another stream of research highlighted organizational culture as a key factor in fostering ambidexterity [Wang, Rafiq, 2014]. In order to gain a fair understanding of ambidexterity, this review emphasizes the need to go beyond processes and antecedents alone or control systems alone to achieve a balanced view of ambidexterity and effectively manage both short-term and long-term goals. The results of the study provide a better understanding of the key drivers of TMT ambidexterity and organizational culture. The review identified the differentiation/integration challenges that ambidextrous organizations face in their TMT, and those of the coexistence of exploration/exploitation cultural values within a single organization. It explores the middle, front line management level as well as R&D staff and employees, going beyond earlier ambidexterity studies that were centered on the top management team level.

The research also revealed the need for ambidexterity support systems to generate, synthesize, and implement innovative ideas in order to create new products, enhance existing ones, and deal effectively with the complex demands and contradictory circumstances that arise because of the need for ambidexterity. Second, the present study adds to the learning literature by emphasizing that knowledge is a company's most valuable vital

resource and that ambidextrous learning is intrinsically linked to an organization's attempts to manage people by establishing a learning context through knowledge management practices. The development of ambidexterity benefited greatly from the multilayer organizational learning at both the strategic level (emphasis on the overall organization as well as long-term goals) and operational level (looking at specific interests as well as short-term goals). Third, the review contributes to management literature by highlighting how organizations are better able to pursue exploitative and exploratory innovation in an ambidextrous manner when they have strong knowledge management capabilities (knowledge creation, retention, and transfer), human resource management (training programs, problem-solving technique), and management control systems (combined use of opposing management controls, package approach). The fourth contribution to the innovation literature is to illustrate the importance of combining differentiation and integration approaches, while simultaneously supporting the paradox mindset and providing targeted action and resources for the management of exploitation-exploration tensions.

Moreover, a contribution is made to the upper echelon literature by showing the cognitions of the top management team and the role of the CEO in balancing conflicts in decision making and the development of the firm's innovation agenda. In this regard, following the line of research that considers ambidexterity a dynamic capability and gives upper echelons a significant role in its evolution through sensing, seizing, and reconfiguring.

The present study offers some insightful pieces of advice for managers. First, managers should incorporate an ambidextrous vision into their strategies for both short- and long-term success [Lubatkin et al., 2006], especially in crisis environments, such as COVID-19 pandemic or rising economic tensions. The findings provide managers with a larger view on ambidexterity, as well as suggestions for how the organization could adjust its setting and structure to become more ambidextrous. The development of an overarching supportive context by senior executives is necessary to strike a balance between exploitation and exploration, particularly in complex organizational environments where it may be advantageous to foster ambidexterity at the operational level. TMT variety may provide circumstances that allow for the processing of more data from more sources, but diversity can also have unintended consequences that can be avoided by integration mechanisms like shared responsibility. Additionally, opening and closing leadership behaviors complement one another to promote innovation by supporting the creative process, providing new hires with additional opportunities to learn about their new roles, as well as adopting corrective measures, and keeping track of target achievement. Second, CEO characteristics not only promote the exchange and integration of the spread information, but also allow TMTs realize their full information potential, and help in resolving novel, unexpected, or changing environmental problems. Third, because information and communication technology capabilities are essential for pursuing competing needs for exploration and exploitation, organizations should make additional efforts to build these capabilities along with marketing ones.

In addition, ambidextrous organizations rely on the availability of information technology systems that allow employees to participate in communities of practice, partners, suppliers, and customers; control systems with dynamic tension that may be more beneficial for firms that explicitly face conflicting strategic agendas; and open R&D systems that extend to external knowledge sources and benefit more from their external R&D activities toward innovative output when they have a high level of R&D capacity. To ensure ambidexterity, organizations can also focus as much on existing resources and capabilities as on exploring new resources to seize market and crisis opportunities. Middle, frontline managers, frontline workers, and R&D professionals are jointly responsible for handling paradoxes and tensions between exploration and exploitation across organizational levels, in addition to the senior management team. Different leadership behaviors are needed to permit differentiation while preserving integration and ambidextrous leadership with opening and closing behaviors is a factor that facilitates the generation of ideas, their advancement and their implementation. Idea generation can be conducted by individuals or in groups and relies heavily on factors such as open-mindedness and cognitive flexibility.

CONCLUSION

Organizations today operate in an environment that really is complex, intensely competitive, and quickly changing. This environment is marked by ongoing technological innovation, scarce munificence, and a high degree of uncertainty. Research on ambidexterity has gained momentum over the past decade, particularly after ambidexterity was linked to survival and resilience in a crisis context. Recent studies have focused on the crucial part that digital technology might play in the development of ambidexterity.

The question in this study sought to determine how to achieve and implement this highly desirable strategic approach. To address the dual challenges of ambidexterity and balance both exploitation and exploration, this study relied on a systematic review of 80 conceptual and empirical articles published in this field. After reviewing the selected studies as well as the evidence found in the literature, three types of organizational systems that can help to change the trade-off between exploration and exploitation are found. These systems are managed by leaders who personify the culture and serve as its outward symbols. This line of inquiry is enriched by specifying a framework that connects organizational and managerial antecedents of ambidexterity found in the literature, including individual and team mechanisms, organizational culture and supportive context, ambidexterity support systems guided by strategic goals, and organizational capabilities and resources to organizational ambidexterity characterized by ambidextrous leadership, CEO, employee, behavior, and learning.

The adoption of smart technologies with technological and marketing capabilities allow exploration and exploitation to be run in parallel. Building ambidexterity support systems, together with their underlying mechanisms and procedures as well as the rele-

vant leadership styles and R&D staff competences help to fulfill the competing demands pursuing the dual objective of supporting exploration and exploitation. Idea generation capability supports search for creative ideas in order to develop new products and to improve existing products or processes and seems to play a crucial role in the success of the new product development program. Finally, this study encourages further development of the understanding and analysis of the coexistence of essentially different systems, processes, and mechanisms for dealing with the dual challenge of ambidexterity.

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Received: December 30, 2022

Accepted: April 20, 2023

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ПУТИ ДОСТИЖЕНИЯ ОРГАНИЗАЦИОННОЙ АМБИДЕКСТРИИ: СИСТЕМАТИЧЕСКИЙ ОБЗОР ЛИТЕРАТУРЫ

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Для цитирования: Smara R., Bogatyreva K. A. 2023. Moving to ambidextrous organization: A systematic literature review. *Вестник Санкт-Петербургского университета. Менеджмент* 22 (2): 191–225. <https://doi.org/10.21638/11701/spbu08.2023.203>

Существующие исследования подтверждают положительное влияние организационной амбидекстрии на результаты деятельности фирмы и ее способность добиваться успеха в ситуации динамичной внешней среды, сформировавшейся в результате пандемии COVID-19 и изменений в условиях ведения бизнеса. В сфере бизнеса амбидекстрия проявляется в поддержании баланса между стратегиями «поиск нового» и «использование существующего», а ее достижение — непростая управленческая задача. В статье представлен анализ литературы, посвященной способам развития и поддержки организационной амбидекстрии, системам и процессам, которые позволяют результативно уравновесить «поиск нового» и «использование существующего» внутри организации. В результате исследования разработан и обоснован интегральный подход, синтезирующий и систематизирующий знания об организационной амбидекстрии. Установлено, что в целях успешного управления внутренними противоречиями организации-амбидекстра менеджеры должны адаптировать организационную культуру, стратегические задачи и структуру для реализации двух существенно различающихся инновационных стратегий. В работе определены три тесно связанные системы поддержки амбидекстрии, а также лежащие в их основе механизмы, процедуры и стили лидерства. Кроме того, выявлены основные пробелы в литературе и актуальные направления дальнейших эмпирических исследований.

Ключевые слова: амбидекстрия, баланс, «поиск нового», «использование существующего».

Статья поступила в редакцию 30 декабря 2022 г.

Статья рекомендована к печати 20 апреля 2023 г.

Контактная информация

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