



What makes innovation ambidexterity manageable: a systematic review, multi-level model and future challenges

Rabab H. Saleh¹ · Christopher M. Durugbo^{1,2} · Soud M. Almahamid¹

Received: 23 June 2022 / Accepted: 14 March 2023 / Published online: 22 May 2023

© The Author(s), under exclusive licence to Springer-Verlag GmbH Germany, part of Springer Nature 2023

Abstract

Innovation ambidexterity has emerged as a primary interest in management research due to the strategy's support for adaptability and flexibility pursuant to competitiveness. While management studies investigate and explicate the socioeconomic and technological challenges of ambidexterity, there is a gap in knowledge on the determinants that underpin the management of ambidextrous organisations. To tackle this paucity, this article uses a systematic approach to review existing literature on innovation ambidexterity, identifying the main determinants for managing ambidexterity in organisations, and setting an agenda for future management research informed by these determinants. The review assembles and critically appraises 121 articles published between 2007 and 2021. It examines the research clusters, investigated industry sectors, research methodologies, management theories, and research contributions of studies on innovation ambidexterity. The review finds seven main determinants for managing ambidexterity consisting of: (i) process mechanisms, (ii) organisational learning, (iii) leadership styles, (iv) technology investments, (v) organisational contexts, (vi) environmental uncertainties, and (vii) institutional pressures. Using insights from the review process, the article proposes a set of management priorities and suggests seven areas for future ambidexterity research with respect to digital interdependence, organisational legacy, stewardship behaviour, technology sourcing, organisational resilience, environmental readiness, and institutional transformation. Theoretically, the article contributes to knowledge via a multi-level 'wheel' model of ambidexterity management that links management determinants to priorities, and managerially, the review offers a fresh perspective on management factors for ambidexterity.

Keywords Ambidexterity · Ambidextrous innovation · Explorative innovation · Exploitative innovation · Innovation strategy · Systematic review

✉ Christopher M. Durugbo
mcmillanod@agu.edu.bh

Extended author information available on the last page of the article

JEL Classification O32

1 Introduction

Recent strategy and innovation management literature highlight the growing importance of combining both exploitative (or incremental) and explorative (or radical) innovations to sustain high levels of organisational performance (Wong et al. 2017; Xie and Gao 2018; Röd 2019; Xie et al. 2020). Innovation ambidexterity (IA) is the term that characterises this combination, and IA involves the concurrent pursuit of *radical innovation* largely aimed at entering new market areas alongside *incremental innovation* primarily aimed at improving existing market positions (Čirjevskis 2016). Combining and balancing both radical and incremental forms of innovation aids organisations in proactively reacting to environmental changes, systematically breaking new ground, fully harnessing their experience and underdeveloped ideas, and dynamically refreshing their knowledge and capabilities (Berraies et al. 2019). This combinatory capability remains essential for business survival because it allows firms adapt over time, gain operational flexibility, and reduce the impact of unpredictability in the external environment (Alcalde-Heras et al. 2019).

Considering the connections of IA to organisational survival raises unique management issues to understand the determinants of IA, and these connections stem from the growing importance of investment decisions pertaining to the development of innovative capabilities (Berraies et al. 2019; Janahi et al. 2021; 2022). Although literature contains several studies on IA, the management determinants of the concept remain unclear, with authors such as Asif (2017) arguing for a future systematic analysis of IA determinants. Furthermore, literature (e.g., Suzuki (2019) and Rosing and Zacher (2017)) suggests mixed results on the value of ambidexterity, with limited insight on the current state of IA literature regarding determinants. An analysis of the literature suggests several previous reviews of IA with varying foci. These foci include the role IA plays as a mediator between market orientation and new product development performance (Zhao et al. 2021), the effects and challenges of digitalisation concerning the management of IA (Niewöhner et al. 2021), the impact of design thinking on IA (Zheng 2018), and the development of a ‘business resilience framework’ that relies on exploring capabilities that include IA alone and with other capabilities and factors (Aldianto et al. 2021). Related reviews of ambidexterity also consider topics such as mechanisms (Turner et al. 2013), platforms (Wan et al. 2017), and micro-foundations (Christofi et al. 2021; Pertusa-Ortega et al. 2021) of IA management. Premised on IA as a research variable, these different reviews offer specific dependencies and influences of IA on management performance. However, there is a gap in knowledge on the range of determinants for managing IA. The desire to fill this gap is the motivation for this review. This gap relates to understanding the variables and factors that influence the mastery of IA by organisations (Berraies et al. 2019) and contribute to well-suited IA strategies for organisations

(Hughes et al. 2021; Rojas-Córdova et al. 2022). Knowledge of these factors potentially offers added clarity for managers when confronting conundrums and trade-offs regarding investment and initiatives for IA. Awareness of determinants for managing IA is also crucial to organisational perspectives and practices for configuring innovation resources (Choi et al. 2021), developing innovation ecosystems (Inoue 2021), and ensuring diversity of innovation networks (Zhang et al. 2020a).

This review aims to identify core determinants for managing IA in organisations, systematically capturing research trends and the current state of literature, and methodically using insights from the review to make recommendations for future IA research. This article employs the systematic literature review methodology, which is popular in management research, because the methodology aids in addressing particular research questions on topical management issues through the use of well-defined protocols and processes that reduce the possibility of bias (Kraus et al. 2020, 2022). Using insights from the IA determinants, the review proposes a multi-level ‘wheel’ model of IA management that summarises the key findings. The model advances knowledge by presenting the main determinants and core management priorities from analysing the studies. The main argument in this multi-level model is that IA depends on core determinants within organisations and that these determinants influence management strategies for IA. Thus, ‘steering the wheel’ of determinants enables organisations make trade-offs in management priorities for realising IA. The proposed model of determinants and priorities presents a scope of aspects that seek to address the demand for a more comprehensive assessment of IA, which current research explains in the form of a paradox that permits the understanding of multiple-level and overlapping ambidextrous innovation aspects (Tan et al. 2017; Berraies et al. 2019; Lin and Qu 2021).

This review contributes to existing strategy and innovation management theory and attempts to fill the gap in knowledge on determinants for managing IA in two distinctive ways. First, the review provides new critical insights into the core determinants (i.e., enabling, and inhibiting factors) for managing IA. Second, and with close links to the first contribution, the study captures research trends on the extant literature concerning the management of IA, highlighting the current range of methodologies, use of management theories, and investigated sectors by IA researchers. Motivated by the aim, focus and contributions, this study confronts the following question:

What are the research trends and main determinants for managing IA in literature?

2 Innovation ambidexterity: a background

Fundamentally, ‘ambidexterity’ refers to the ability to perform two distinct tasks concurrently (He and Wong 2004). In an organisational context, the term ambidexterity refers to an organisation’s dual capabilities, or specifically its capacity to both expand external resources as well as integrate and use existing resources to intentionally gain competitive advantage in a dynamic and demanding environment (Duncan 1976). It also refers to an organisation’s ability to concurrently achieve

alignment and flexibility at the business unit level (Gibson and Birkinshaw 2004). From the perspective of organisational learning, March (1991) proposed two distinct exploration and exploitation behaviours pertaining to ambidexterity. Here, the author describes exploration as an organisation's actions that try out a new option even though the outcomes are frequently unexpected, unfavourable, and immediate. In contrast, exploitation is the process of improving and developing current capabilities, technologies, and paradigms, which results in a gradual and slight improvement of existing products. Organisations that are equally adept at exploring and exploiting are described as ambidextrous (Simsek 2009) and Benner and Tushman (2003) used this dichotomy of actions to categorise organisational innovation into exploratory and exploitative forms. However, these two endeavours compete for the same limited resources, which has often led to organisations choosing one over the other (March 1991). Consequently, managers must find ways to make the most of a company's resources so that the company can engage in and operationally pursue both types of activities with equal success (Durugbo et al. 2021; Lin et al. 2013).

Based on an organisational perspective, IA is defined as the ability of organisations to "simultaneously pursue both explorative (discontinuous or radical) and exploitative (incremental) innovation" (Junni et al. 2013.p.299). This ability has been argued as the most effective strategy for enhancing business performance (Açıkgöz et al. 2021; Altındağ and Bilaloğlu Aktürk 2020), growth (Choi et al. 2021; Kuo et al. 2018; Liu et al. 2019a, b; Zhang et al. 2019), internationalisation (Alayo et al. 2021; Hsieh et al. 2019), sustainability (Zhang and Zhang 2016) and competitive advantage (Lin and Cheung 2022; Martin et al. 2017; Pangarso et al. 2020a, 2020b; Sijabat et al. 2020, 2021; Wang and Fang 2021; Ye et al. 2018a; Yu and Kim 2020). However, to successfully deal with the paradox of IA, organisations must invest in the development of innovative capabilities (Berraies et al. 2019). Based on this point of view, it is necessary to place greater emphasis on the antecedents that contribute to the development of ambidexterity to resolve the conflict that exists between exploratory and exploitative innovations, which compete for limited resources and are based on different information processing skills.

According to Berraies et al. (2019) organisations that master IA, i.e., those that can combine exploratory and exploratory innovation, are the most successful organisations. Thus, most organisations face challenges when trying to find a balance between the contradictory practices and logics that underlie exploration and exploitation. Growing tensions pull the company, teams, and individuals in opposite directions, which leads to an increase in frustration (Andriopoulos and Lewis 2010). Yet, exploratory and exploitative innovations are both increasingly essential for the success of an organisation (Gupta et al. 2006; Weigel et al. 2022), and focusing on just one form of innovation may result in a 'failure trap' (caused by too much exploration) or a 'success trap' (caused by too much exploitation) (March 1991). Accordingly, Bedford et al. (2019) argued that ambidexterity is one of the most complicated challenges and ambidextrous organisations that strive to acquire capabilities during exploration and exploitation, are able to make real product and service changes, but this is not always easy or problem-free. In addition, according to Chen and Liu (2020), to achieve IA, organisations usually face significant obstacles and tensions.

Thus, organisations must effectively manage the determinants that aid in simultaneously adapting to changing environments and maintaining stability.

Even though IA determinants by characterisation play an important role in IA, the range of IA determinants in literature remains unclear, and more research is needed into how organisations enact IA in terms of processes and factors. Moreover, Asif (2017), notes that there is little research on the range of antecedents, determinants, factors, and relations of ambidexterity. Awareness of such determinants remains significant for cultivating the organisational structures, processes, and behaviours that permit and sustain IA. Although related reviews elaborate on specific contexts for IA in relation to organisational structures, processes, and behaviours (Zhao et al. 2021; Niewöhner et al. 2021; Zheng 2018; Aldianto et al. 2021), this review is unique in its concentration of IA determinants. Accordingly, this article is original and valuable in its focus on IA determinants and theories, and we seek to complement these existing reviews with insights that enrich discourse on innovation enablers and inhibitors as well as potential future research agendas. In so doing, this review strives to deepen knowledge and advance management research for IA.

3 Review methodology

Methodologically, the approach adopted is a systematic review, which Fink (2005), describes as a strategy to recognise, analyse, and synthesise the current body of final, documented work by researchers, academics, and practitioners in a systematic, clear, and reproducible way. The approach is chosen for this review because it supports the use of prior studies to develop knowledge that serves as a firm foundation for improving theory, addressing research gaps, and identifying research priorities (Kraus et al. 2022; Webster and Watson 2014). Systematic reviews also provide solid, integrated, and up-to-date understanding of concepts, as well as highlight major issues and trends in research output. For this review, we adopt a three-stage approach based on previous suggestions (Furlan et al. 2001; Petticrew and Roberts 2006; Booth et al. 2012), to aid in the search, selection, assemblage, extraction, and critical appraisal of relevant research publications, based on the review's research question, i.e., 'what are the research trends and main determinants for managing IA in literature?'

The first stage is planning, which involves defining the study goal, research question, keyword list, and inclusion and exclusion criteria. Supporting this phase is a search strategy based on inclusion and exclusion criteria (Furlan et al. 2001; Petticrew and Roberts 2006). Scopus and Web of Science databases were adopted for the review to identify, screen, and select publications for the study. Web of Science is the oldest and authoritative database of scientific publications (Birkle et al. 2020), while Scopus is widely recognised as the world's largest abstract and citation database of peer-reviewed literature, including scientific journals, conference proceedings, and books (Chadegani et al. 2013; Agapiou and Lysandrou 2015). Both databases provide an overview of the world's research output in different academic disciplines. Overall, the review's search strategy seeks to identify closely relevant

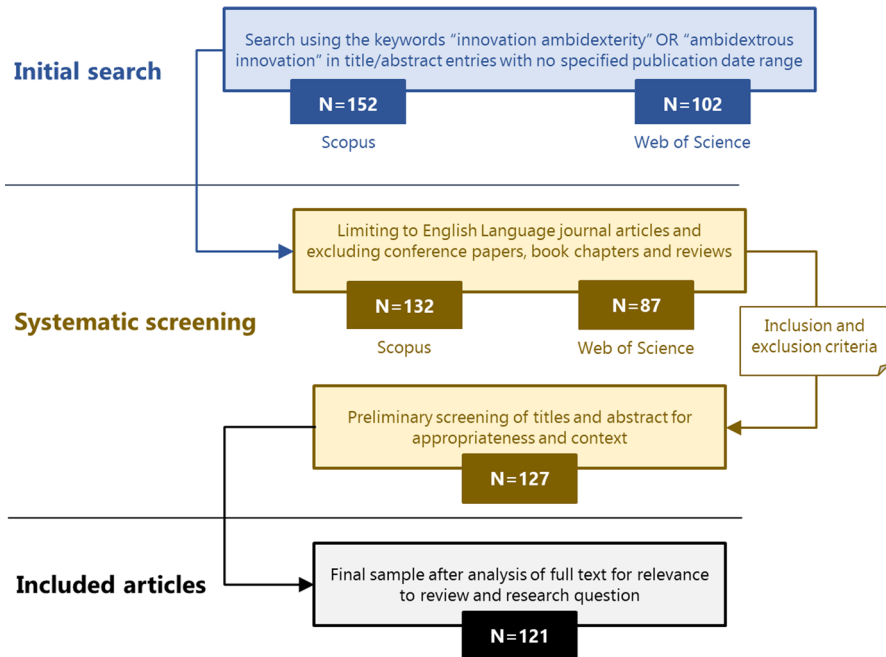


Fig. 1 Sourcing method

sources for the review by focusing on literature with key terms in their titles and abstracts.

The second stage is executing, which focuses on conducting the review search by sourcing and gathering pertinent publications. Figure 1 summarises the sourcing approach adopted for this review.

We conducted database searches on Scopus and Web of Science for articles published until the end of 2021 with titles containing the terms “innovation ambidexterity” or “ambidextrous innovation”. The initial search with keywords found 152 and 102 records, respectively. Filtering based on the inclusion and exclusion criteria reduced the results to 132 and 87 articles on Scopus and Web of Science, respectively. The criteria centres on limiting sources to English-language journal articles and excluding conference papers, book chapters, and reviews. Reviewing the full text of the selected articles, and cross-referencing for duplicates, narrowed down the sources to 127 papers, and a subsequent re-evaluation of these sources resulted in a final number of 121 journal articles. The review contains contributions from scholarly journals such as *Journal of Business Research*, *Journal of Construction Engineering Management*, *International Journal of Innovation Management*, *International Small Business Journal: Research Entrepreneurship*, *Chinese Management Study*, *Industry and Innovation*, and *International Journal of Operations and Production Management*.

The third stage is analysing, which entails reading and analysing the body of literature in line with the research aim. This stage categorises and clusters the studied

literature into general themes that present different determinants, outcomes, and management strategies for IA. Analysis focuses squarely on the 121 articles in relation to research designs, theories, antecedents, behaviours, and consequences of IA. Driving this stage is a thematic analysis that identifies major themes and arranges/structures the examined literature under these themes (Dixon-Woods et al. 2005). Thematic analysis aligns with the systematic review and comprises data reduction that is accomplished in three stages (Guest et al. 2012). First, repeatedly reading the publications (twice for this review) for preparedness to identify possible themes and patterns within the reviewed articles and for familiarity with the data to gain deeper understanding of content. Second, generating initial codes that reflect concepts related to the study question. Third, creating themes through marking different and relevant sentences along with rereading content to confirm and contrast different themes.

Following the data reduction stages, an assessment of the reliability and validity of created themes is performed, which is a critical step in ensuring the themes reflect the entire text (Alhojailan and Ibrahim 2012). For reliability and internal validity of themes, two independent researchers reviewed the documents containing the developed themes. Additionally, defining inclusion and exclusion criteria in advance helps to reduce the risk in this review. The research also evaluates external validity, primarily in terms of the review's scope, which is limited to peer-reviewed scientific literature. Threats to this study include potential gaps between research findings and recommendations, as well as various procedures that might convey clues intentionally or subconsciously during study selection and influence the review process's conclusions. As a result, it is critical to recognise the potential consequences of these risks to validity when evaluating the study findings. The next section presents findings from the reviewed articles.

4 Review findings

This section presents the findings of the review in accordance with the review question. It details research trends and determinants for managing IA based on an analysis and synthesis of the literature.

4.1 Research trends on managing innovation ambidexterity

4.1.1 Research methodologies and yearly trends

The basis for this review is the 121 articles published between 2007 and 2021. Figure 2 and Table 1 show the yearly distribution of the reviewed articles, indicating a growing trend and interest in the topic, particularly in the past 7 years.

In terms of methodologies, the analysis showed that the earliest and main approaches used in studies are surveys with 94 articles (77.7%) that focus mainly on gathering cross-sectional data. From 2015 onwards, there have been qualitative

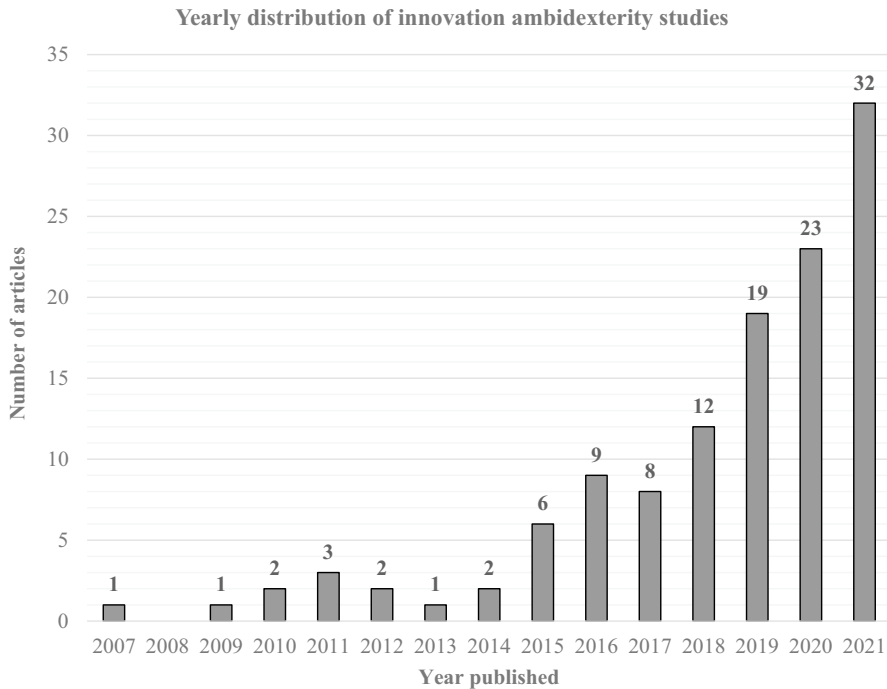


Fig. 2 Breakdown of reviewed articles according to year published

case studies and approaches present in 11 articles (9.1%), and econometric analysis of panel data in 8 articles (6.6%), as shown by the yearly distribution of Fig. 3 and Table 2. During the last three years, two other methodologies have emerged, i.e., mathematical models and simulation in 5 articles (4.1%), and mixed approaches that combine surveys and interviews in 3 articles (2.5%).

4.1.2 Theories

Insights from the reviewed articles suggest various theoretical underpinnings for IA studies, as summarised by Table 3. Dominating the literature are *resource theories* with studies based on the resource-based view, knowledge-based view, resource dependency and dynamic capability theories. From an earlier study on the impact of learning capability (Lin et al. 2013), the scope for resource-based analysis extends to topics such as business intelligence (Božič and Dimovski 2019), resource allocation mechanism (Fu et al. 2021), and entrepreneurial orientation (EO) (Arzubiaga et al. 2018; Nofiani et al. 2021). The next set of theories are *leadership theories* which posit on leader behaviour and structural mechanisms facilitating IA, with most coverage by upper echelon theory that examines executive viewpoints on organisational strategic choices for IA. Other theories applied to study the impact of leadership styles and characteristics on IA are transformational, transactional, habitual domain, ambidextrous, strategic forms of leadership theories.

Table 1 Yearly distribution for review according to citations

Year	Number	Citation
2007	1	Grover et al. (2007)
2009	1	Jansen et al. (2009)
2010	2	Brion et al. (2010), Hughes et al. (2010)
2011	3	Chang et al. (2011), Lin and McDonough (2011), Wei et al. (2011)
2012	2	Chang and Hughes (2012), McDermott and Prajogo (2012)
2013	1	Lin et al. (2013)
2014	2	Li et al. (2014), Tan and Liu (2014)
2015	6	Kortmann (2015), Lin and Chen (2015), Lin and Chang (2015), Minh and Hjortso (2015), Suzuki (2015), Yang et al. (2015a, b)
2016	9	Dunlap et al. (2016), Li et al. (2016), Lucena (2016), Pérez Perdomo et al. (2016), Revilla et al. (2016), Tsai (2016), Zhang et al. (2016), Zhang and Zhang (2016), Zheng et al. (2016)
2017	8	Brion and Mothe (2017), Lazzarotti et al. (2017), Martin et al. (2017), Tsai and Wang (2017), Tsai (2017), Wong et al. (2017), Zang and Li (2017), Zhang and Cui (2017)
2018	12	Arzubiaga et al. (2018), Chen et al. (2018a, b), Chen and Liu (2018), Chen et al. (2018a, b), Fu et al. (2018), Jin et al. (2018), Kuo et al. (2018), Liao et al. (2018), Soto-Acosta et al. (2018), Xie and Gao (2018), Ye et al. (2018a, 2018b)
2019	19	Alcalde-Heras et al. (2019), Ardito et al. (2019), Batt-Rawden et al. (2019), Bedford et al. (2019), Berraies et al. (2019), Berraies and Bchini (2019), Božič and Dimovski (2019), Fu et al. (2019), Hsieh et al. (2019), Hu et al. (2019), Lee et al. (2019), Liu et al. (2019a, b), Liu et al. (2019a, b), Röd (2019), Wang (2019), Wang et al. (2019), Yi et al. (2019), Yin and Su (2019), Zhang et al. (2019)
2020	23	Ahmad et al. (2020), Altındağ and Bilaloğlu Aktürk (2020), Ardito et al. (2020), Ben Rejeb et al. (2020), Blomkvist et al. (2020), Buccieri et al. (2020), Oluwafemi et al. (2020), Cabeza-Pullés et al. (2020), Chang and Gotcher (2020), Chen and Liu (2020), Chen et al. (2020), Cho et al. (2020), Ghantous and Alnawas (2020), Harmancioglu et al. (2020), Pangarso et al. (2020a, 2020b), Scuotto et al. (2020), Sijabat et al. (2020), Wiratmadja et al. (2020), Xie et al. (2020), Yu and Kim (2020), Zhang et al. (2020a, b), Zhang and Tang (2020), Zhang et al. (2020a, b)
2021	32	Açıkgöz et al. (2021), Alayo et al. (2021), Doghri et al. (2021), Berraies and Rejeb (2021), Ceptureanu et al. (2021), Ceptureanu and Ceptureanu (2021), Choi et al. (2021), Frare and Beuren (2021), Fu et al. (2021), Gong et al. (2021), Hughes et al. (2021), Inoue (2021), Jin and Zhou (2021), Kahn and Candi (2021), Kanchanabha and Badir (2021), Khairuddin et al. (2021), Khan et al. (2021), Lei et al. (2021), Lin and Qu (2021), Liu and Long (2021), Nofiani et al. (2021), Onufrey and Bergek (2021), Randhawa et al. (2021), Sijabat et al. (2021), Song and Zhao (2021), Tong and Han (2021), Wang and Fang (2021), Wang et al. (2021), Wei et al. (2021), Yan et al. (2021), Zhang et al. (2021a, 2021b)

Organisational theories posit on processes by organisations and contain recent expositions based on organisational learning theory and the Technology–Organisation–Environment framework, while the cluster of *information theories* postulate on organisational exchanges and flows with instances of transaction cost and information processing theories. *Role-based theories* involve stakeholder theory (Ardito

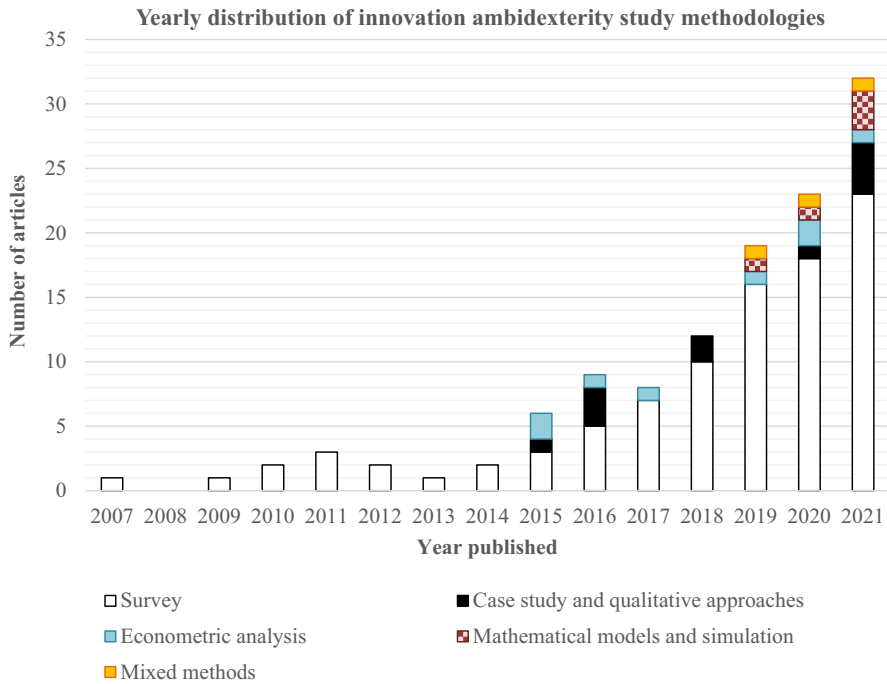


Fig. 3 Yearly breakdown of reviewed articles according to research methodologies

et al. 2020) and stewardship theory (Arzubiaga et al. 2018), and there are other theoretical groundings based on institutional theory in relation to institutional pressures for IA (Chang and Gotcher 2020; Song and Zhao 2021) and componential theory of creativity in regards to entrepreneurial leadership (Khairuddin et al. 2021). The review also contains applications of social capital theory for analysing resource configurations (Choi et al. 2021) and for examining the effects of business and political ties (Zhang and Cui 2017) and managerial ties (Li et al. 2014; Zhang et al. 2019).

4.1.3 Geographical regions and industry sectors

The analysis indicates variations in the industry sectors investigated in the reviewed articles, as summarised by Fig. 4. The most investigated single-sourced sector was the technology industry with reported work in 24.8% (29 out of 121) of the reviewed articles. Manufacturing and service firms are favoured sources of data as reported by 17.4% (21 out of 121) of articles. The review includes 9.9% (12 out of 121) of studies involving small and medium enterprises (SMEs) and 2.5% (3 out of 121) of studies with educational institutions. Agricultural, construction, gaming, hotels, shipping, and pharmaceutical firms each had coverage in 2 studies (representing 8.5% of included articles). The review contains eight investigations (representing 6.6% of included articles) of the automotive, finance, healthcare, restaurants, fashion,

Table 2 Overview of review methodologies in reviewed articles

Methodology	Overview	References
Case study and qualitative approaches	Applying interviewing techniques to explore determinants of innovation ambidexterity management and challenges	Lin and Qu (2021), Onufrey and Bergek (2021), Choi et al. (2021), Randhawa et al. (2021), Blomkvist et al. (2020), Ye et al. (2018b), Kuo et al. (2018), Zhang and Zhang (2016), Tsai (2016), Minh and Hjortsø (2015), Pérez Perdomo et al. (2016)
Economic analysis	Analysing innovation ambidexterity data and practices using econometric methods	Liu and Long (2021), Zhang and Tang (2020) Zhang and Tang (2020), Lee et al. (2019), Wong et al. (2017), Lucena (2016), Suzuki (2015), and Lin and Chang (2015)
Mathematical models and simulation	Using mathematical models or simulations to represent process, system, or phenomenon as a basis to study innovation ambidexterity concept	Wei et al. (2021), Liu and Long (2021), Fu et al. (2021), Yin and Su (2019), and Zhang et al. (2020a, b)
Mixed approach	Mixing approaches, i.e. quantitative and qualitative methods, to study innovation ambidexterity concepts	Berraies and Rejeb (2021), Ben Rejeb et al. (2020), Hsieh et al. (2019)
Surveys	Utilising questionnaire-based surveys in cross-sectional and longitudinal studies to examine innovation ambidexterity antecedents, behaviour and consequences	Wang et al. (2021), Jin and Zhou (2021), Ceptureanu and Ceptureanu (2021), Khan et al. (2021), Frare and Beuren (2021), Tong and Han (2021), Alayo et al. (2021), Nofiani et al. (2021), Doghri et al. (2021), Hughes et al. (2021), Gong et al. (2021), Khairuddin et al. (2021), Yan et al. (2021), Sijabat et al. (2021), Song and Zhao (2021), Kahn and Candi (2021), Inoue (2021), Kanchanabha and Badir (2021), Wang and Fang (2021), Zhang et al. (2021a; 2021b), Ceptureanu et al. (2021), Açıkgoz et al. (2021), Lei et al. (2021), Scuotto et al. (2020), Chang and Gotcher (2020), Oluwafemi et al. (2020), Ardito et al. (2020), Chen and Liu (2020), Chen et al. (2020), Altındağ and Bilaloğlu Aktürk (2020), Ghantous and Alnawas (2020), Cabeza-Pullés et al. (2020), Cho et al. (2020), Pangarso et al. (2020a; 2020b), Ahmad et al. (2020), Bucciari et al. (2020), Xie et al. (2020), Sijabat et al. (2020), Wiratmadja et al. (2020), Yu and Kim (2020), Harmancıoglu et al. (2020), Batt-Rawden et al. (2019), Božič and Dimovski (2019), Röd (2019), Ardito et al. (2019), Liu et al. (2019a, b), Berraies et al. (2019), Hu et al. (2019), Wang (2019), Liu et al. (2019a, b), Berraies and Bchini (2019), Zhang et al. (2019), Wang et al. (2019), Alcalde-Heras et al. (2019), Bedford et al. (2019), Chen et al. (2018a, b), Liao et al. (2018), Arzubiaga et al. (2018), Xie and Gao (2018), Ye et al. (2018a), Jin et al. (2018), Chen et al. (2018a, b), Chen and Liu (2018), Fu et al. (2018), Soto-Acosta et al. (2018), Tsai (2017), Brion and Mothe (2017), Martin et al. (2017), Zhang and Cui (2017), Zang and Li (2017), Lazzarotti et al. (2017), Tsai and Wang (2017), Revilla et al. (2016), Zhang et al. (2016), Dunlap et al. (2016), Li et al. (2016), Zheng et al. (2016), Yang et al. (2015a, b), Lin and Chen (2015), Kortmann (2015), Tan and Liu (2014), Li et al. (2014), Lin et al. (2013), Chang and Hughes (2012), McDermott and Prajogo (2012), Wei et al. (2011), Lin and McDonough (2011), Chang et al. (2011), Hughes et al. (2010), Brion et al. (2010), Jansen et al. (2009), Grover et al. (2007), and Yi et al. (2019)

Table 3 Overview of main theories in reviewed articles

Category	Theory	Definitions and constructs	Examples in IA studies
Resource	Dynamic capabilities view (Tece et al. 1997)	Refers to a company's ability to quickly create and reconfigure internal and external capabilities in changing contexts	Examining the moderating role of institutional pressures on co-production and eco-innovation (Chang and Grotcher 2020) Studying the impact of absorptive capacity (Pangarso et al. 2020a) Exploring the use of business intelligence and analytics (Božič and Dimovski 2019) Investigating the mediating role of knowledge sharing between distributed leadership enhances IA (Fu et al. 2018)
	Knowledge creation theory (Nonaka 1994)	Posits that new organisational knowledge is formed through the interaction of tacit and explicit knowledge	
	Knowledge-Based View (Grant 1996)	Claims that knowledge is the most important strategic asset of a company	Exploring the influence of alliance network diversity (Zhang et al. 2020a) Analysing the process of coordination and ecological spiral (Long and Liu 2021) Examining the effect of technological, organisational and environmental factors (Soto-Acosta et al. 2018) Examining the moderating influences of supplier involvement and foreignness (Dunlap et al. 2016)
	Resource dependence theory (Pfeffer and Salancik 1978)	Claims that organisational behaviour must be understood in relation to the allocation of power and control in and out of a company	Assessing the influence of board of directors on the link between entrepreneurial orientation (EO) and IA (Arzubiaga et al. 2018) Exploring the impact of EO (Nofiani et al. 2021)
	Resource-based View (Barney 1991)	Posits on resources that are rare, valuable, hard to duplicate, and impossible to replace for long-term success	Exploring competitive marketing strategies (Hughes et al. 2021) Analysing the impact of learning capability (Lin et al. 2013) Investigating ambidextrous market orientation (Tan and Liu 2014) Identifying value-adding creation of service offerings and the sustainable competitive advantage derived from heterogeneous resources and capabilities (Tsay and Wang 2017) Exploring the antecedent roles of technological and marketing capabilities (Zang and Li 2017) Examining the effects on business model ambidexterity (Liao et al. 2018) Investigating resource allocation mechanisms (Fu et al. 2021) Exploring the relationship between board human capital and enterprise growth (Liu et al. 2019b) Examining the moderating role of institutional pressures on co-production and eco-innovation (Chang and Grotcher 2020)
			Exploring the impact of EO (Nofiani et al. 2021)

Table 3 (continued)

Category	Theory	Definitions and constructs	Examples in IA studies
Leadership	Ambidextrous leadership theory (Rosing et al. 2011)	Suggests that leaders need to show two paradoxical leadership behaviours (opening and closing) to foster employee exploitative and explorative innovation behaviours	Investigating how leadership facilitates employee innovation behaviours (Oluwafemi et al. 2020)
	Leadership habitual domain theory (Ye et al. 2018b)	Posits on leaders' habitual behaviours and their potential abilities based on their experience, knowledge, and capabilities	Analysing the impact mechanisms of leadership habitual domain on IA via the mediating role of dynamic capabilities (Ye et al. 2018b)
	Strategic leadership theory (Finkelstein and Hambrick 1996)	Emphasises on leaders who execute strategies and oversee organisations	Understanding the importance of strategic leadership in creating a learning company (Lin and McDonough 2011)
	Transactional leadership style (Burns 1978)	Proposes that leaders use a system of incentives and punishments to drive their followers	Investigating the impact of the transformational and transactional leadership styles (Berrates et al. 2019)
	Transformational leadership theory (Bass 1985)	Suggests that the role of leaders is to transform and inspire individuals for mutually supporting each other	Investigating the impact of the transformational and transactional leadership styles (Berrates et al. 2019) Examining the inner mechanisms of leader attention scope, and transformational leadership behaviour (Zheng et al. 2016)
	Upper echelon theory (Hambrick and Mason 1984)	Suggests that organisational strategic choices are reflections of the thoughts of executives	Analysing the effects of top management team (TMT) diversity (Röd 2019) Examining how transactive memory system enhances ambidexterity (Chen and Liu 2018) Exploring the role of overconfident CEO (Wong et al. 2017)
			Proposing that top teams with task-related diversity effectively addressed the differentiating-integrating challenges of IA when they engaged in effective strategic decision-making processes (Li et al. 2016) Examining the inner mechanisms of leader attention scope, and transformational leadership behaviour (Zheng et al. 2016) Exploring TMT ambidexterity-oriented decisions (Kortmann 2015)

Table 3 (continued)

Category	Theory	Definitions and constructs	Examples in IA studies
Organisational	Organisational learning theory (Chiva et al. 2014)	Posits on processes through which organisations change or modify their mental models, rules, processes, or knowledge, for maintaining or improving their performance	Investigating the mediating role of knowledge sharing between distributed leadership enhances IA (Fu et al. 2018) Highlighting requirements for the adoption of organisational cultures, willingness to cannibalise and willingness to combine existing knowledge (Harmançioglu et al. 2020) Exploring the influence of alliance network diversity (Zhang et al. 2020a) Exploring IA activities (Blomkvist et al. 2020)
	Technology–Environment T-O-E framework (Tornatzky et al. 1990)	Describes how companies use and deploy new technologies, and how these processes are influenced by a variety of variables, including technological, organisational, and environmental contexts	Examining the effects of technological, organisational and environmental factors Soto-(Acosta et al. 2018)
Information	Information processing theory Miller et al. (1998)	Supports the idea that businesses gain from matching their informational support mechanisms with the information requirements of strategic decision-makers	Examining the influence of TMT cognitive diversity (Kanchanabha and Badir 2021)
	Transaction cost theory (Coase 1937, Williamson 1985)	Theorises that the relative costs of handling transactions dictate governance structures	Exploring the influence of alliance network diversity (Zhang et al. 2020a)

Table 3 (continued)

Category	Theory	Definitions and constructs	Examples in IA studies
Role-based	Stakeholder theory (Parmar et al. 2010)	Proposes a variety of stakeholders, and relationships among these entities, as influenced by corporate entities, such as employees, suppliers, and local communities, as well as creditors	Examining the effects of knowledge sourcing activities directed toward supply chain stakeholders (Ardito et al. 2020)
	Stewardship theory (Davis et al. 1997)	Hypothesises that stewards will prioritise collaboration over defection when faced with a choice between self-serving and pro-organisational action	Assessing the influence of board of directors on the link between EO and IA (Arzubiaga et al. 2018)
Other	Componential theory of creativity (Amabile 2011)	Posits on organisational creativity and innovation as well as the work environments that managers build	Investigating how entrepreneurial leadership affects creativity (Khairuddin et al. 2021)
	Institutional theory (DiMaggio and Powell 2010)	Suggests that homogeneity of firm strategies tend to be the net effect of institutional pressures	Exploring the moderating role of institutional pressures on effects of co-production on eco-innovation (Chang and Gocher 2020) Examining the influence of institutional pressures on IA through the moderated mediating role of strategic cognition in clusters (Song and Zhao 2021)
	Social capital theory (Coleman 1988)	Claims that a person's social connections are a valuable source for gaining and maintaining power and influence	Analysing social relationships among top managers (Li et al. 2014) Examining managerial ties (Zhang et al. 2019) Examining the effects of business and political ties (Zhang and Cui 2017) Exploring resource configuration (Choi et al. 2021) Exploring the impact of corporate social responsibility on IA (Khan et al. 2021)

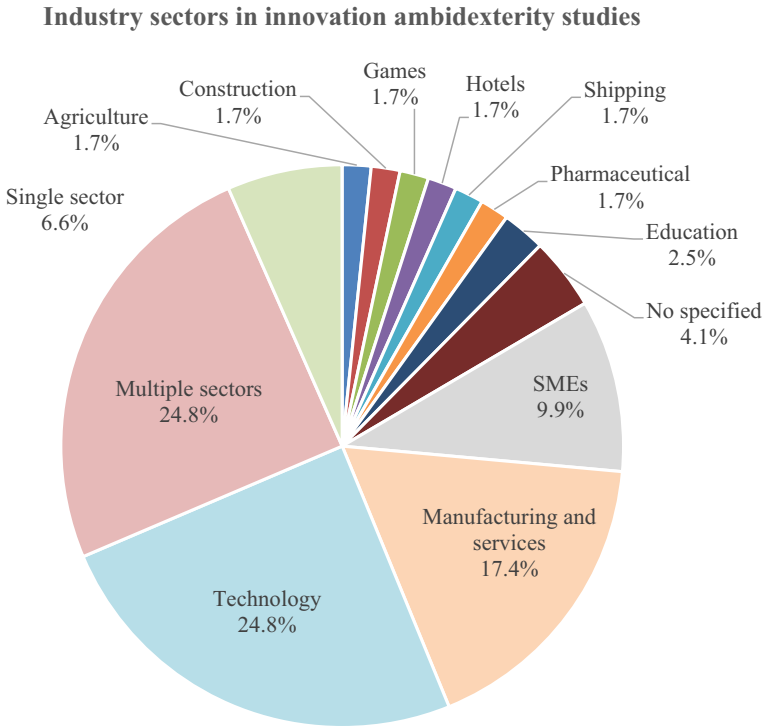


Fig. 4 Breakdown of industry sectors in the reviewed articles

property development, paper and pulp, and utilities sectors. Studies with multiple sectors make up 24.8% (30 out of 121) of articles.

Next, the breakdown of reviewed articles according to geographical regions, as illustrated by Fig. 5, shows that mainland China is the most studied region with 36.4% (44 out of 121) of the reviewed articles. Next is Taiwan at 9.9% (12 out of 121), followed by Spain and Indonesia each at 5.0% (6 out of 121), Tunisia at 4.1% (5 out of 121), Italy at 3.3% (4 out of 121), and the United Kingdom and United States each with 3 studies, each representing 2.5% (3 out of 121) of the reviewed articles. Australia, Brazil, France, Japan, Mexico, Pakistan, Romania, Scotland, and Turkey offer 2 studies each, representing 15.3% (18 out of 121) overall of the reviewed articles. Austria, Finland, Hong Kong, India, Ireland, Jordan, Kenya, Korea, Netherland, Norway, Slovenia, Thailand, and Vietnam each had 1 study, accounting for 10.7% (13 out of 121) overall of the reviewed articles.

4.2 Main determinants for managing innovation ambidexterity

Our analysis of the reviewed articles suggests seven main themes on determinants for managing IA. First is a ‘process mechanisms’ theme, which involves 47.1% (57 from 121) of the reviewed articles followed by an ‘organisational learning’ theme

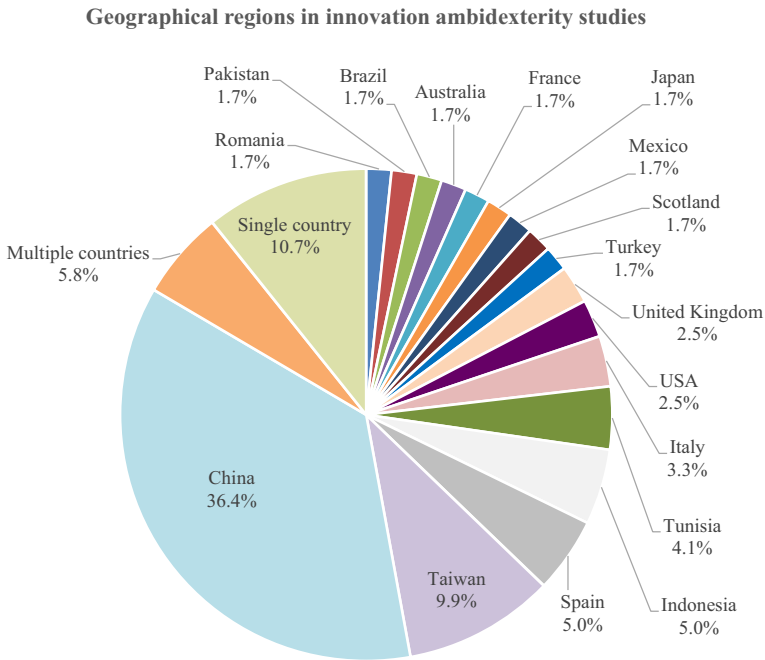


Fig. 5 Breakdown of geographical regions in the reviewed articles

covered by 22.3% (27 from 121) of the articles. Next theme of interest in the review is a ‘leadership styles’ theme investigated in 13.2% (16 from 121) of the articles and the themes of ‘technology investments’ and ‘organisational contexts’, representing 5.8% (7 from 121) and 4.1% (5 from 121) of the articles, respectively. The remaining themes are ‘environmental uncertainties’, and ‘institutional pressures’ covered in 4.1% (5 from 121) and 3.3% (4 from 121) of the articles, respectively. Figure 6 and Table 4 communicate the yearly trends and citations for these determinants, and the following subsections define the fundamental concepts within the determinants.

4.2.1 Process mechanisms

Generally, the most studied category of IA determinants is the theme named ‘process mechanisms’, which underscores procedures, tendencies, and with emphasis on managing IA processes. Driving these interests, are six concepts, which studies apply as antecedents, moderators, and mediating variables, as shown by Table 4. These concepts are interaction, involvement, collaboration, networks, capabilities, and orientation.

Studies with focus on *interaction* as a process mechanism reveal that this concept influences companies’ ability to create ambidextrous innovations and thus improve their performance. For instance, studies on the interaction modes of IA (McDermott and Prajogo 2012; Lucena 2016) and influencing factors of balanced

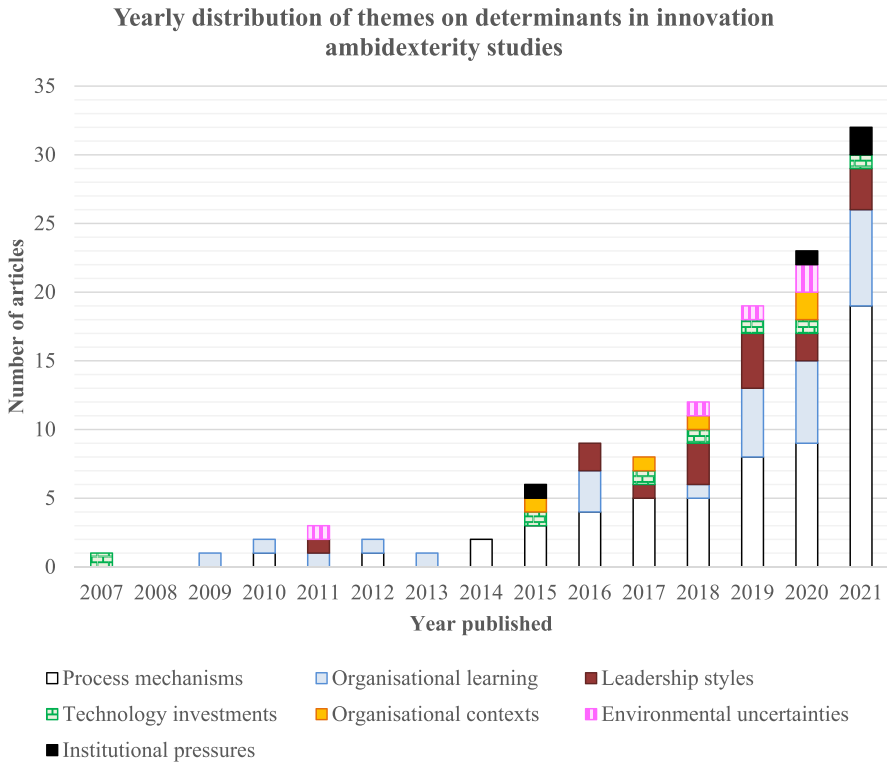


Fig. 6 Yearly breakdown of reviewed articles according to determinants for managing IA

organisational IA (Cho et al. 2020; Lin and Qu 2021) reveal a significant and positive impact of IA on performance, as well as factors such as entrepreneurial bricolage (Lin and Qu 2021) that can balance innovation. Other studies, which focus on variables such as buyer–supplier interaction (Wang et al. 2021) and supplier-side search (Wang et al. 2019) suggest that ambidextrous innovation and performance are positively influenced by these variables. Similarly, Zhang et al. (2016) in a study on how EO and human resource management interact to influence IA, discovered that such interaction has a considerable impact on IA and, as a result, firm performance. *Integration* mainly concerns coping combination (i.e., alignment and misalignment) issues (Chen et al. 2020) and combining dimensions of IA (Suzuki 2015; Dunlap et al. 2016). *Networks* facilitate exchanges and resource flow for IA through avenues such as social media networks (Scuotto et al. 2020), strategic networks (Xie and Gao 2018), cluster network (Zhang and Zhang 2016), and corporate networks (Choi et al. 2021). In these arrangements, exchanges strengthen network ties (Zhang and Cui 2017; Cabeza-Pullés et al. 2020), social capital (Li et al. 2014; Lazzarotti et al. 2017), and relational embeddedness (Zhang and Zhang 2016; Hughes et al. 2021).

Evaluated sources in this review show that *involvement* as a process mechanism has a favourable influence on increasing IA. Involvement has been the

Table 4 Main themes on determinants for managing innovation ambidexterity according to citations

Theme	Concepts	Codes and focus of research studies
Process mechanisms	Interaction	Interaction and balance mode between IA dimensions (McDermott and Prajogo 2012; Lin and Chang 2015; Lucena 2016; Cho et al. 2020; Lin and Qu 2021) Buyer–supplier interaction (Wang et al. 2021) Supplier-side search (Wang et al. 2019) Entrepreneurial orientation (EO) and human resource management systems interactions (Zhang et al. 2016) Relationships (Kahn and Candi 2021) Job autonomy (Frare and Beuren 2021)
	Integration	Integration mechanisms (Jansen et al. 2009) Coping combinations (Chen et al. 2020) Unscripted agility (Frare and Beuren 2021) Combined dimension of IA (Suzuki 2015; Dunlap et al. 2016)
	Involvement	Family involvement (Alayo et al. 2021) Feedback (Liu et al. 2019a) Customer participation (Chen et al. 2018a) Supplier involvement (Dunlap et al. 2016)
	Collaboration and coordination	Inter-organisational collaboration (customer, competitor, and supplier coordination) (Doghri et al. 2021) Collaboration with partners (Lazzarotti et al. 2017) Ties (Zhang et al. 2019; Xie et al. 2020) Platform ecosystems (Inoue 2021) Parent control asymmetry (Jin and Zhou 2021) Decentralisation (Ceptureanu and Ceptureanu 2021) Collaborative modes (Wei et al. 2021) Value co-creation capabilities of employee engagement, customer participation, and partner collaboration (Tsai 2017)
	Orientation	Coordination mechanism of cooperative ambidextrous arrangements (Yin and Su 2019) EO (Arzubiaga et al. 2018; Ghantous and Alnawas 2020; Nofiani et al. 2021; Hughes et al. 2021) Market orientations (Tan and Liu 2014; Tsai and Wang 2017; Hu et al. 2019; Ghantous and Alnawas 2020) Ambidexterity-oriented decisions (Kortmann 2015) Internationalisation (Hisieh et al. 2019; Hughes et al. 2021)

Table 4 (continued)

Theme	Concepts	Codes and focus of research studies
Networks and networking		Egocentric alliance networks (Zhang and Tang 2020)
		Social media networks (Scuotto et al. 2020)
		Strategic networks (Xie and Gao 2018)
		Network ties (Zhang and Cui 2017; Cabeza-Pullés et al. 2020)
		Corporate networks (Choi et al. 2021; Wang and Fang 2021)
		Corporate social responsibility (Khan et al. 2021)
		Social capital (Li et al. 2014; Lazzarotti et al. 2017; Khan et al. 2021)
		Sustainable supply chain management (Khan et al. 2021)
		Cluster networks (Zhang and Zhang 2016)
		Relational embeddedness (Hughes et al. 2021)
Recourses		Resources allocation (Kuo et al. 2018; Zhang et al. 2020b; Fu et al. 2021)
		Organisational slack (Hu et al. 2019)
		Resource configuration (Choi et al. 2021)
		Business experience (Ceptureanu et al. 2021)
		Business model ambidexterity (Liao et al. 2018)
Capabilities		Human resource management (Altındağ and Bilalöglü Aktürk 2020; Lei et al. 2021)
		Managerial capabilities (Alcalde-Heras et al. 2019)
		Dynamic capabilities (Kuo et al. 2018; Ye et al. 2018b; Yu and Kim 2020; Sijabat et al. 2021)
		Technology capabilities (Zang and Li 2017)
		Marketing capabilities (Martin et al. 2017; Bucciari et al. 2020)
		Bottom-up learning (Wei et al. 2011)
Organisational learning		Learning capabilities (Lin et al. 2013; Batt-Rawden et al. 2019)
		Unlearning (Açık-göz et al. 2021)
		Team learning and identification (Zhang et al. 2021a)

Table 4 (continued)

Theme	Concepts	Codes and focus of research studies
Knowledge	Knowledge	Knowledge ecology and knowledge spiral (Long and Liu 2021)
		Knowledge sources (Revilla et al. 2016; Jin et al. 2018; Ardito et al. 2020)
		Information literacy (Ahmad et al. 2020)
		Knowledge sharing (Fu et al. 2018; Yi et al. 2019)
		Absorptive capacity (Božič and Dimovski 2019; Pangarso et al. 2020a, b)
		Knowledge management (Soto-Acosta et al. 2018; Yu and Kim 2020; Lei et al. 2021)
		Knowledge-centred culture (Lei et al. 2021)
		Knowledge network capability (Tong and Han 2021)
		Design thinking (Randhawa et al. 2021)
		Cognitive conflict (Bedford et al. 2019)
		Headquarters mind-sets (Lin and Chen 2015)
		Cognitive diversity of top management teams (TMTs) (Kanchanabha and Badir 2021)
		Team diversity (Zhang et al. 2021b)
		Team heterogeneity (Zhang et al. 2021a)
Alliance network diversities (Zhang et al. 2020a)		
Alliance portfolio diversity (Ardito et al. 2019)		
Diversity	Diversity	Gender diversity (Ben Rejeb et al. 2020)
		TMT transactive memory systems (Chen and Liu 2018)
		Knowledge heterogeneity (Tsai 2016)
		TMT diversity (Li et al. 2016; Röd 2019)
		Technological portfolio (Lin and Chang 2015)
		Structural differentiation (Jansen et al. 2009)
		Leadership styles (Lin and McDonough 2011; Zheng et al. 2016; Chen and Liu 2018; Fu et al. 2018; Berraias and Behimi 2019; Berraias et al. 2019; Oluwatemi et al. 2020; Gong et al. 2021; Khairuddin et al. 2021)
		Board of directors' roles and composition (Arzubiaga et al. 2018; Ben Rejeb et al. 2020; Berraias and Ben Rejeb 2021)
		TMT temporal leadership (Chen and Liu 2020)
		Board human capital (Liu et al. 2019b)
		Leadership habitual domains (Ye et al. 2018a)
		CEO overconfidence (Wong et al. 2017)
		Leader attention scope (Zheng et al. 2016)
		Top manager characteristics (Chang and Hughes 2012; Wiratmadja et al. 2020)
Stakeholder role (Pérez Perdomo et al. 2016)		
Leadership styles	Leadership	Leadership styles (Lin and McDonough 2011; Zheng et al. 2016; Chen and Liu 2018; Fu et al. 2018; Berraias and Behimi 2019; Berraias et al. 2019; Oluwatemi et al. 2020; Gong et al. 2021; Khairuddin et al. 2021)
		Board of directors' roles and composition (Arzubiaga et al. 2018; Ben Rejeb et al. 2020; Berraias and Ben Rejeb 2021)
		TMT temporal leadership (Chen and Liu 2020)
		Board human capital (Liu et al. 2019b)
		Leadership habitual domains (Ye et al. 2018a)
		CEO overconfidence (Wong et al. 2017)
		Leader attention scope (Zheng et al. 2016)
		Top manager characteristics (Chang and Hughes 2012; Wiratmadja et al. 2020)
		Stakeholder role (Pérez Perdomo et al. 2016)

Table 4 (continued)

Theme	Concepts	Codes and focus of research studies
Technology investments	Technology	Business intelligence and analytics (Božič and Dimovski 2019) Technological innovation strategies (Wang 2019) Technology habitual domain (Ye et al. 2018b) Technology capability (Hughes et al. 2010; Zang and Li 2017; Soto-Acosta et al. 2018; Lee et al. 2019; Wiratmadja et al. 2020) Telecommunication technologies (Grover et al. 2007)
	Investment in infrastructure	Investment in infrastructure (Yan et al. 2021) Infrastructure for utilities (Blomkvist et al. 2020)
Organisational contexts	Culture	Creativity (Brion et al. 2010; Brion and Mothe 2017; Sijabat et al. 2020, 2021; Fu et al. 2021) Organisational culture (Lin and McDonough 2011; Chen et al. 2018b; Bucciari et al. 2020; Harmancioglu et al. 2020; Sijabat et al. 2021) Organisational formalisation (Brion et al. 2010; Wei et al. 2011) Organisational structure and context (Brion et al. 2010; Chang et al. 2011; Chang and Hughes 2012; Brion and Mothe 2017) Collectivistic culture (Yang et al. 2015b) Cultural embeddedness (Zhang and Zhang 2016)
	Uncertainty and dynamism	Environmental uncertainty (Gong et al. 2021) Dynamic environment (Chang et al. 2011; Soto-Acosta et al. 2018) Environmental dynamism (Zheng et al. 2016; Wang 2019; Bucciari et al. 2020; Wiratmadja et al. 2020)
Institutional pressures	Institutions and transformation	Institutional pressures (Minh et al. 2015; Chang and Gotcher 2020; Song and Zhao 2021) Transformational pressures (Onufrey and Bergek 2021)

subject of studies on family involvement (Alayo et al. 2021), supplier involvement (Dunlap et al. 2016), feedback from game testers (Liu et al. 2019a) and customer participation (Chen et al. 2018a). Insights from these research studies suggest customer engagement and ambidextrous innovation tend to reduce the impact of management change on company performance, but family and supplier participation appears to have a positive effect on IA. The studies also show that ‘feedback timing’ of game testers enhances the link between ambidextrous innovation and a game’s ultimate development performance, while ‘feedback specificity’ diminishes the ambidextrous innovation efficacy.

Next, studies show positive association between various *capabilities* and IA. Examples in the literature are individual capabilities such as managerial capabilities during economic recession periods (Alcalde-Heras et al. 2019) and organisational capabilities, particularly in the context of dynamic capabilities (Kuo et al. 2018; Ye et al. 2018b; Yu and Kim 2020; Sijabat et al. 2021). There are also instances of technology capabilities (Zang and Li 2017), and marketing capabilities (Martin et al. 2017; Zang and Li 2017; Buccieri et al. 2020; Yu and Kim 2020), with positive IA links. Although researchers agree on the importance of resources and capabilities as process mechanisms that induce IA, the spotlight on the impact of different resources determinants tend to vary. Some researchers look at resource allocation to achieve balance of IA (Kuo et al. 2018; Fu et al. 2021), while others look at the impact of organisational slack (Hu et al. 2019) and resource configuration (Choi et al. 2021) on IA. Research examines knowledge management capability as a mediating mechanism between human resource management and organisations’ IA (Lei et al. 2021) and the moderating relationship of business experience between IA and organisational performance (Ceptoreanu et al. 2021). Also of interest is the mediating role of business model ambidexterity between IA and company performance by Liao et al. (2018).

Studies concerning the impact of *collaboration* consider concepts such as inter-organisational collaboration between partners (e.g., customers, competitors, and suppliers) (Lazzarotti et al. 2017; Doghri et al. 2021), ties for collaboration (Zhang et al. 2019; Xie et al. 2020), platform ecosystems (Inoue 2021), value co-creation capabilities (Tsai 2017), and coordination mechanisms (Yin and Su 2019). In contrast, studies on *orientation* as a process mechanism report differential focus and links with IA. For instance, scholars examine impacts of EO (Ghantous and Alnawas 2020; Hughes et al. 2021), market orientation (MO) (Ghantous and Alnawas 2020), and ambidexterity-oriented decisions (Kortmann 2015) on IA. Other studies look at moderation relationships, such as the moderating link of IA to EO and business performance (Nofiani et al. 2021), the moderating effects of board of directors on EO and IA (Arzubiaga et al. 2018), and the moderating effect of IA and MO on service innovation and firm performance (Tsai and Wang 2017). While Hu et al. (2019) look at the role of MO in mediating the impact of organisational slack on IA, Tan and Liu, (2014) look at the role of IA in mediating the impact of MO on business performance. Hsieh et al. (2019) emphasise that internationalisation relates to a desire for an innovation approach that is defined by IA.

4.2.2 Organisational learning

The ‘organisational learning’ theme is the next category of IA determinants examined by researchers. Here, the first emphasis is on understanding ambidextrous learning within organisations relative to decisions concerning retaining or discarding knowledge. For a start, most studies stress learning capability, which is defined as “the combination of practices that promote intra-organisational learning among employees, partnerships with other organisations that enable the spread of learning, and an open culture within the organisation that promotes and maintains sharing of knowledge” (Lin et al. 2013, p.2). Some studies (Lin et al. 2013; Batt-Rawden et al. 2019; Zhang et al. 2021a) suggest a positive relationship between organisational learning and IA, while a study (Açıkgöz et al. 2021) suggests IA mediates the relationship between unlearning and performance. A study (Wei et al. 2011) on bottom-up organisational learning (i.e., “information gathering of managers from bottom-line employees with lower level” (p. 314)), argues that this form of learning accelerates exploitative innovation while slowing explorative innovation.

Organisational learning relate to knowledge, which the review captures in concepts of knowledge management (Soto-Acosta et al. 2018; Yu and Kim 2020; Lei et al. 2021), knowledge sources (Revilla et al. 2016; Jin et al. 2018; Ardito et al. 2020), and knowledge sharing (Fu et al. 2018). There are also concepts of knowledge ecology and knowledge spiral (Long and Liu 2021), knowledge-centred culture (Lei et al. 2021), absorptive capacity (Božič and Dimovski 2019; Pangarso et al. 2020a, 2020b), information literacy (Ahmad et al. 2020), relational embeddedness (Hughes et al. 2021), and cognitive conflict (Bedford et al. 2019). Generally, studies indicate a positive relationship between knowledge and IA but two studies suggest that knowledge has a partial mediating role on IA (Fu et al. 2018; Pangarso et al. 2020a).

According to the literature, organisational learning for IA benefits from different forms of diversity such as gender diversity (Ben Rejeb et al. 2020), alliance portfolio diversity (Ardito et al. 2019), and alliance network diversity that encompasses partner type diversity, technological diversity, industrial diversity, geographical diversity, and functional diversity (Zhang et al. 2020a). Other forms of diversity in the literature include technological portfolio diversity (Lin and Chang 2015), team heterogeneity (Zhang et al. 2021a), knowledge heterogeneity (Tsai 2016), top management team (TMT) diversity (Röd 2019; Lei et al. 2021), team diversity (Zhang et al. 2021b), and TMT’s cognitive diversity (Kanchanabha and Badir 2021). Whereas most of the studies reveal that diversity has a positive impact on IA, Zhang et al. (2020a, b) notes that different types of alliance network diversities have different effects on IA, such as industrial diversity enhancing IA, geographical diversity hindering IA, and functional diversity having an inverted U-shaped relationship with firm IA. Ardito et al. (2019) also find that internationalising alliance portfolio variety has an inverted U-shaped influence on IA.

4.2.3 Leadership styles

Insights from the literature suggest that ‘leadership styles’ offers the third most investigated determinant for IA (Lin and McDonough 2011; Zheng et al. 2016; Chen and Liu 2018; Fu et al. 2018; Berraies et al. 2019; Oluwafemi et al. 2020; Gong et al. 2021; Khairuddin et al. 2021). In this context, researchers analyse IA influences from board of directors’ roles and composition (Arzubiaga et al. 2018; Ben Rejeb et al. 2020; Berraies and Ben Rejeb 2021), TMT temporal leadership (Chen and Liu 2020), TMT characteristics (Chang and Hughes 2012; Wiratmadja et al. 2020), and board human capital (Liu et al. 2019b). There is additional coverage of leadership habitual domains (Ye et al. 2018b), CEO overconfidence (Wong et al. 2017), and leader attention scope (Zheng et al. 2016). The examined articles indicate a positive link between leadership and IA, except for two studies, which show a contrary result. First, according to Berraies and Ben Rejeb (2021), the service role of the board of directors appears to have a positive influence on IA but not the BD’s strategy function, which is negatively linked to innovation, and board of directors’ control role is not substantially linked. Second, Ben Rejeb et al. (2020) assert that the board’s service has a beneficial influence on IA but their results show that the board’s control function is adversely associated to IA.

4.2.4 Technology investments

The next theme on ‘technology investments’ offers context for the impact of infrastructure and technology investments on IA. For this theme, research suggests that investments in technology brings ground-breaking processes and services to medium- and large-sized businesses (Božič and Dimovski 2019), high-tech businesses (Ye et al. 2018b), hospitals (Zang and Li 2017), and telecommunications companies (Grover et al. 2007). Research also shows that ambidexterity has a detrimental impact on export performance, which is reduced by infrastructure investment (Yan et al. 2021). Using the case of Nairobi’s water infrastructure innovation, Blomkvist et al. (2020) examine the impact of preserving the current system while concurrently exploring new technology solutions and business strategies to service disconnected users. A key argument in this paper is that it is the quality of the innovation process that determines outcomes of sustainable services. Overall, the reviewed studies suggest that organisations are taking a balanced approach to innovation and the usage of technology has favourable connections with effective balance of exploitative and explorative innovations.

4.2.5 Organisational contexts

‘Organisational contexts’, which refers to the system of settings, environments, and assumptions inside an organisation that enable individuals and groups to function, is another key research concept extracted from the literature. Contexts reflect viewpoints on organisational formalisation (Brion et al. 2010; Wei et al. 2011), organisational structure (Brion et al. 2010; Chang et al. 2011; Chang and Hughes 2012; Brion and Mothe 2017), and organisational creativity (Brion et al. 2010; Brion and

Mothe 2017; Sijabat et al. 2020, 2021; Fu et al. 2021). Priority in the theme lies in supporting the organisational culture for shared values and beliefs for IA with expositions on themes such as collectivistic culture (Yang et al. 2015b) and cultural embeddedness (Zhang and Zhang 2016).

Due to potential links between contextual antecedents and IA, it is suggested that strategies focused on collectivism within organisations promote IA (Yang et al. 2015b). Furthermore, the adoption of two critical organisational contexts, willingness to cannibalise and willingness to integrate existing knowledge, enable organisations to achieve higher performance through implementing IA (Harmancioglu et al. 2020). When mediated by IA, firm creativity is strongly and favourably linked with firm performance and competitive advantage (Zhang and Zhang 2016; Brion and Mothe 2017). The match between organisational culture and innovation strategy is insignificantly linked with innovation speed and quality in businesses demonstrating ambidextrous innovation approach (Chen et al. 2018b).

4.2.6 Environmental uncertainties

For the ‘environmental uncertainties’ theme, the interest lies in volatility, variability, complexity, and unpredictability of environments for organisations. For instance, Gong et al. (2021) look at environmental uncertainty as a moderator between inclusive leadership and IA. Environmental uncertainty favourably influenced the relationship between inclusive leadership and exploitative innovation but had little effect on exploitation innovation.

Within the theme of environmental uncertainties, researchers have interests in the role of environmental dynamism (i.e., changes in technology, client preferences and product demand with limited predictability) in assisting organisations to improve their performance through the deployment of IA. For instance, Soto-Acosta et al. (2018) explore environmental dynamism as a moderator for the relationship between IA and firm performance. Their study finds that environmental dynamism appears to amplify the positive impact of IA on organisational performance. Similarly, a study by Chang et al. (2011) examines the internal and external antecedents of IA by SMEs and finds that internal organisational structures in a highly dynamic environment fosters the emergence of IA. Another study by Bucciari et al. (2020) examines the moderating role of environmental dynamism between international entrepreneurial culture, IA and the dynamic marketing qualities that are essential for supporting international performance. The study reveals that in the presence of dynamic environments, entrepreneurial culture has a greater influence on the formation of IA that supports the international performance. Likewise, Wiratmadja et al. (2020) find that IA has a direct influence on firm performance, while environmental dynamism has a partial mediating effect.

4.2.7 Institutional pressures

The final theme entails ‘institutional pressures’, which stem from regulative, cognitive, and normative forces. According to Song and Zhao (2021), IA stems from institutional pressures, in addition to an organisation’s ability to search through

innovation networks. The authors also note that organisations subject to varying degrees of institutional pressure may choose to employ a variety of methods and allocate resources to both exploitative and explorative innovations. Their study centres on a framework of institutional pressures acting on IA through the mediating function of strategic cognition in clusters. Another study by Chang and Gotcher (2020) which investigates the role of institutional pressures as a moderator between co-production and environmental IA, finds that there is a direct relationship between co-production and environmental IA and that this relationship is stronger when institutional pressures are high versus low. Onufrey and Bergek (2021) examine institutional pressures vis-à-vis transformational pressures for IA. Their study looks at how a mature sector responds to transformational pressure and, using the context of the pulp and paper industry, observes that company reactions are the result of deliberate and logical strategic decisions rather than route reliance and inertia, exposing a new type of IA strategy termed ‘market-driven exploitation’. In contrast, an exploratory study of SMEs (Minh et al. 2015) finds that institutional pressures made it more difficult for these enterprises to be innovatively ambidextrous.

5 Future research challenges for innovation ambidexterity scholarship

Summarising the findings from the review offers a multi-level ‘wheel’ model of IA management, as shown in Fig. 7. Insights from the study suggest that at the *organisational level*, the main determinants for managing IA are organisational contexts and learning with priorities for organisational culture (Lin and McDonough 2011; Chen et al. 2018b; Buccieri et al. 2020; Harmancioglu et al. 2020; Sijabat et al. 2021) and diversity (Li et al. 2016; Röd 2019), respectively. Similarly, the *individual level* entails leadership styles as determinants with management priorities for leadership control



Fig. 7 Summary of review findings and multi-level ‘wheel’ model of IA management

(Zheng et al. 2016), while the dominant *process level* consists of process mechanisms and technology investments as determinants with management priorities for process integration (Jansen et al. 2009) and technology infrastructure (Yan et al. 2021), respectively. The *environmental level* accounts for additional environmental uncertainties and institutional pressures as determinants with management priorities for environmental dynamism (Zheng et al. 2016; Wang 2019; Buccieri et al. 2020; Wiratmadja et al. 2020) and institutional environments (Minh et al. 2015).

Reflecting on the identified determinants from the literature, this review proposes seven topics for future management studies of IA: digital interdependence, organisational legacy, stewardship behaviour, technology sourcing, organisational resilience, environmental readiness, and institutional transformation. Table 5 summarises the main future research lines, motivations, and questions of these topics, and the next subsections present these topics, detail current related work, and outline some specific targets for studies.

5.1 Digital interdependence

The first challenge entails studies of ‘digital interdependence’ (primarily from reflections on the process mechanism determinant) that investigate the role of digital technologies, digitalisation, and digital transformation in interactions, engagements, relationship building, and involvement for IA. Consequently, studies of digital interdependence advance resource, organisational, and information theories of Table 3. The term ‘interdependence’ refers to the interconnectedness of activities, actors, and technology in organisational routines, and research studies (e.g., Pentland et al. (2015)) posit on the interdependencies of organisational subunits, activities, jobs, and technology. Thus, advances in digital interdependence promote a way to think about how to manage digital technologies so that these technologies help the most and hurt the least, and this consideration requires a long-term and broad view of digital technology integration within legal, environmental, social, ethical, and economic systems (D’Agostino et al. 2021).

Digitalisation of industrial and manufacturing processes unlocks prospects for co-creative IA because digital technologies and information systems are interdependent (Khan et al. 2022). Yet, research on the link between digital interdependence and IA remains limited. Consequently, we advocate for studies into the influence of digital interdependence on IA and critical success factors of digitalisation for IA processes. With evidence suggesting that the non-substitutability of resources is a critical prerequisite for preserving competitive advantage and revenue streams (Wassmer and Dussauge 2011), future research could additionally theorise on and empirically investigate strategic enforcement for digital interdependencies on managing IA. Research also suggests that many sceptics are dissatisfied with a simple request for a reform of engagement rules in accordance with technology’s promise because digital interdependence remains too ambiguous to demand their support (Coe et al. 2001). Accordingly, future research could focus on developing normative frameworks for digital interdependence in the context of organisational IA.

Table 5 Overview of main future research lines, motivations, and questions

Future direction	Motivation from IA determinant	Key questions
Digital interdependence	Reflecting on process mechanisms for IA raises management questions on digitalisation that increasingly plays a critical role in the processes of modern organisations	What is the influence of digital interdependence on IA? What are critical success factors of digitalisation for IA processes? How can organisations harness the potential of digital technology for improved IA?
Organisational legacy	Reflecting on organisational learning for IA and the progress made through IA warrants concerns for the legacy of systems and the ability of organisations to learn lessons is essential to maintaining such legacy	What is the relationship between organisational legacy, learning, and IA? What are the factors and processes for modernising legacy systems that enable IA?
Stewardship behaviour	Reflecting on leadership styles for IA offers prospects to further assess the behaviours of leaders for IA and focus on stewardship behaviour offers prospects to study responsibility and accountability of leaders	What is the role of stewardship behaviour by employees for IA? What are the issues of stewardship in IA and their influence on the various stages of the innovation process?
Technology sourcing	Reflecting on technology investments for IA elicits considerations for the strategy adopted to source technology and such sourcing strategy determines the speed, sophistication, and success of invested technology	What process for technology sourcing facilitates IA and what are the critical success factors of this process? What are the implementation mechanisms for technology sourcing in IA?
Organisational resilience	Reflecting on organisational contexts for IA provokes scrutiny of socio-economic shocks and crises that pose contexts for the resilience of organisations based on IA	How can IA be developed through organisational resilience and how can organisational resilience enhance IA? What contingency factors determine organisational resilience for IA in times of socio-economic shocks and crisis?
Environmental readiness	Reflecting on environmental uncertainties for IA induces examination of environmental factors for the IA that prepares organisations for institutional and societal changes	What is the relationship between environmental readiness and IA? What orientations towards IA enable organisations prepare for institutional and societal changes?
Institutional transformation	Reflecting on insitutional pressures for IA stimulates wider considerations for organisations (as part of and pressured by institutions) to respond to and transform in view of socio-economic shocks and crises	What is the role of institutional transformation on IA by organisations? What is the impact of megatrends such as digitalisation, globalisation, and personalisation on IA by organisations?

Bold texts are the identified determinants while underlined texts are the main focus for organisations related to the determinants

5.2 Organisational legacy

The next challenge relates to research on ‘organisational legacy’ (from reflections on the organisational learning determinant) for improved understanding on the transferability of learning capabilities and lessons learnt from individual to individual, ensuring the preservation of organisational knowledge. Organisational legacy progresses resource and organisational theories, as shown by Table 3, and this proposed track for research further challenges researchers to examine legacy systems “that are mission critical, expensive to maintain, brittle and inflexible to changes, run on obsolete hardware, incomplete or outdated documentation, and difficult to extend and integrate with other systems” (Gholami et al. 2017; p.101). In addition to maintaining organisational expertise and contributing positively to the organisation’s income and growth, legacy systems give a considerable competitive advantage (Sneed 1995; Erlikh 2000). Despite their importance in sustaining daily operations, legacy systems can impede innovation efforts (Bakar et al. 2021) and the failure of such systems, might have disastrous consequences for the organisation (Khadka et al. 2014). Hence, to ensure that these systems continue to deliver the best service possible in accordance with global trends, there must be support, integration, or modernisation of such systems. Modernisation of legacy systems is crucial when the maintenance of the old systems is insufficient to satisfy new and emerging expectations. Modernisation refers to improvements of existing systems to interface with newer technology while emphasising agility to adapt quickly to business changes (Ahmad et al. 2021). According to Khadka et al. (2014) there are numerous studies on legacy systems, yet only a few investigations have focused on the entire process of modernising old systems. Therefore, we advocate for future research studies on potential links that exist between organisational legacy, learning, and IA. Likewise, we recommend examinations of the process of modernising legacy systems that enable IA and the critical success criteria for this approach. Future studies could also investigate the implementation processes for modernising a legacy system in support of IA, both theoretically and experimentally.

5.3 Stewardship behaviour

For management researchers, there are future opportunities to examine ‘stewardship behaviour’ (mainly from reflections on the leadership styles determinant), a behaviour which instils organisational leaders with not just personal goals, but also collectivist and pro-organisational motivations (Davis et al. 1997). With an emphasis on responsibility and accountability concerned with the long-term implications of actions (Nunn and Avella 2015), stewardship advances leadership styles and strategies via the motivation of employees that boosts participation and inspiration for innovation. Insights from the reviewed articles suggest the influence of different leadership styles on IA underpinned by various leadership and role-based theories, as shown by Table 3. Despite this focus on leadership, the literature offers little insights on the possible role of stewards in enhancing IA. Although a study (Arzubiga et al. 2018) applies stewardship for explaining the varied impacts of boards

of directors on the link between EO and ambidextrous innovation within family SMEs, treatment in the wider context of organisations remains limited. Future research could study specific roles of stewardship for IA in different organisational contexts, i.e., formalisation, structure, creativity, and culture, as identified from the organisational context determinant. Although, empirical evidence suggests links between stewardship behaviour and the success of innovation (Domínguez-Escrig et al. 2019), there are opportunities for studies to test this relationship in normative and cognitive organisational contexts. In addition, future research may examine the issues of stewardship in IA and their influence on the various stages of the innovation process.

5.4 Technology sourcing

The fourth challenge relates to research on ‘technology sourcing’ (from reflections on the technology infrastructure determinant) with opportunities to examine the process of R&D outsourcing, the engagement of various types of partners in collaborative networks, and the negotiation processes with contractors for the formulation and implementation of various IT contracts, licenses, staff, leases, assets. Accordingly, technology sourcing studies advance the management of infrastructure investment and technology. This management focus entails overseeing the creation, deployment, and reconfiguration of resources within organisations, in accordance with resource, organisational, and information theories presented by Table 3. Technology sourcing has become a crucial part of a company’s technology strategy due to the continually evolving and complicated nature of technology. Advances in the speed and sophistication of technology motivates organisational strategies for purchasing and procuring technologies from outside sources (Tsai and Wang 2009). In this context, organisations also turn to outside partners to aid with innovation and technology management processes. With the increasing importance of innovation as a key enabler for a company’s competitive advantage, a number of studies examine the issues surrounding technology sourcing in relation to foreign direct investment (De Propris and Driffield 2006), mergers and acquisitions on corporate (Cefis 2010), innovative capability (Zhao et al. 2005) and innovation performance (Tsai and Wang 2009). Though these studies highlight the impact of technology sourcing on organisational innovation, much remains unexplained in the specific context of IA. Thus, we urge for research investigating the process of technology sourcing that facilitates IA and critical success factors of this process. Additionally, future research could hypothesise on and empirically examine implementation mechanisms for technology sourcing in IA.

5.5 Organisational resilience

Another challenge for future research involves analysing organisational resilience (from reflections on the organisational context determinant). Organisational resilience entails making ongoing adjustments and adaptation to tough situations and disruptions. In this context, organisational resilience enables firm to react and recover

from socio-economic shocks and to maintain a desired degree of stability. Research concerning organisational resilience identifies several abilities that contribute to resilience, e.g., fixing and learning from mistakes quickly (Weick and Sutcliffe 2001), and changing business practices to suit the needs of the new environment (Mafabi et al. 2012), with continuous innovation playing a critical role for organisational survival. Particularly, a resilient organisation gathers information from the environment to implement innovations related to achieving resilience in times of crisis and calm (Durugbo and Al-Balushi 2022). Furthermore, failure to become resilient may cause organisations to lose their vision, mission, and authorisation, making them more vulnerable to deterioration and abandonment. Consequently, research on organisational resilience advances organisational contexts in line with organisational and resource theories of Table 3. Due to recent socio-economic shocks and crisis like COVID-19 pandemic and the financial crisis, organisational resilience continues to gain substantial academic attention. Yet insights on the topic from the perspective of IA remain restricted. As a result, we challenge academics to study this area empirically to develop, recognise, and harness the potential for building organisational resilience within the framework of IA. Studies may also consider more specific research questions for future IA studies on organisational resilience such as ‘how can IA be developed through organisational resilience?’ In addition, there is a need to investigate, understand, and eventually operationalise the interface between organisational resilience and IA.

5.6 Environmental readiness

Another potential research area entails studies of ‘environmental readiness’ (mainly from reflections on the environmental uncertainty determinant), which refers to the external factors that drive an organisation to seek IA. Research studies focused on innovation adoption reveal that environmental readiness along with technological, organisational readiness are all essential for the adoption of innovation (Yang et al. 2015a; AlSheibani et al. 2018). In this sense, environmental readiness refers to how organisational users are prepared and eager to accept innovation in response to perceived external influences. These forces include customer/supplier pressure, competition pressure, and external support, all of which impact adoption (Priambodo et al. 2021). Furthermore, research shows that the adoption of innovation is influenced by external variables such as competitive pressure and regulatory issues (Ifinedo 2005). Considering these viewpoints from previous research, environmental readiness offers a construct that tackles environmental uncertainty and dynamism, with theoretical underpinnings from resource, organisational, and institutional theories of Table 3. Thus, understanding future needs of environmental readiness by organisations in times of uncertainty and crisis, such as the COVID-19 pandemic, continues to be a concern, since it determines organisational continuity and viability in dynamic business environments (Priambodo et al. 2021). Research studies could also consider readiness constructs for contexts, such as sustainability, interconnectivity, and security, with respect to IA by organisations.

5.7 Institutional transformation

The final challenge is for research studies on ‘institutional transformation’ (primarily from reflections on the institutional pressure determinant). Here, institutional transformation refers to the process of change that is inherent in the act of organising and this process is carried out by institutional actors as they manage, innovate, and modify their routines practices through time (Orlikowski 1996). Such organising indicates major shifts in organisational operations, which necessitate structural, management, and cultural changes (Sligo et al. 2019). Institutional transformation responds to institutional pressures for IA (AlMalki and Durugbo 2022; 2023), as well as fosters process mechanisms for IA, in line with the resource and institution theories presented by Table 3.

Like challenges for organisational resilience studies, research on institutional transformation demands focus on recent socio-economic shocks and crises like COVID-19 pandemic and the financial crises, as well as major technological transitions and transformations in society. Here, prospects exist to unravel how organisations apply IA in response to these on-going institutional shocks and transitions. Current research underscores the need for evolutionary views on institutional transformation (Karaulova et al. 2017), and such stances could serve as the foundation for wider critiques on the potential organic nature of constructs for managing IA. Alternatively, research could examine the role of institutional transformation on IA and shed light on IA relative to megatrends (e.g., digitalisation, globalisation, and personalisation) of modern society.

6 Conclusions

Balancing exploitative and explorative innovation, i.e., innovation ambidexterity (IA) remains an essential condition for delivering competitive advantage and seeking out new revenue streams. Consequently, insights on the key determinants and management strategies for IA are crucial to managing the inherent conflict and paradox that exist between exploitative and explorative innovations. These determinants and strategies contribute to the development of IA within organisations and necessitate review on an on-going basis to update scholarship and practice. Keeping this in mind, this review addressed the following research question: ‘What are the research trends and main determinants for managing IA in literature?’.

Using insights from 121 peer-reviewed journal articles published between 2007 and 2021, the review finds seven determinants for managing IA: (i) process mechanisms, (ii) organisational learning, (iii) leadership styles, (iv) technology investments, (v) organisational contexts, (vi) environmental uncertainties, and (vii) institutional pressures. Reinforcing these determinants are resource, leadership, organisational, information, role-based, creativity, institutional and social capital theories that influence organisational-, individual-, process-, and environmental-level structures and behaviours for IA.

This review has two major limitations. First, the scope of the review is limited to identifying the main determinants for managing IA. In view of this limitation, there is a need for more data on the activities of innovation processes, the behaviour of

intra- and inter-organisational actors, and organisational configurations for IA. Second, the review method is limited to a systematic approach with thematic analysis of the main concerns and topics of studies. As a result, deeper insights based on other review methodologies, such as meta-analyses and meta-syntheses, can provide more focused and extensive knowledge on constructs, dependencies, and links between variables within qualitative and quantitative studies of IA. Further research on co-citations may also provide insights into the nature of citation dynamics and potential links between articles. Sourcing for the review centres on limiting search results to English-language journal articles, excluding conference papers, book chapters, and grey literature. Furthermore, the initial search for the review uses keywords ‘innovation ambidexterity’ or ‘ambidextrous innovation’, and there is potential for additional insights using related keywords such as ‘explorative and exploitive innovation’ and ‘radical and incremental innovation’.

In line with insights on the seven determinants, the review posits on seven management priorities of process integration, organisational diversity, leadership control, technology infrastructure, organisational culture, environmental dynamism, and institutional environments. Correspondingly, the determinants serve as the backdrop for seven areas of future management research involving digital interdependence, organisational legacy, stewardship behaviour, technology sourcing, organisational resilience, environmental readiness, and institutional transformation. In summary, the review anticipates that the necessities and niceties of these proposed areas will aid in strengthening existing knowledge on IA and in uncovering new and exciting phenomena, as organisational managers develop and implement strategies based on the combinatory and contradictory contexts of IA.

Funding None.

Data availability Not applicable.

Declarations

Conflicts of interest Not applicable.

References

- Açıkgöz A, Demirkan I, Latham GP, Kuzey C (2021) The relationship between unlearning and innovation ambidexterity with the performance of new product development teams. *Gr Decis Negot* 30:945–982. <https://doi.org/10.1007/s10726-021-09743-0>
- Agapiou A, Lysandrou V (2015) Remote sensing archaeology: tracking and mapping evolution in European scientific literature from 1999 to 2015. *J Archaeol Sci Rep* 4:192–200. <https://doi.org/10.1016/j.jasrep.2015.09.010>
- Ahmad F, Widén G, Huvila I (2020) The impact of workplace information literacy on organizational innovation: an empirical study. *Int J Inf Manage*. <https://doi.org/10.1016/j.ijinfomgt.2019.102041>
- Ahmad A, Alkhalil A, Altamimi AB et al (2021) Modernizing legacy software as context—sensitive and portable mobile-enabled application. *IT Prof* 23:42–50. <https://doi.org/10.1109/MITP.2020.2975997>

- Alayo M, Iturralde T, Maseda A (2021) Innovation and internationalization in family SMEs: analyzing the role of family involvement. *Eur J Innov Manag*. <https://doi.org/10.1108/EJIM-07-2020-0302>
- Alcalde-Heras H, Iturrioz-Landart C, Aragon-Amonarriz C (2019) SME ambidexterity during economic recessions: the role of managerial external capabilities. *Manag Decis* 57:21–40. <https://doi.org/10.1108/MD-03-2016-0170>
- Aldianto L, Anggadwita G, Permatasari A et al (2021) Toward a business resilience framework for startups. *Sustain*. <https://doi.org/10.3390/su13063132>
- Alhojailan MI, Ibrahim M (2012) Thematic analysis: a critical review of its process and evaluation. *WEI Int Eur Acad Proc* 1:8–21
- AlMalki HA, Durugbo CM (2022) Systematic review of institutional innovation literature: towards a multi-level management model. *Manag Rev Q*. <https://doi.org/10.1007/s11301-022-00259-8>
- AlMalki HA, Durugbo CM (2023) Evaluating critical institutional factors of Industry 4.0 for education reform. *Technol Forecast Soc Change*. <https://doi.org/10.1016/j.techfore.2023.122327>
- AlSheibani S, Cheung Y, Messom C (2018) Artificial intelligence adoption: AI-readiness at firm-level. In: *Proceedings of the 22nd Pacific Asia conference on information systems - opportunities and challenges for the digitized society: are we ready?* PACIS 2018
- Altındağ E, Bilaloğlu Aktürk H (2020) The Impact of New Generation Management Approaches on the Firm Performance: The Moderating Role of Strategic Human Resource Management Applications. *SAGE Open*. <https://doi.org/10.1177/2158244020948845>
- Amabile T (2011) *Componential theory of creativity*. Harvard Business School, Boston
- Andriopoulos C, Lewis MW (2010) Managing innovation paradoxes: ambidexterity lessons from leading product design companies. *Long Range Plann* 43:104–122. <https://doi.org/10.1016/j.lrp.2009.08.003>
- Ardito L, Peruffo E, Natalicchio A (2019) The relationships between the internationalization of alliance portfolio diversities, individual incentives, and innovation ambidexterity: a microfoundational approach. *Technol Forecast Soc Change* 148:1–9. <https://doi.org/10.1016/j.techfore.2019.119714>
- Ardito L, Messeni Petruzzelli A, Dezi L, Castellano S (2020) The influence of inbound open innovation on ambidexterity performance: does it pay to source knowledge from supply chain stakeholders? *J Bus Res* 119:321–329. <https://doi.org/10.1016/j.jbusres.2018.12.043>
- Arzubiaga U, Kotlar J, De Massis A et al (2018) Entrepreneurial orientation and innovation in family SMEs: unveiling the (actual) impact of the board of directors. *J Bus Ventur* 33:455–469. <https://doi.org/10.1016/j.jbusvent.2018.03.002>
- Asif M (2017) Exploring the antecedents of ambidexterity: a taxonomic approach. *Manag Decis* 55:1489–1505. <https://doi.org/10.1108/MD-12-2016-0895>
- Bakar HA, Razali R, Jambari DI (2021) Legacy systems modernisation for citizen-centric digital government: a conceptual model. *Sustain*. <https://doi.org/10.3390/su132313112>
- Barney J (1991) Firm resources and sustained competitive advantage. *J Manage* 17:99–120. <https://doi.org/10.1177/014920639101700108>
- Bass BM (1985) *Leadership and performance beyond expectations*. Free Press, New York
- Batt-Rawden VH, Lien G, Slåtten T (2019) Team learning capability – an instrument for innovation ambidexterity? *Int J Qual Serv Sci* 11:473–486. <https://doi.org/10.1108/IJQSS-02-2019-0026>
- Bedford DS, Bisbe J, Sweeney B (2019) Performance measurement systems as generators of cognitive conflict in ambidextrous firms. *Account Organ Soc* 72:21–37. <https://doi.org/10.1016/j.aos.2018.05.010>
- Ben Rejeb W, Berraies S, Talbi D (2020) The contribution of board of directors' roles to ambidextrous innovation: do board's gender diversity and independence matter? *Eur J Innov Manag* 23:40–66. <https://doi.org/10.1108/EJIM-06-2018-0110>
- Benner MJ, Tushman ML (2003) Exploitation, exploration, and process management: the productivity dilemma revisited. *Acad Manag Rev* 28:238–256. <https://doi.org/10.5465/amr.2003.9416096>
- Berraies S, Bchini B (2019) Effect of leadership styles on financial performance: mediating roles of exploitative and exploratory innovations case of knowledge-intensive firms. *Int J Innov Manag*. <https://doi.org/10.1142/S1363919619500208>
- Berraies S, Ben Rejeb W (2021) Do board of directors' roles and composition promote exploitative and exploratory innovations evidence from Tunisian listed firms. *Eur J Int Manag* 15:628. <https://doi.org/10.1504/EJIM.2021.114624>
- Berraies S, Zine El Abidine S, El Abidine SZ (2019) Do leadership styles promote ambidextrous innovation? Case of knowledge-intensive firms. *J Knowl Manag* 23:836–859. <https://doi.org/10.1108/JKM-09-2018-0566>

- Birkle C, Pendlebury DA, Schnell J, Adams J (2020) Web of Science as a data source for research on scientific and scholarly activity. *Quant Sci S* 11:363–376. https://doi.org/10.1162/qss_a_00018
- Blomkvist P, Nilsson D, Juma B, Sitoki L (2020) Bridging the critical interface: Ambidextrous innovation for water provision in Nairobi's informal settlements. *Technol Soc* 60:1–12. <https://doi.org/10.1016/j.techsoc.2019.101221>
- Booth A, Papaioannou D, Sutton A (2012) *Systematic approaches to a successful literature review*. Sage, London
- Božič K, Dimovski V (2019) Business intelligence and analytics use, innovation ambidexterity and firm performance: a dynamic capabilities perspective. *J Strateg Inf Syst* 28:101578. <https://doi.org/10.1016/j.jsis.2019.101578>
- Brion S, Mothe C (2017) Le contexte organisationnel favorable à l'innovation ambidextre. *Rev Française Gest* 43:101–115. <https://doi.org/10.3166/rfg.2017.00108>
- Brion S, Mothe C, Sabatier M (2010) The impact of organisational context and competences on innovation ambidexterity. *Int J Innov Manag* 14:151–178. <https://doi.org/10.1142/S1363919610002593>
- Buccieri D, Javalgi RG, Cavusgil E (2020) International new venture performance: role of international entrepreneurial culture, ambidextrous innovation, and dynamic marketing capabilities. *Int Bus Rev* 29:101639. <https://doi.org/10.1016/j.ibusrev.2019.101639>
- Burns JM (1978) *Leadership*. Harper & Row, New York
- Cabeza-Pullés D, Fernández-Pérez V, Roldán-Bravo MI (2020) Internal networking and innovation ambidexterity: the mediating role of knowledge management processes in university research. *Eur Manag J* 38:450–461. <https://doi.org/10.1016/j.emj.2019.12.008>
- Cefis E (2010) The impact of M&A on technology sourcing strategies. *Econ Innov New Technol* 19:27–51. <https://doi.org/10.1080/10438590903016385>
- Ceptureanu SI, Ceptureanu EG (2021) Innovation ambidexterity effects on product innovation performance: the mediating role of decentralization. *Kybernetes*. <https://doi.org/10.1108/K-05-2021-0364>
- Ceptureanu SI, Ceptureanu EG, Cerqueti R (2021) Innovation ambidexterity and impact on the performance in IT companies: the moderating role of business experience. *Technol Anal Strateg Manag*. <https://doi.org/10.1080/09537325.2021.1918337>
- Chadegani AA, Salehi H, Yunus MM et al (2013) A comparison between two main academic literature collections: web of science and scopus databases. *Asian Soc Sci* 9:18–26. <https://doi.org/10.5539/ass.v9n5p18>
- Chang K-HHK-H, Gotcher DF (2020) How and when does co-production facilitate eco-innovation in international buyer-supplier relationships? The role of environmental innovation ambidexterity and institutional pressures. *Int Bus Rev* 29:101731. <https://doi.org/10.1016/j.ibusrev.2020.101731>
- Chang YY, Hughes M (2012) Drivers of innovation ambidexterity in small- to medium-sized firms. *Eur Manag J* 30:1–17. <https://doi.org/10.1016/j.emj.2011.08.003>
- Chang YY, Hughes M, Hotho S (2011) Internal and external antecedents of SMEs' innovation ambidexterity outcomes. *Manag Decis* 49:1658–1676. <https://doi.org/10.1108/00251741111183816>
- Chen Q, Liu Z (2018) How does TMT transactive memory system drive innovation ambidexterity?: Shared leadership as mediator and team goal orientations as moderators. *Chinese Manag Stud* 12:125–147. <https://doi.org/10.1108/CMS-06-2017-0158>
- Chen J, Liu L (2020) Reconciling temporal conflicts in innovation ambidexterity: the role of TMT temporal leadership. *J Knowl Manag* 24:1899–1920. <https://doi.org/10.1108/JKM-10-2019-0555>
- Chen M, Yang Z, Dou W, Wang F (2018a) Flying or dying? Organizational change, customer participation, and innovation ambidexterity in emerging economies. *Asia Pacific J Manag* 35:97–119. <https://doi.org/10.1007/s10490-017-9520-5>
- Chen Z, Huang S, Liu C et al (2018b) Fit between organizational culture and innovation strategy: Implications for innovation performance. *Sustain* 10:1–18. <https://doi.org/10.3390/su10103378>
- Chen J, Jiang F, Lin S (2020) How coping combination affects innovation ambidexterity in business failure situations. *Front Psychol* 11:1–16. <https://doi.org/10.3389/fpsyg.2020.01409>
- Chiva R, Ghauri P, Alegre J (2014) Organizational learning, innovation and internationalization: a complex system model. *Br J Manag* 25:687–705. <https://doi.org/10.1111/1467-8551.12026>
- Cho M, Bonn MA, Han SJ (2020) Innovation ambidexterity: balancing exploitation and exploration for startup and established restaurants and impacts upon performance. *Ind Innov* 27:340–362. <https://doi.org/10.1080/13662716.2019.1633280>
- Choi YR, Ha S, Kim Y (2021) Innovation ambidexterity, resource configuration and firm growth: is smallness a liability or an asset? *Small Bus Econ*. <https://doi.org/10.1007/s11187-021-00507-3>

- Christofi M, Vrontis D, Cadogan JW (2021) Micro-foundational ambidexterity and multinational enterprises: a systematic review and a conceptual framework. *Int Bus Rev* 30:101625. <https://doi.org/10.1016/j.ibusrev.2019.101625>
- Čirjevskis A (2016) Sustainability in information and communication technologies' industry: innovative ambidexterity and dynamic capabilities perspectives. *J Secur Sustain Issues* 6:211–226. [https://doi.org/10.9770/jssi.2016.6.2\(2\)](https://doi.org/10.9770/jssi.2016.6.2(2))
- Coase RH (1937) The nature of the firm. *Economica* 4:386–405. <https://doi.org/10.1111/j.1468-0335.1937.tb00002.x>
- Coe A, Paquet G, Roy J (2001) many skeptics are dissatisfied with a simple request for a reform of engagement rules in accordance with technology's promise, because digital interdependence remains too ambiguous to demand their support. *Soc Sci Comput Rev* 19:80–93. <https://doi.org/10.1177/089443930101900107>
- Coleman JS (1988) Social capital in the creation of human capital. *Am J Sociol* 94:S95–S120. <https://doi.org/10.1086/228943>
- D'Agostino M, Marti M, Otero P et al (2021) Toward a holistic definition for information systems for health in the age of digital interdependence. *Rev Panam Salud Publica Pan Am J Public Heal*. <https://doi.org/10.26633/RPSP.2021.143>
- Davis JH, Schoorman FD, Donaldson L (1997) Toward a stewardship theory of management. *Acad Manag Rev* 22:20. <https://doi.org/10.2307/259223>
- De Propriis L, Driffield N (2006) The importance of clusters for spillovers from foreign direct investment and technology sourcing. *Cambridge J Econ* 30:277–291. <https://doi.org/10.1093/cje/bei059>
- DiMaggio P, Powell WW (2010) The iron cage revisited: institutional isomorphism and collective rationality in organizational fields (translated by G. Yudin). *J Econ Sociol* 11:34–56. <https://doi.org/10.17323/1726-3247-2010-1-34-56>
- Dixon-Woods M, Agarwal S, Jones D et al (2005) Synthesising qualitative and quantitative evidence: a review of possible methods. *J Heal Serv Res Policy* 10:45–53. <https://doi.org/10.1258/1355819052801804>
- Doghri SBS, Horchani SC, Mouelhi M (2021) The e-leadership linking inter-organisational collaboration and ambidextrous innovation. *Int J Innov Manag* 25:2150043. <https://doi.org/10.1142/S1363919621500432>
- Domínguez-Escrig E, Mallén-Broch FF, Lapiedra-Alcamí R, Chiva-Gómez R (2019) The influence of leaders' stewardship behavior on innovation success: the mediating effect of radical innovation. *J Bus Ethics* 159:849–862. <https://doi.org/10.1007/s10551-018-3833-2>
- Duncan RB (1976) The ambidextrous organization: Designing dual structures for innovation. *Manag Organ* 1(1):167–188
- Dunlap D, Parente R, Geleilate JM, Marion TJ (2016) Organizing for innovation ambidexterity in emerging markets: taking advantage of supplier involvement and foreignness. *J Leadersh Organ Stud* 23:175–190. <https://doi.org/10.1177/1548051816636621>
- Durugbo CM, Al-Balushi Z (2022) Supply chain management in times of crisis: a systematic review. *Manag Rev Q Ahead-of-P*: <https://doi.org/10.1007/s11301-022-00272-x>
- Durugbo CM, Amoudi O, Al-Balushi Z, Anouze AL (2021) Wisdom from Arabian networks: a review and theory of regional supply chain management. *Prod Plan Control* 32:1265–1281. <https://doi.org/10.1080/09537287.2020.1796144>
- Erlikh L (2000) Leveraging legacy system dollars for e-business. *IT Prof* 2:17–23. <https://doi.org/10.1109/6294.846201>
- Fink A (2005) *Conducting research literature reviews: from the Internet to paper*, 2nd edn. SAGE Publications, Thousand Oaks, Calif
- Finkelstein S, Hambrick D (1996) *Strategic leadership: top executives and their effects on organizations*. West Publishing Company, St. Paul, Minneapolis
- Frare AB, Beuren IM (2021) Job autonomy, unscripted agility and ambidextrous innovation: analysis of Brazilian startups in times of the Covid-19 pandemic. *Rev Gest* 28:263–278. <https://doi.org/10.1108/REGE-01-2021-0005>
- Fu L, Liu Z, Liao S (2018) Is distributed leadership a driving factor of innovation ambidexterity? An empirical study with mediating and moderating effects. *Leadersh Organ Dev J* 39:388–405. <https://doi.org/10.1108/LODJ-05-2017-0134>
- Fu L, Liao S, Liu Z, Lu F (2019) An investigation of resource allocation mechanism for exploration and exploitation under limited resource. *IEEE Trans Eng Manag* 68(6):1802–1812

- Fu L, Liao S, Liu Z, Lu F (2021) An investigation of resource allocation mechanism for exploration and exploitation under limited resource. *IEEE Trans Eng Manag* 68:1802–1812. <https://doi.org/10.1109/TEM.2019.2938480>
- Furlan AD, Clarke J, Esmail R et al (2001) A critical review of reviews on the treatment of chronic low back pain. *Spine*. <https://doi.org/10.1097/00007632-200104010-00018>
- Ghantous N, Alnawas I (2020) The differential and synergistic effects of market orientation and entrepreneurial orientation on hotel ambidexterity. *J Retail Consum Serv*. <https://doi.org/10.1016/j.jretconser.2020.102072>
- Gholami MF, Daneshgar F, Beydoun G, Rabhi F (2017) Challenges in migrating legacy software systems to the cloud—an empirical study. *Inf Syst* 67:100–113. <https://doi.org/10.1016/j.is.2017.03.008>
- Gibson CB, Birkinshaw J (2004) The antecedents, consequences, and mediating role of organizational ambidexterity. *Acad Manag J* 47(2):209–226
- Gong L, Liu Z, Rong Y, Fu L (2021) Inclusive leadership, ambidextrous innovation and organizational performance: the moderating role of environment uncertainty. *Leadersh Organ Dev J*. <https://doi.org/10.1108/LODJ-06-2020-0253>
- Grant RM (1996) Toward a knowledge-based theory of the firm. *Strateg Manag J* 17:109–122. <https://doi.org/10.1002/smj.4250171110>
- Grover V, Purvis RL, Segars AH (2007) Exploring ambidextrous innovation tendencies in the adoption of telecommunications technologies. *IEEE Trans Eng Manag* 54:268–285. <https://doi.org/10.1109/TEM.2007.893995>
- Guest G, MacQueen K, Namey E (2012) *Applied Thematic Analysis*. SAGE Publications Inc, Thousand Oaks, California
- Gupta AK, Smith KG, Shalley CE (2006) The interplay between exploration and exploitation. *Acad Manag J* 49:693–706. <https://doi.org/10.5465/amj.2006.22083026>
- Hambrick DC, Mason PA (1984) Upper echelons: the organization as a reflection of its top managers. *Acad Manag Rev* 9:193. <https://doi.org/10.2307/258434>
- Harmancioglu N, Sääksjärvi M, Hultink EJ (2020) Cannibalize and combine? The impact of ambidextrous innovation on organizational outcomes under market competition. *Ind Mark Manag* 85:44–57. <https://doi.org/10.1016/j.indmarman.2019.07.005>
- He ZL, Wong PK (2004) Exploration vs. exploitation: an empirical test of the ambidexterity hypothesis. *Organ Sci* 15:481–495. <https://doi.org/10.1287/orsc.1040.0078>
- Hsieh L, Child J, Narooz R et al (2019) A multidimensional perspective of SME internationalization speed: the influence of entrepreneurial characteristics. *Int Bus Rev* 28:268–283. <https://doi.org/10.1016/j.ibusrev.2018.09.004>
- Hu H, Wang Q, Chen J (2019) Why do some SMEs explore more while others exploit further? Evidence from Chinese SMEs. *Chinese Manag Stud* 13:379–396. <https://doi.org/10.1108/CMS-12-2017-0358>
- Hughes M, Martin SL, Morgan RE, Robson MJ (2010) Realizing product-market advantage in high-technology international new ventures: the mediating role of ambidextrous innovation. *J Int Marketing* 18:1–21
- Hughes M, Hughes P, Morgan RE et al (2021) Strategic entrepreneurship behaviour and the innovation ambidexterity of young technology-based firms in incubators. *Int Small Bus J Res Entrep* 39:202–227. <https://doi.org/10.1177/0266242620943776>
- Ifinedo P (2005) Measuring Africa's e-readiness in the global networked economy: a nine-country data analysis. *Int J Educ Dev Using Inf Commun Technol* 1:53–71
- Inoue Y (2021) Indirect innovation management by platform ecosystem governance and positioning: toward collective ambidexterity in the ecosystems. *Technol Forecast Soc Change*. <https://doi.org/10.1016/j.techfore.2021.120652>
- Janahi NA, Durugbo CM, Al-Jayyousi OR (2021) Eco-innovation strategy in manufacturing: a systematic review. *Clean Eng Technol* 5:100343. <https://doi.org/10.1016/j.clet.2021.100343>
- Janahi NA, Durugbo CM, Al-Jayyousi OR (2022) Exploring network strategies for eco-innovation in manufacturing from a triple helix perspective. *Clean Logist Supply Chain* 4:100035. <https://doi.org/10.1016/j.clscn.2022.100035>
- Jansen JJP, Tempelaar MP, van den Bosch FAJ, Volberda HW (2009) Structural differentiation and ambidexterity: the mediating role of integration mechanisms. *Organ Sci* 20:797–811. <https://doi.org/10.1287/orsc.1080.0415>
- Jin JL, Zhou KZ (2021) Is ambidextrous innovation strategy beneficial to international joint venture performance? evidence from China. *J Int Mark* 29:1–21. <https://doi.org/10.1177/1069031X211006075>

- Jin X, Wang J, Chu T, Xia J (2018) Knowledge source strategy and enterprise innovation performance: dynamic analysis based on machine learning. *Technol Anal Strateg Manag* 30:71–83. <https://doi.org/10.1080/09537325.2017.1286011>
- Junni P, Sarala RM, Taras V, Tarba SY (2013) Organizational ambidexterity and performance: a meta-analysis. *Acad Manag Perspect* 27:299–312. <https://doi.org/10.5465/amp.2012.0015>
- Kahn KB, Candi M (2021) Investigating the relationship between innovation strategy and performance. *J Bus Res* 132:56–66. <https://doi.org/10.1016/j.jbusres.2021.04.009>
- Kanchanabha B, Badir YF (2021) Top management team's cognitive diversity and the firm's ambidextrous innovation capability: the mediating role of ambivalent interpretation. *Technol Soc.* <https://doi.org/10.1016/j.techsoc.2020.101499>
- Karaulova M, Shackleton O, Liu W et al (2017) Institutional change and innovation system transformation: a tale of two academies. *Technol Forecast Soc Change* 116:196–207. <https://doi.org/10.1016/j.techfore.2016.10.018>
- Khadka R, Batlajery BV, Saeidi AM et al (2014) How do professionals perceive legacy systems and software modernization? ACM, New York
- Khairuddin SM, Haider SA, Tehseen S, Iqbal S (2021) Creativity in construction project through entrepreneurial leadership, innovative ambidexterity and collaborative culture. *Adv Math Sci J.* <https://doi.org/10.37418/amsj.10.3.38>
- Khan A, Chen C-CCC, Suanpong K et al (2021) The impact of csr on sustainable innovation ambidexterity: the mediating role of sustainable supply chain management and second-order social capital. *Sustain.* <https://doi.org/10.3390/su132112160>
- Khan IS, Kauppila O, Fatima N, Majava J (2022) Stakeholder interdependencies in a collaborative innovation project. *J Innov Entrep.* <https://doi.org/10.1186/s13731-022-00229-0>
- Kortmann S (2015) The mediating role of strategic orientations on the relationship between ambidexterity-oriented decisions and innovative ambidexterity. *J Prod Innov Manag* 32:666–684. <https://doi.org/10.1111/jpim.12151>
- Kraus S, Breier M, Dasí-Rodríguez S (2020) The art of crafting a systematic literature review in entrepreneurship research. *Int Entrep Manag J* 16:1023–1042. <https://doi.org/10.1007/s11365-020-00635-4>
- Kraus S, Breier M, Lim WM et al (2022) Literature reviews as independent studies: guidelines for academic practice. *Rev Manag Sci* 16:2577–2595. <https://doi.org/10.1007/s11846-022-00588-8>
- Kuo TK, Lim SS, Sonko LK (2018) Catch-up strategy of latecomer firms in Asia: a case study of innovation ambidexterity in PC industry. *Technol Anal Strateg Manag* 30:1483–1497. <https://doi.org/10.1080/09537325.2018.1475642>
- Lazzarotti V, Manzini R, Nosella A, Pellegrini L (2017) Innovation ambidexterity of open firms. The role of internal relational social capital. *Technol Anal Strateg Manag* 29:105–118. <https://doi.org/10.1080/09537325.2016.1210119>
- Lee YJ, Shin K, Kim E (2019) The influence of a firm's capability and dyadic relationship of the knowledge base on ambidextrous innovation in biopharmaceutical M&As. *Sustain* 11:1–17. <https://doi.org/10.3390/su11184920>
- Lei H, Khamkhoutlavong M, Le PB (2021) Fostering exploitative and exploratory innovation through HRM practices and knowledge management capability: the moderating effect of knowledge-centered culture. *J Knowl Manag.* <https://doi.org/10.1108/JKM-07-2020-0505>
- Li CR, Lin CJ, Huang HC (2014) Top management team social capital, exploration-based innovation, and exploitation-based innovation in SMEs. *Technol Anal Strateg Manag* 26:69–85. <https://doi.org/10.1080/09537325.2013.850157>
- Li CR, Liu YY, Lin CJ, Ma HJ (2016) Top management team diversity, ambidextrous innovation and the mediating effect of top team decision-making processes. *Ind Innov* 23:260–275. <https://doi.org/10.1080/13662716.2016.1144503>
- Liao S, Liu Z, Zhang S (2018) Technology innovation ambidexterity, business model ambidexterity, and firm performance in Chinese high-tech firms. *Asian J Technol Innov* 26:325–345. <https://doi.org/10.1080/19761597.2018.1549954>
- Lin C, Chang CC (2015) A patent-based study of the relationships among technological portfolio, ambidextrous innovation, and firm performance. *Technol Anal Strateg Manag* 27:1193–1211. <https://doi.org/10.1080/09537325.2015.1061119>
- Lin CJ, Chen CC (2015) The responsive-integrative framework, outside-in and inside-out mechanisms and ambidextrous innovations. *Int J Technol Manag* 67:148–173. <https://doi.org/10.1504/IJTM.2015.068212>

- Lin CP, Cheung YK (2022) Developing learning ambidexterity and job performance: training and educational implications across the cultural divide. *Rev Manag Sci*. <https://doi.org/10.1007/s11846-022-00565-1>
- Lin HE, McDonough EF (2011) Investigating the role of leadership and organizational culture in fostering innovation ambidexterity. *IEEE Trans Eng Manag* 58:497–509. <https://doi.org/10.1109/TEM.2010.2092781>
- Lin H, Qu T (2021) How does the evolution of an organization's multiple-dominant-logic system affect its ambidextrous innovation? *J Organ Chang Manag* 34:545–569. <https://doi.org/10.1108/JOCM-11-2020-0340>
- Lin HE, McDonough EF, Lin SJ, Lin CYY (2013) Managing the exploitation/exploration paradox: the role of a learning capability and innovation ambidexterity. *J Prod Innov Manag* 30:262–278. <https://doi.org/10.1111/j.1540-5885.2012.00998.x>
- Liu JW, Wang YH, Tsai JCA, Chang JYT (2019a) Ambidextrous innovation and game market fit performance: feedback from game testers. *J Comput Inf Syst* 59:233–242. <https://doi.org/10.1080/08874417.2017.1330127>
- Liu Z, Chi GD, Han L (2019b) Board human capital and enterprise growth: a perspective of ambidextrous innovation. *Sustain* 11:1–32. <https://doi.org/10.3390/su11143993>
- Long Y, Liu P (2021) Study on coordination of industrial technology ambidextrous innovation in knowledge ecology spiral. *Kybernetes* 50:3246–3268. <https://doi.org/10.1108/K-07-2020-0479>
- Lucena A (2016) The interaction mode and geographic scope of firms' technology alliances: implications of balancing exploration and exploitation in R&D. *Ind Innov* 23:595–624. <https://doi.org/10.1080/13662716.2016.1201648>
- Mafabi S, Munene J, Ntayi J (2012) Knowledge management and organisational resilience: organisational innovation as a mediator in Uganda parastatals. *J Strateg Manag* 5:57–80. <https://doi.org/10.1108/17554251211200455>
- March JG (1991) Exploration and exploitation in organizational learning. *Organ Sci* 2:71–87. <https://doi.org/10.1287/orsc.2.1.71>
- Martin SL, Javalgi RG, Cavusgil E (2017) Marketing capabilities, positional advantage, and performance of born global firms: Contingent effect of ambidextrous innovation. *Int Bus Rev* 26:527–543. <https://doi.org/10.1016/j.ibusrev.2016.11.006>
- McDermott CM, Prajogo DI (2012) Service innovation and performance in SMEs. *Int J Oper Prod Manag* 32:216–237. <https://doi.org/10.1108/01443571211208632>
- Miller CC, Burke LM, Glick WH (1998) Cognitive diversity among upper-echelon executives: implications for strategic decision processes. *Strateg Manag J* 19:39–58. [https://doi.org/10.1002/\(SICI\)1097-0266\(199801\)19:1%3c39::AID-SMJ932%3e3.0.CO;2-A](https://doi.org/10.1002/(SICI)1097-0266(199801)19:1%3c39::AID-SMJ932%3e3.0.CO;2-A)
- Minh TT, Hjortsø CN, Hjortsø CN, Hjortsø CN (2015) How institutions influence SME innovation and networking practices: the case of Vietnamese agribusiness. *J Small Bus Manag* 53:209–228. <https://doi.org/10.1111/jsbm.12189>
- Niewöhner N, Lang N, Asmar L, et al (2021) Towards an ambidextrous innovation management maturity model. In: *Procedia CIRP*. Elsevier B.V., pp 289–294
- Nofiani D, Indarti N, Lukito-Budi AS, Manik HFGG (2021) The dynamics between balanced and combined ambidextrous strategies: a paradoxical affair about the effect of entrepreneurial orientation on SMEs' performance. *J Entrep Emerg Econ*. <https://doi.org/10.1108/JEEE-09-2020-0331>
- Nonaka I (1994) A dynamic theory of organizational knowledge creation. *Organ Sci* 5:14–37. <https://doi.org/10.1287/orsc.5.1.14>
- Nunn SG, Avella JT (2015) Does moral leadership conflict with organizational innovation? *J Leadersh Stud* 9:85–87. <https://doi.org/10.1002/jls.21417>
- Oluwafemi TB, Mitchelmore S, Nikolopoulos K (2020) Leading innovation: empirical evidence for ambidextrous leadership from UK high-tech SMEs. *J Bus Res* 119:195–208. <https://doi.org/10.1016/j.jbusres.2019.10.035>
- Onufrey K, Bergek A (2021) Transformation in a mature industry: the role of business and innovation strategies. *Technovation*. <https://doi.org/10.1016/j.technovation.2020.102190>
- Orlikowski W (1996) Improvising organizational transformation over time: a situated change perspective by improvising organizational transformation over time: a situated change perspective to appear in information systems research. *Inf Syst Res* 7:63–92
- Pangarso A, Astuti ES, Raharjo K, Afrianty TW (2020a) The impact of absorptive capacity and innovation ambidexterity on sustainable competitive advantage: The case of Indonesian higher education. *Entrep Sustain Issues* 7:2436–2455. [https://doi.org/10.9770/jesi.2020.7.3\(65\)](https://doi.org/10.9770/jesi.2020.7.3(65))

- Pangarso A, Astuti ES, Raharjo K, Afrianty TW (2020b) Data of innovation ambidexterity as a mediator in the absorptive capacity effect on sustainable competitive advantage. *Data Br.* <https://doi.org/10.1016/j.dib.2020.105200>
- Parmar BL, Freeman RE, Harrison JS et al (2010) Stakeholder theory: the state of the art. *Acad Manag Ann* 4:403–445. <https://doi.org/10.1080/19416520.2010.495581>
- Pentland BT, Recker J, Wyner G (2015) A thermometer for interdependence: Exploring patterns of interdependence using networks of affordances. In: *Proceedings of the international conference on information systems-exploring the information frontier, ICIS 2015*
- Pérez Perdomo SA, Farrow A, Trienekens JH, Omta SWF (2016) Stakeholder roles for fostering ambidexterity in Sub-Saharan African agricultural netchains for the emergence of multi-stakeholder cooperatives. *J Chain Netw Sci* 16:59–82. <https://doi.org/10.3920/JCNS2014.0007>
- Pertusa-Ortega EM, Molina-Azorín JF, Tari JJ et al (2021) The microfoundations of organizational ambidexterity: a systematic review of individual ambidexterity through a multilevel framework. *BRQ Bus Res Q* 24:355–371. <https://doi.org/10.1177/2340944420929711>
- Petticrew M, Roberts H (eds) (2006). Blackwell Publishing Ltd, Oxford, UK
- Pfeffer J, Salancik G (1978) *The external control of organizations: a resource dependence perspective.* Harper & Row, New York
- Priambodo IT, Sasmoko S, Abdinagoro SB, Bandur A (2021) E-commerce readiness of creative industry during the COVID-19 pandemic in Indonesia. *J Asian Financ Econ Bus.* <https://doi.org/10.13106/jafeb.2021>
- Randhawa K, Nikolova N, Ahuja S, Schweitzer J (2021) Design thinking implementation for innovation: an organization's journey to ambidexterity. *J Prod Innov Manag* 38:668–700. <https://doi.org/10.1111/jpim.12599>
- Revilla E, Rodríguez-Prado B, Cui Z (2016) A knowledge-based framework of innovation strategy: the differential effect of knowledge sources. *IEEE Trans Eng Manag* 63:362–376. <https://doi.org/10.1109/TEM.2016.2586300>
- Röd I (2019) TMT diversity and innovation ambidexterity in family firms: the mediating role of open innovation breadth. *J Fam Bus Manag* 9:377–392. <https://doi.org/10.1108/JFBM-09-2018-0031>
- Rojas-Córdova C, Williamson AJ, Pertuze JA et al (2022) Why one strategy does not fit all: a systematic review on exploration–exploitation in different organizational archetypes. *Rev Manag Sci.* <https://doi.org/10.1007/s11846-022-00577-x>
- Rosing K, Zacher H (2017) Individual ambidexterity: the duality of exploration and exploitation and its relationship with innovative performance. *Eur J Work Organ Psychol* 26:694–709. <https://doi.org/10.1080/1359432X.2016.1238358>
- Rosing K, Frese M, Bausch A (2011) Explaining the heterogeneity of the leadership-innovation relationship: Ambidextrous leadership. *Leadersh Q* 22:956–974. <https://doi.org/10.1016/j.leaqua.2011.07.014>
- Scuotto V, Arrigo E, Candelo E, Nicotra M (2020) Ambidextrous innovation orientation effected by the digital transformation: a quantitative research on fashion SMEs. *Bus Process Manag J* 26:1121–1140. <https://doi.org/10.1108/BPMJ-03-2019-0135>
- Sijabat EAS, Nimran U, Utami HN, Prasetya A (2020) Ambidextrous innovation in mediating entrepreneurial creativity on firm performance and competitive advantage. *J Asian Financ Econ Bus* 7:737–746. <https://doi.org/10.13106/jafeb.2020>
- Sijabat EAS, Nimran U, Utami HN, Prasetya A (2021) The effects of dynamic capabilities, entrepreneurial creativity and ambidextrous innovation on firm's competitiveness. *J Asian Financ Econ Bus* 8: 711–721. <https://doi.org/10.13106/jafeb.2021>
- Simsek Z (2009) Organizational ambidexterity: towards a multilevel understanding. *J Manag Stud* 46:597–624. <https://doi.org/10.1111/j.1467-6486.2009.00828.x>
- Sligo J, Roberts V, Gauld R, Villa L, Thirlwall S (2019) A checklist for healthcare organisations undergoing transformational change associated with large-scale health information systems implementation. *Health Policy Technol* 8(3):237–247
- Sneed HM (1995) Planning the reengineering of legacy systems. *IEEE Softw* 12:24–34. <https://doi.org/10.1109/52.363168>
- Song B, Zhao Z (2021) Institutional pressures and cluster firms' ambidextrous innovation: the mediating role of strategic cognition. *Chinese Manag Stud* 15:245–262. <https://doi.org/10.1108/CMS-11-2019-0397>

- Soto-Acosta P, Popa S, Martinez-Conesa I (2018) Information technology, knowledge management and environmental dynamism as drivers of innovation ambidexterity: a study in SMEs. *J Knowl Manag* 22:824–849. <https://doi.org/10.1108/JKM-10-2017-0448>
- Suzuki O (2015) Unpacking performance benefits of innovation ambidexterity: evidence from the pharmaceutical industry. *Manag Rev* 26:328–348. <https://doi.org/10.5771/0935-9915-2015-4-328>
- Suzuki O (2019) Uncovering moderators of organisational ambidexterity: evidence from the pharmaceutical industry. *Ind Innov* 26:391–418. <https://doi.org/10.1080/13662716.2018.1431525>
- Tan M, Liu Z (2014) Paths to success: an ambidexterity perspective on how responsive and proactive market orientations affect SMEs' business performance. *J Strateg Mark* 22:420–441. <https://doi.org/10.1080/0965254X.2013.876084>
- Tan FTC, Tan B, Wang W, Sedera D (2017) IT-enabled operational agility: an interdependencies perspective. *Inf Manag* 54:292–303. <https://doi.org/10.1016/j.im.2016.08.001>
- Teece DJ, Pisano G, Shuen A (1997) Dynamic capabilities and strategic management. *Strateg Manag J* 18:509–533. [https://doi.org/10.1002/\(SICI\)1097-0266\(199708\)18:7](https://doi.org/10.1002/(SICI)1097-0266(199708)18:7)
- Tong X, Han X (2021) Knowledge network capability and organizational innovation: Network position transition and ambidextrous innovative behaviors as mediators. *Soc Behav Pers.* <https://doi.org/10.2224/sbp.10246>
- Tornatzky LG, Fleischer M, Chakrabarti AK (1990) Processes of technological innovation. Lexington books, Lexington
- Tsai FS (2016) Knowing what we know differently: knowledge heterogeneity and dynamically ambidextrous innovation. *J Organ Chang Manag* 29:1162–1188. <https://doi.org/10.1108/JOCM-01-2016-0021>
- Tsai SP (2017) Driving holistic innovation to heighten hotel customer loyalty. *Curr Issues Tour* 20:1604–1619. <https://doi.org/10.1080/13683500.2015.1043249>
- Tsai KH, Wang JC (2009) External technology sourcing and innovation performance in LMT sectors: an analysis based on the Taiwanese technological innovation survey. *Res Policy* 38:518–526. <https://doi.org/10.1016/j.respol.2008.10.007>
- Tsai MC, Wang C (2017) Linking service innovation to firm performance: the roles of ambidextrous innovation and market orientation capability. *Chinese Manag Stud* 11:730–750. <https://doi.org/10.1108/CMS-03-2017-0045>
- Turner N, Swart J, Maylor H (2013) Mechanisms for managing ambidexterity: a review and research agenda. *Int J Manag Rev* 15:317–332. <https://doi.org/10.1111/j.1468-2370.2012.00343.x>
- Wan X, Cenamor J, Parker G, Van Alstyne M (2017) Unraveling platform strategies: a review from an organizational ambidexterity perspective. *Sustainability* 9:734. <https://doi.org/10.3390/su9050734>
- Wang DS (2019) Association between technological innovation and firm performance in small and medium-sized enterprises: the moderating effect of environmental factors. *Int J Innov Sci* 11:227–240. <https://doi.org/10.1108/IJIS-04-2018-0049>
- Wang H, Fang CCC-C (2021) The influence of corporate networks on competitive advantage: the mediating effect of ambidextrous innovation. *Technol Anal Strateg Manag.* <https://doi.org/10.1080/09537325.2021.1934436>
- Wang Y, Jia T, Chen J, Sun H (2019) Recombine supplier-side search via innovation ambidexterity: an empirical study on Hong Kong manufacturing firms. *Int J Phys Distrib Logist Manag* 49:178–199. <https://doi.org/10.1108/IJPDLM-02-2018-0054>
- Wang Y, Sun H, Jia T, Chen J (2021) The impact of buyer–supplier interaction on ambidextrous innovation and business performance: the moderating role of competitive environment. *Int J Logist Manag* 32:673–695. <https://doi.org/10.1108/IJLM-05-2019-0141>
- Wassmer U, Dussauge P (2011) Value creation in alliance portfolios: the benefits and costs of network resource interdependencies. *Eur Manag Rev* 8:47–64. <https://doi.org/10.1111/j.1740-4762.2011.01003.x>
- Webster J, Watson RT (2014) Analysing the past for prepare the future : writing a review. *MIS Q* (262), 26:xiii–xxiii
- Wei Z, Yi Y, Yuan C (2011) Bottom-up learning, organizational formalization, and ambidextrous innovation. *J Organ Chang Manag* 24:314–329. <https://doi.org/10.1108/09534811111132712>
- Wei F, Feng N, Evans RD et al (2021) How do innovation types and collaborative modes drive firm performance? An FsQCA analysis based on evidence from software ecosystems. *IEEE Trans Eng Manag.* <https://doi.org/10.1109/TEM.2021.3102321>

- Weick KE, Sutcliffe KM (2001) *Managing the unexpected: assuring high performance in an age of complexity*. Jossey-Bass, San Francisco
- Weigel C, Derfuss K, Hiebl MRW (2022) Financial managers and organizational ambidexterity in the German Mittelstand: the moderating role of strategy involvement. *Rev Manag Sci* 17:569–605. <https://doi.org/10.1007/s11846-022-00534-8>
- Williamson OE (1985) *The economic institutions of capitalism*. Free Press, New York
- Wiratmadja II, Profityo WB, Rumanti AA (2020) Drivers of innovation ambidexterity on small medium enterprises (SMEs) performance. *IEEE Access*. <https://doi.org/10.1109/ACCESS.2020.3048139>
- Wong YJ, Lee CY, Chang SC (2017) CEO overconfidence and ambidextrous innovation. *J Leadersh Organ Stud* 24:414–430. <https://doi.org/10.1177/1548051817692329>
- Xie X, Gao Y (2018) Strategic networks and new product performance: the mediating role of ambidextrous innovation. *Technol Anal Strateg Manag* 30:811–824. <https://doi.org/10.1080/09537325.2017.1380790>
- Xie X, Gao Y, Zhang Z, Meng X (2020) Collaborative ties and ambidextrous innovation: insights from internal and external knowledge acquisition. *Ind Innov* 27:285–310. <https://doi.org/10.1080/13662716.2019.1633909>
- Yan J, Tsinopoulos C, Xiong Y (2021) Unpacking the impact of innovation ambidexterity on export performance: microfoundations and infrastructure investment. *Int Bus Rev*. <https://doi.org/10.1016/j.ibusrev.2020.101766>
- Yang Z, Sun J, Zhang Y, Wang Y (2015a) Understanding SaaS adoption from the perspective of organizational users: a tripod readiness model. *Comput Human Behav* 45:254–264. <https://doi.org/10.1016/j.chb.2014.12.022>
- Yang Z, Zhou X, Zhang P (2015b) Discipline versus passion: collectivism, centralization, and ambidextrous innovation. *Asia Pacific J Manag* 32:745–769. <https://doi.org/10.1007/s10490-014-9396-6>
- Ye X, Feng J, Ma L, Huang X (2018a) Impact of team leadership habitual domains on ambidextrous innovation. *Soc Behav Pers* 46:1955–1966. <https://doi.org/10.2224/sbp.7323>
- Ye X, Ma L, Feng J et al (2018b) Impact of technology habitual domain on ambidextrous innovation: case study of a Chinese high-tech enterprise. *Sustain* 10:1–21. <https://doi.org/10.3390/su10124602>
- Yi L, Mao H, Wang Z (2019) How paradoxical leadership affects ambidextrous innovation: the role of knowledge sharing. *J Soc Behav Pers* 47:1–15. <https://doi.org/10.2224/sbp.7636>
- Yin J, Su Y (2019) Coordination mechanism of cooperative ambidextrous innovation of graphene enterprises. *IEEE Access* 7:154719–154731. <https://doi.org/10.1109/ACCESS.2019.2949420>
- Yu XR, Kim TI (2020) The impact of knowledge management and dynamic capacity on the ambidextrous innovation of Korean MNCs in the Chinese market. *J Korea Trade* 24:99–112. <https://doi.org/10.35611/jkt.2020.24.1.99>
- Zang J, Li Y (2017) Technology capabilities, marketing capabilities and innovation ambidexterity. *Technol Anal Strateg Manag* 29:23–37. <https://doi.org/10.1080/09537325.2016.1194972>
- Zhang JA, Cui X (2017) In search of the effects of business and political ties on innovation ambidexterity. *Int J Innov Manag* 21:1–27. <https://doi.org/10.1142/S1363919617500190>
- Zhang G, Tang C (2020) How the egocentric alliance network impacts firm ambidextrous innovation: a three-way interaction model. *Eur J Innov Manag* 25:19–38. <https://doi.org/10.1108/EJIM-07-2020-0295>
- Zhang Y, Zhang M (2016) Can overseas migrants develop sustained entrepreneurship? Multiple case studies of Wenzhou migrants in Italy. *J Chinese Sociol*. <https://doi.org/10.1186/s40711-015-0020-z>
- Zhang JA, Edgar F, Geare A, O’Kane C (2016) The interactive effects of entrepreneurial orientation and capability-based HRM on firm performance: the mediating role of innovation ambidexterity. *Ind Mark Manag* 59:131–143. <https://doi.org/10.1016/j.indmarman.2016.02.018>
- Zhang L, Wang Y, Wei Z (2019) How do managerial ties leverage innovation ambidexterity for firm growth? *Emerg Mark Financ Trade* 55:902–914. <https://doi.org/10.1080/1540496X.2018.1526075>
- Zhang G, Tang C, Qi Y (2020) Alliance network diversity and innovation ambidexterity: the differential roles of industrial diversity, geographical diversity, and functional diversity. *Sustain*. <https://doi.org/10.3390/su12031041>

- Zhang W, Liu Z, Shi X, Chen J (2020b) Managing strategic contradictions: a resource allocation mechanism for balancing ambidextrous innovation. *Comput Human Behav* 107:1–26. <https://doi.org/10.1016/j.chb.2020.106277>
- Zhang X, Le Y, Liu Y, Chen X (2021a) Fostering ambidextrous innovation strategies in large infrastructure projects: a team heterogeneity perspective. *IEEE Trans Eng Manag.* <https://doi.org/10.1109/TEM.2021.3074431>
- Zhang X, Le Y, Liu Y, Liu M (2021b) Fostering ambidextrous innovation in infrastructure projects: differentiation and integration tactics of cross-functional teams. *J Constr Eng Manag* 147:04021046
- Zhao H, Tong X, Wong PK, Zhu J (2005) Types of technology sourcing and innovative capability: an exploratory study of Singapore manufacturing firms. *J High Technol Manag Res* 16:209–224. <https://doi.org/10.1016/j.hitech.2005.10.004>
- Zhao A, Bi X, Han L (2021) Re-examining the new product paradox: how innovation ambidexterity mediates the market orientation and new product development performance relationship. *Front Psychol* 12:611293
- Zheng DL (2018) Design thinking is ambidextrous. *Manag Dec* 56(4):736–756
- Zheng X, Liu Z, Gong X (2016) Why does leader attention scope matter for innovation ambidexterity? The mediating role of transformational leadership. *Leadersh Organ Dev J* 37:912–935. <https://doi.org/10.1108/LODJ-12-2014-0242>

Publisher's Note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Springer Nature or its licensor (e.g. a society or other partner) holds exclusive rights to this article under a publishing agreement with the author(s) or other rightsholder(s); author self-archiving of the accepted manuscript version of this article is solely governed by the terms of such publishing agreement and applicable law.

Authors and Affiliations

Rabab H. Saleh¹ · Christopher M. Durugbo^{1,2}  · Soud M. Almahamid¹

¹ Department of Innovation and Technology Management, Arabian Gulf University, Manama, Bahrain

² Abu Dhabi School of Management, Abu Dhabi, United Arab Emirates