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Antecedents, mediators, moderators, and theories in firm Innovative Performance: A literature review

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ABSTRACT

Over the last three decades, firm innovative performance has received notable attention from scholars and practitioners. Regardless of the rising number of publications, there is a lack of synthetic understanding of innovative performance. This study aims to review and understand the extant firm innovative performance within the management science and business studies literature. This review utilized a systematic review approach and studied peer-reviewed articles (n=95) published between 1990 and 2020. This research introduces a nomological network of innovative Performance antecedents, mediators, and moderators. The developed model also shows that broader fields of HRM, knowledge management, and R&D are sine qua non for the firm's innovative performance. The graphical representation of innovative performance drivers enables us to develop a strategic and profound understanding of several management, organizational, and environmental concepts that improve or impair firms' innovative performance. In addition, the nomological network also shows the way number of variables are influencing each other in the process of innovative performance.

Keywords: Innovative performance, Innovation, Innovation antecedents, review.

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1 INTRODUCTION

Despite its luster, the idea of innovation is a repulsive one. In ancient times, when Xenophon came up with his innovative ideas in the realm of politics, the best intellectuals of his time Plato and Aristotle lampooned him assuming that all best ways of doing were already known (Godin, 2015). The acceptance of novelty is not so encouraging even today. Smartphones so much in vogue today were considered an eccentric idea coming from an abnormal. In short, every new idea has to face gargantuan resistance either in form of light-hearted mockery or outright rejection.

In modern history, the idea and concept of innovation was first propagated by the Austrian economist, Joseph Schumpeter. He also introduced the first-ever definition of innovation emphasizing the novelty perspective (Crossan and Apaydin, 2010). Schumpeter presaged that business competition on price would be secondary, the primary job of the organizations would be to cope with the novel products, new supply

sources, novel organizational structure, and a new production mechanism (Schumpeter, 1943). Almost a century earlier, the ideas of Schumpeter were very vivid as he stressed the firm to develop new products and upgrade existing production processes, which is still the hallmark of the innovative performance of an organization.

Christopher Freeman, a researcher, economist, policymaker, and consultant working for The Organization for Economic Co-operation and Development (OECD) introduced a definition that puts the organizational innovative performance concept in a nutshell. Innovation was defined as an iterative process of developing, producing, and marketing products or services as a response to a perception of new opportunities and in association with aspiring commercial success (OECD, 1991).

It is imperative to recognize that innovation is primarily a loose term that is often considered synonymous with creativity and change. Additionally, typing the word 'innovation' on Google scholar gives more than four million results in less than a second. To understand the evolution and transformation of different aspects of innovation research, many scholars have attempted to review the innovation antecedents and outcome (Anderson *et al.*, 2004; Crossan and Apaydin, 2010; Damanpour, 1991; Foss and Saebi, 2017; Keupp *et al.*, 2012; Khosravi *et al.*, 2019; Natalicchio *et al.*, 2017; van der Panne *et al.*, 2003; Seeck and Diehl, 2017; Tadeu and Silva, 2014; Tian *et al.*, 2008; West, 2013; Wolfe, 1994). However, there has not been any systematic review on firm innovative performance. Hence, this study only used the keyword 'innovative performance' till the year 2020. This systematic review approaches innovative performance literature intending to answer the following primary questions.

1. How is firm innovative performance is understood within the management science and business studies literature?
2. What innovative performance antecedents have been used by scholars and researchers?
3. How innovative performance has been measured empirically in the existing literature?

In response to the above questions, this research conducts a systematic review to scan the literature related to innovative performance. This review included research works that primarily focused innovative performance as a dependent or mediating variable. This study utilized six prominent databases (Science Direct, Emerald, Google Scholar, Web of Science, Wiley, Taylor & Francis, Sage, and Jstor).

This study reviews the innovative performance literature since 1990. This was also the year when Hans Thamhain published his study in peer review journal and he also developed the first scale to measure firm innovative performance Thamhain (1990). A couple of years later, another landmark study was published, which studied the innovative performance of the 660 largest manufacturing companies in the world (Patel and Pavitt, 1992). Both of these studies operationalized differently to measure the innovative performance. The premier study used scale and the latter study used several research activities and the number of patents. Similarly, studies measuring innovative performance have employed multiple indicators and constructs in the last three decades of study. Further, many of these studies also had empirical and conceptual inconsistencies, incoherence, and lack of clarity.

To develop a better comprehension and analyze the innovative performance notion, researchers have introduced and applied various antecedents. The constructs of Knowledge assets, organization structure, leadership, intellectual capital, Marketing strategy, absorptive capacity, and HRM were some of the commonly used drivers of innovative performance. Although these research works provide useful insights, it still lacks a clear depiction of antecedents affecting innovative performance.

Hence, this systematic review aims to examine the extant work on innovative performance to provide a better understanding. This research also offers a framework comprising not only antecedents but also mediators and moderators. This research work structures this systematic review in primarily six parts to address the above-mentioned research questions. The first part discusses the antecedents of innovative performance. The second and third parts shed light on the employed mediators and moderators respectively. The fourth part reviews the range of theories used to underpin the research work. The fifth section explains the operationalization and measurement of innovative performance. The last part comprises discussion, managerial implications, and areas for future research.

1. Innovative Performance Antecedents

The innovative performance characterizes the creation and implementation of new ideas in the form of new policies, practices, and products. The literature on innovative performance discusses its drivers from the wide range of business and management science concepts and constructs. The researchers have generally used organizational processes and factors like leadership styles, intellectual capital, knowledge management, HRM, marketing strategy, Operations management, network structure and capability, Organizational resources, dynamic capability, and open innovation to examine organizational innovative performance. This systematic review has given valuable consideration to the antecedents to provide a comprehensive understanding of the entire innovative performance framework.

2.1 Organizational structure

Many studies adopted organization structure and its dimensions to explain innovative performance (Akdogan and Kale, 2017; Alpkan *et al.*, 2010; Cloodt *et al.*, 2006; Dedahanov *et al.*, 2017; Jin *et al.*, 2020; Patel and Pavitt, 1992). Patel and Pavitt (1992) studied the innovative performance of the 660 largest manufacturing companies in the world. They noticed that innovative performance increased with the firm size. Communication channels inside an organization pave way for the knowledge acquisition and significantly impact innovative performance (Akdogan and Kale, 2017). In addition, they also noticed that bureaucratic structure negatively affects innovative performance. Moreover, Dedahanov *et al.*, (2017) also found that centralization and formalization adversely affect innovative performance. Furthermore, Jin *et al.*, (2020) considered control structure as a determinant of innovative performance. Drawing upon the local embeddedness concept and open innovation, they found that foreign management control reduces local networking ability, resulting in lower innovation output.

2.2 Knowledge Management

Knowledge management and innovation are strongly knotted in the extant research. The constructs of knowledge management have emerged as the most frequently cited indicator from this systematic review.

Many studies emphasize that Knowledge sharing, knowledge stock, knowledge flow, and knowledge creation contribute significantly to innovative performance (Adaileh and Abu AlZeat, 2017; Chen *et al.*, 2016; Jiang and Li, 2009; van Wijk *et al.*, 2012; Yamin and Otto, 2004). On the other hand, organizations with a higher degree of knowledge sharing are at risk to release sensitive knowledge (Adaileh and Abu AlZeat, 2017). Along the similar lines, Anzola-Román *et al.*, (2019) also found that the relationship between technological proximity and collaboration with innovative performance was progressive in the earlier stage, but the relationship turned negative because of critical knowledge leakage in the later stage of collaboration and turned detrimental for innovative performance.

The managers are suggested to tap knowledge resources from internal as well as external sources of an organization (Figueiredo, 2013). In addition, external search strategies and sources of knowledge are also regarded as significant for innovative performance in some studies (G. P. Moreira *et al.*, 2016; Hwang and Lee, 2010; Oluwatope *et al.*, 2016; Zhang, 2019). Laursen and Salter (2006) identified sixteen knowledge sources including competitors, customers, and technical standards as the primary source of knowledge. Moreover, Adeyeye *et al.*, (2018) cautioned that the relationship between knowledge search and innovative performance could be decreased with the range of barriers inside an organization.

Abu Hasan *et al.*, (2020) studied the interaction of knowledge assets and knowledge transfer with innovative performance. They concluded that proper knowledge management, particularly ensuring knowledge transfer to the right people could increase SMEs' innovative performance. Kaya *et al.*, (2020) symbolized organizational learning as an organization's structured values that realize the creation, retention, and transfer of knowledge with the developed knowledge base. They hypothesize that organizational learning positively impacts innovative performance.

2.3 HRM

Many studies considered HRM as a highly relevant resource for the organizations' innovative performance (Acosta-Prado *et al.*, 2020; Cabello-Medina *et al.*, 2011; Li *et al.*, 2019). Some scholars used several HRM functions and some considered merely one or two HR elements crucial for innovative performance. Altarawneh *et al.*, (2018) examined innovative performance through AMO (ability, motivation, and opportunity) enhancing HRM practices. The results showed a significant relationship between HRM practices and performance. One of the recent studies, (Acosta-Prado *et al.*, 2020) also found that HRM practices are statistically significant to predict innovative performance. Similarly, Li *et al.*, (2019) found HRM practices positively affect multinational enterprises (MNEs) subsidiaries' innovative performance. Cabello-Medina *et al.*, (2011) highlighted the HRM practices' role to manage human and social capital, which results in better innovation and organizational performance.

A statistically positive relationship between innovative performance and hypothesized predictors like training programs, coaching and mentoring, and international work assignments were established (Berber and Lekovic, 2018). Moreover, the relationship between on-the-job training and off-the-job training with organizations' innovative performance was found to be stronger (Boadu *et al.*, 2018). Furthermore, investment in T&D activities garners better innovative performance (Ciriaci, 2017). Sung and Choi (2018)

showed that T&D indirectly affects innovative performance through employees' competence and commitment. In similar vein, (Sohn and Jung, 2010) regard basic skill essential for innovative performance. A performance-based reward system emerged as one of the organizational support factors that affect innovative performance (Alpkan *et al.*, 2010). Additionally, Sohn & Jung (2010) also hypothesized and found compensation packages as an important indicator of innovative performance.

2.4 Intellectual Capital

Intellectual capital is the intangible assets owned by organizations (Stewart, 1991). Intellectual capital scholars have classified the concept into three components of human, structural and relational capital (Bontis, 1998; Lentjušenkova and Lapina, 2016; Sumedrea, 2013). The understanding and deployment of intellectual capital as an innovative performance antecedent are incongruent in the literature. Some scholars have considered intellectual capital as a single indicator (Alzuod *et al.*, 2017; Ansari *et al.*, 2016; Wu *et al.*, 2007). However, some studies have utilized its various components as the precursor of innovative performance (Al-Abbadi and Almomani, 2019a; Cabrilo *et al.*, 2018; Protogerou *et al.*, 2017; Rooks *et al.*, 2012; Setini *et al.*, 2020). Specifically, human capital is considered one of the most important drivers of innovative performance (Al-Abbadi and Almomani, 2019a). Moreover, founder human capital (education background, skills, knowledge) facilitates firm's internal capabilities to develop, which is critical for organizations' innovative performance (Protogerou *et al.*, 2017). Cabrilo *et al.*, (2018) enriched intellectual capital taxonomy with the introduction of two new components-renewal and entrepreneurial capital. They asserted that all the components of intellectual capital are relevant and propel the innovative performance of an organization.

2.5 Leadership

Conventional wisdom would argue that leadership positively affects innovation processes. Along the same line, Rizki (2018) hypothesized the positive impact of transformational leadership on innovative performance. Interestingly, the result showed that transformational leadership does not influence innovative performance. They reasoned that seniority is the leadership criteria in the country of research. The older people in leadership ranks do not encourage new patterns and processes. In addition, Akdogan and Kale (2017) also found that leaders do not influence innovative performance.

2.6 Organization Culture

Various scholars have considered how organizational culture and its factors are affecting innovative performance. Organizations need to cultivate a culture where human capabilities are nurtured to develop innovative processes, subsequently, accomplishing innovative performance (Halim *et al.*, 2014). Thamhain (1990) also considered the work environment as one of the primary indicators of innovative performance. Additionally, top management support and risk-taking climate were also regarded as important predictors of innovative performance (Alpkan *et al.*, 2010; Li *et al.*, 2018). The role of leadership is indispensable for the creation and embedment of cultural elements (Nam Nguyen and Mohamed, 2011; Schein, 1983). The founder's experience to run the business had a positive impact on organizations' innovation processes.

However, industry-specific prior knowledge did not affect innovative performance. (Weterings and Koster, 2007).

2.7 Network Structure

With the rise of the knowledge economy, the notion of network structure and its dimensions has drawn the attention of scholars. Many studies have also attempted to examine its relationship with innovative performance. Xie et al., (2014) concluded that network form and network structure significantly enhance the innovative performance of an organization. In a similar vein, (Fang *et al.*, 2017) suggested that network structure enables organizations to create a better understanding of knowledge flow through relationships. Gunawan *et al.*, (2016) investigated the role of network ties on innovative performance. They advocated that extra cluster ties are important windows for new technological prospects that could offer crucial knowledge on new processes and technological trends. However, overdependence on within cluster knowledge sharing could end in piling up redundant knowledge, which could obstruct innovative performance.

In one of the recent studies, Vătămănescu *et al.*, (2020) found that strategic ties are an important predictor of innovative performance. Moreover, longitudinal research with a sample size of fifty-three strategic networks found that the diversity and educational level of the network board with other interconnecting directorates have a positive effect on innovative performance (Wincent *et al.*, 2010). Furthermore, Kotabe *et al.*, (2017) found that networking capability play a complementary role with absorptive capacity to overcome resource limitations and weakness of an organization to enhance innovative performance.

2.8 Open innovation

Many scholars argued open innovation and its element as an antecedent of innovative performance. Gebremichael (2018) advocate that open innovation practices positively influence innovative performance. Many studies established that open innovation and innovative performance maintain the classical U-shape relationship (Bayona-Saez *et al.*, 2017; Ye *et al.*, 2020; Zhou *et al.*, 2018). Additionally, Jugend (2018) found out that internal collaboration impacts external collaboration and they both enrich firm innovative performance. Moreover, Wang *et al.*, (2012) remarked that the high-tech firms' innovative performance largely depends upon communicating with the various external technology bases. Specifically, internal R&D and external agreements to acquire technologies from foreign companies improve an organization’s innovative performance.

2.9 Absorptive Capacity

In management science and business research, the concept of absorptive capacity was first introduced by Cohen and Levinthal. They defined absorptive capacity as the ability of an organization to identify the new knowledge, assimilate it and apply it to generate revenue (Cohen and Levinthal, 1990). Many scholars considered the role of absorptive capacity is phenomenal for innovative processes (Carvache-Franco *et al.*, 2020; Kotabe *et al.*, 2017; Moura *et al.*, 2020). Emphasizing the absorptive capacity as a process, Jantunen (2005) provided empirical evidence that knowledge flow is key to innovative performance sustenance. Kim

et al., (2016a) utilized the two dimensions of absorptive capacity-potential absorptive capacity and realized absorptive capacity in their framework. They suggested how organizations could get away from the self-reinforcing process and develop absorptive capacity for superior innovative performance.

2.10 Research and Development

This review found a strong representation of the research and development and related terms in the innovative performance literature. These studies examined the relationship of an organization's and their alliance innovative performance with the number of antecedents like R&D orientation (Hsiao and Hsu, 2018), R&D alliance (Capaldo and Messeni Petruzzelli, 2015), R&D internationalization (Hurtado-Torres *et al.*, 2018), R&D strategy (Peeters and Martin, 2017), R&D resources (Bayona-Saez *et al.*, 2017). Indicating the significance of R&D spending, (Marsili and Salter, 2006) asserted that organizations with higher research spending are found to be more innovative than organizations with a relatively little spending. Additionally, The positive role of research intensity and external R&D for the innovative performance was empirically confirmed in the extensive studies carried out in more than a dozen countries in Europe and South America (Caloghirou *et al.*, 2004; Carvache-Franco *et al.*, 2020; Ferraris *et al.*, 2017)

Innovative performance has also been studied with R&D collaboration with a variety of partners (Belderbos *et al.*, 2018). They suggested that not just current and potential future partner types but the role of experience with prior R&D collaboration contribute greatly to the innovative performance. They warned companies to note the primary difference between the R&D partnership with research institutes, universities, customers, and suppliers, and on the other hand, R&D partnership with competitors. Moreover, Berchicci (2013) findings suggested that organizations focusing on external R&D perform innovatively better, but up to a certain limit. Afterward, the greater efforts of external R&D diminish the firm's innovative performance.

2.11 Other Organizational factors

The firm size also emerged as a predictor of innovative performance as the large organizations are found to be performing better in innovation activities because of the availability of better resources (Patel and Pavitt, 1992). Many scholars consider management factors like marketing (Hsiao and Hsu, 2018; Sicotte *et al.*, 2012), Finance (Moura *et al.*, 2020; Satta *et al.*, 2016), TQM (Fernandes *et al.*, 2014), and entrepreneurial orientation (Khalili *et al.*, 2013) as the important antecedents for organizations' innovative performance. Lokshin *et al.*, (2009) stated that technological competencies and customer competencies have a direct impact on innovative performance.

2.12 Environmental factors

A wide range of influential factors external to organizations were found to be drivers and barriers to innovative performance. The external environment is one of the important factors positively affecting innovative performance (Sohn and Jung, 2010). In addition, Yuan *et al.*, (2020) showed empirically that a strong relationship with competitors indirectly weakens innovative performance. Moreover, (Bengtsson and Sölvell, 2004) further stated that the climate and structure of competition are crucial antecedents of

innovative performance. Furthermore, networking with universities and technology collaborations are some of the important predictors of a young organization's innovative performance (Protogerou *et al.*, 2017).

2.13 Collaboration

Collaborations and their various forms have been considered as a crucial competitive stratagem in many studies. Satta *et al.*, (2016) asserted the pivotal role of technological collaboration to foster the innovative activities at the organizations. Additionally, Lazzarotti *et al.*, (2015) considered absorptive capacity and openness important predictors for the organizations' collaborative innovative performance. Exploring the innovative process of around 70,000 patents, Singh *et al.*, (2016) argued that new knowledge is created and acquired through a collaboration network, which significantly affects innovative performance. Furthermore, Inter-organization communication and cooperation are also important drivers of an organization's innovative performance (Kaya *et al.*, 2020; Moura *et al.*, 2020).

Table I: Innovative Performance antecedents

Antecedents	Sources
Organizational structure	(Akdogan and Kale, 2017; Alpkan *et al.*, 2010; Cloodt *et al.*, 2006; Dedahanov *et al.*, 2017; Jin *et al.*, 2020; Patel and Pavitt, 1992).
Knowledge Management	(Adaileh and Abu AlZeat, 2017; Adeyeye *et al.*, 2018; Anzola-Román *et al.*, 2019; Chen *et al.*, 2016; Figueiredo, 2013; G. P. Moreira *et al.*, 2016; Hwang and Lee, 2010; Jiang and Li, 2009; Kaya *et al.*, 2020; Laursen and Salter, 2006; Oluwatope *et al.*, 2016; van Wijk *et al.*, 2012; Yamin and Otto, 2004; Zhang, 2019)
HRM	(Acosta-Prado *et al.*, 2020; Alpkan *et al.*, 2010; Altarawneh *et al.*, 2018; Berber and Lekovic, 2018; Boadu *et al.*, 2018; Cabello-Medina *et al.*, 2011; Ciriaci, 2017; Li *et al.*, 2019; Sohn and Jung, 2010, 2010)
Intellectual Capital	(Al-Abbadi and Almomani, 2019a; Alzuod *et al.*, 2017; Ansari *et al.*, 2016; Cabrilo *et al.*, 2018; Protogerou *et al.*, 2017; Rooks *et al.*, 2012; Setini *et al.*, 2020).
Leadership	(Akdogan and Kale, 2017; Rizki *et al.*, 2019)
Organizational culture	(Alpkan *et al.*, 2010; Halim *et al.*, 2014; Li *et al.*, 2018; Nam Nguyen and Mohamed, 2011; Thamhain, 1990; Weterings and Koster, 2007).
Network structure	(Fang *et al.*, 2017; Gunawan *et al.*, 2016; Kotabe *et al.*, 2017; Vătămănescu *et al.*, 2020; Wincent *et al.*, 2010; Xie *et al.*, 2014)
Open innovation	(Bayona-Saez *et al.*, 2017; Gebremichael, 2018; Jugend, 2018; Wang *et al.*, 2012; Ye *et al.*, 2020; Zhou *et al.*, 2018)
Absorptive capacity	(Carvache-Franco *et al.*, 2020; Jantunen, 2005; Kim *et al.*, 2016a; Kotabe *et al.*, 2017; Moura *et al.*, 2020)

Research and Development	(Bayona-Saez *et al.*, 2017; Belderbos *et al.*, 2018; Berchicci, 2013; Caloghirou *et al.*, 2004; Capaldo and Messeni Petruzzelli, 2015; Carvache-Franco *et al.*, 2020; Ferraris *et al.*, 2017; Hsiao and Hsu, 2018; Hurtado-Torres *et al.*, 2018; Peeters and Martin, 2017)
Marketing	(Hsiao and Hsu, 2018; Sicotte *et al.*, 2012)
Finance	(Moura *et al.*, 2020; Satta *et al.*, 2016)
TQM	(Fernandes *et al.*, 2014)
Entrepreneurial orientation	(Khalili *et al.*, 2013)
Technological competencies	(Lokshin *et al.*, 2009)
External environment	(Sohn and Jung, 2010).
Competition/Competitors	(Bengtsson and Sölvell, 2004) (Yuan *et al.*, 2020)
Networking	(Protogerou *et al.*, 2017)
Collaboration	(Kaya et al., 2020; Lazzarotti et al., 2015; Moura et al., 2020; Satta et al., 2016; Singh et al., 2016)

2. Mediators

Knowledge and its variants were used as mediators linking different antecedents with innovative performance. Knowledge management (Jiang and Li, 2009), knowledge leakage (Adaileh and Abu AlZeat, 2017), knowledge stock (van Wijk *et al.*, 2012), knowledge process ability (Altarawneh *et al.*, 2018), external knowledge sources (Caloghirou *et al.*, 2004), Knowledge searching (Fang *et al.*, 2017), and Knowledge sharing (Setini *et al.*, 2020; Vătămănescu *et al.*, 2020) were found to be positively mediating. One exception was the study conducted by (Adaileh and Abu AlZeat, 2017), who found knowledge leakage had not been mediating between knowledge sharing and innovative performance.

Scholars also employed different organizational capabilities as mediators such as dynamic capability (Ansari *et al.*, 2016), technological capability (Chen *et al.*, 2016), absorptive capacity (Lazzarotti *et al.*, 2015; Li *et al.*, 2018), and organizational learning (Fang *et al.*, 2017). Moreover, intellectual capital components have also been used to explain innovative performance and its antecedent relationship. The significant mediation role of Human capital and social capital were also ascertained in the studies (Al-Abbadi and Almomani, 2019a; Cabello-Medina *et al.*, 2011). Organizational culture was also examined as the intervening variable (Acosta-Prado *et al.*, 2020; Rizki *et al.*, 2019). In addition to the aforementioned mediators, scholars considered a plethora of other organizational activities, processes, resources, and functions like R&D intensity (Carvache-Franco *et al.*, 2020), project management (Sicotte *et al.*, 2012), strategic activities (Chowhan, 2016), market orientation (Yuan *et al.*, 2020), new product (Saastamoinen *et al.*, 2018), collaboration for information (Kaya *et al.*, 2020), service innovativeness (Liu, 2013), open innovation (Kim et al., 2016b), information exchange (Shih et al., 2020). Table 2 given below represents the mediators and authors respectively.

Table II: Mediating Variables

Mediators	Authors
Knowledge management	(Jiang and Li, 2009)
Knowledge leakage	(Adaileh and Abu AlZeat, 2017)
Knowledge stock	(van Wijk *et al.*, 2012)
Knowledge process ability	(Altarawneh *et al.*, 2018)
Knowledge sources, and	(Caloghirou *et al.*, 2004)
Knowledge searching	(Fang *et al.*, 2017),
Knowledge sharing	(Setini *et al.*, 2020; Vătămănescu *et al.*, 2020)
Dynamic capability	(Ansari *et al.*, 2016)
Technological capability	(Chen *et al.*, 2016)
Absorptive capacity	(Lazzarotti *et al.*, 2015; Li *et al.*, 2018)
Organizational learning	(Fang *et al.*, 2017)
Human capital and social capital	(Al-Abbadi and Almomani, 2019a; Cabello-Medina *et al.*, 2011)
Organizational culture	(Acosta-Prado *et al.*, 2020; Rizki *et al.*, 2019)
R&D intensity	(Carvache-Franco *et al.*, 2020)
Project management	(Sicotte *et al.*, 2012)
Market orientation	(Yuan *et al.*, 2020)
New product	(Saastamoinen *et al.*, 2018)
Collaboration for information	(Kaya *et al.*, 2020)
Service innovativeness	(Liu, 2013)
Open innovation	(Kim *et al.*, 2016b)
Information exchange	(Shih *et al.*, 2020)

3. Moderators

To study the boundary condition, researchers utilized a diverse range of moderators explaining the interaction of innovative performance and its predictors. With the rising emphasis on knowledge in extant research, this review notes that knowledge management moderators had the largest representation. These included knowledge transfer (Boadu *et al.*, 2018), knowledge search span (Capaldo and Messeni Petruzzelli, 2015), accuracy and speed of knowledge (Abu Hasan *et al.*, 2020), knowledge management (Ferraris *et al.*, 2017), and knowledge structure (Zhou *et al.*, 2019).

Absorptive capacity was the most commonly adopted moderator which appeared in three studies. (Kafouros *et al.*, 2020; Presutti *et al.*, 2019) emphasize its positive role in innovative performance. On the contrary, Moreira et al., (2016) argued that absorptive capacity does not positively moderate in all the contexts, which is due to compromise between the absorptive capacity process and other organizational factors. Human

capital was utilized as a moderator in studies conducted by (Alpkan *et al.*, 2010; Halim *et al.*, 2014). Moreover, Wu *et al.*, (2007) found the positive moderating role of dynamic capabilities in the relationship between intellectual capital and innovative performance.

Researchers also focused R&D factors to study the relationship between innovative performance and its predictors, which cover R&D collaboration (Hurtado-Torres *et al.*, 2018), R&D intensity (Cefis *et al.*, 2020), and scientific intensity (Operti and Carnabuci, 2014). Apart from these, many management, organizational, environmental factors were used as the moderators such as creativity (Sohn and Jung, 2010), innovative climate (Waheed *et al.*, 2019), perceived support for innovation (Leung *et al.*, 2011), risk taking (Gunawan *et al.*, 2016), decentralization (Li *et al.*, 2018), entrepreneurial orientation (Alzuod *et al.*, 2017), organization size and turbulence (Sicotte *et al.*, 2012), and market force (Kotabe *et al.*, 2017). The table 3 shows the moderators and authors.

Table III: Moderators

Moderators	Authors
Knowledge transfer	(Boadu *et al.*, 2018)
Knowledge search span	(Capaldo and Messeni Petruzzelli, 2015)
Accuracy and speed of knowledge	(Abu Hasan *et al.*, 2020)
Knowledge management	(Ferraris *et al.*, 2017)
Knowledge structure	(Zhou *et al.*, 2019)
Absorptive capacity	(G. P. Moreira *et al.*, 2016; Kafouros *et al.*, 2020; Presutti *et al.*, 2019)
Human Capital	(Alpkan *et al.*, 2010; Halim *et al.*, 2014)
Dynamic Capability	(Wu *et al.*, 2007)
Creativity	(Sohn and Jung, 2010)
Innovative climate	(Waheed *et al.*, 2019)
Perceived support for innovation	(Leung *et al.*, 2011)
R&D collaboration	(Hurtado-Torres *et al.*, 2018)
R&D intensity	(Cefis *et al.*, 2020)
Scientific intensity	(Operti and Carnabuci, 2014)
Risk taking	(Gunawan *et al.*, 2016)
Decentralization	(Li *et al.*, 2018)
Entrepreneurial orientation	(Alzuod *et al.*, 2017)
Organization size and turbulence	(Sicotte *et al.*, 2012)
Market force	(Kotabe *et al.*, 2017)

4. Theories used in innovative performance research

This review shows that theories utilized in innovative performance research is primarily drawn from the resource-based (RBV) and social based paradigms. Resource-based view (Acosta-Prado *et al.*, 2020; Carvache-Franco *et al.*, 2020; Protogerou *et al.*, 2017; Zhou *et al.*, 2019) and its subsequent theoretical frameworks like knowledge based view (Abu Hasan *et al.*, 2020; Han and Li, 2015a; Peeters and Martin, 2017), intellectual capital (Cabrilo *et al.*, 2014), and absorptive capacity (Moreira et al., 2016; Kim et al., 2012; Lund Vinding, 2006) emerged incredibly popular within management science and business studies research.

RBV's theoretical underpinning was based on Edith Penrose's theory of the firm (Penrose, 1959). Capitalizing on the Penrose and Wenerfelt work (Wernerfelt, 1984), Barney's RBV research paper prompted a sharp rise in valuable publications (Barney, 1991), which enhanced the understanding and implications of RBV for scholars and practitioners. RBV considers that the capabilities and resources of an organization provide it with a sustained competitive edge over its competitors.

The theme of human capital theory also emerged in the studies carried out by (Al-Abbadi and Almomani, 2019b; Ciriaci, 2017; Gagliardi, 2015). In contrast to the aforementioned theories, human capital theory exclusively focuses on employees rather than entire organizational resources. This theory posits that people are the most important asset of an organization, and investment in employee development does not only benefit the employees and the company but also the society (Blaug, 1976). Additionally, some scholars based their studies on social capital theory (Rooks *et al.*, 2012; Yuan *et al.*, 2020). It proposes that the social relationship of the employees is significant prerequisite for knowledge creation and innovative performance.

Moreover, some other social-based theories such as social exchange theory and social network theory have also been used in innovative performance research. The key difference in social exchange and social network theoretical perspective is the primary focus of social exchange theory on relationship and behavior aspects. On the other hand, social network theory asserts that structure is equally important as the relationship for innovative performance. (Fang *et al.*, 2017; Hurtado-Torres *et al.*, 2018; Shih *et al.*, 2020; Vătămănescu *et al.*, 2020; Zhang *et al.*, 2015)

Furthermore, organizational learning theory has also provided theoretical underpinning to research design (Cefis et al., 2020; Kafouros et al., 2020; Operti & Carnabuci, 2014; Zhang et al., 2015). The core idea of organizational learning theory is that learning results from social interactions and the knowledge become part of organizational processes and routines with time. The ability to acquire knowledge and apply it to maximize business returns varies among organizations. Cohen and Levinthal termed it an absorptive capacity of an organization (Cohen and Levinthal, 1990). The absorptive capacity theory has been used to

explain the organization's ability to recognize, acquire, assimilate, and create new knowledge. In the same manner, the open innovation concept and theory focus convergence of knowledge to cultivate internal innovation (Chesbrough, 2003).

In addition to the aforementioned theories, this review notices a variety of other theories employed to study antecedents' relationship with innovative performance. This includes contingency theory (Alpkan *et al.*, 2010; Capaldo and Messeni Petruzzelli, 2015) AMO (Altarawneh *et al.*, 2018), organizational ecology (Weterings and Koster, 2007), resource dependence (Wincent *et al.*, 2010), technical change (Jiang and Li, 2009), transactive memory (Kaya *et al.*, 2020), institutional (Kotabe *et al.*, 2017), and attention theory (Laursen and Salter, 2006).

Table IV: Theories in innovative performance research

Theory	Sources
RBV	(Acosta-Prado *et al.*, 2020; Alzuod *et al.*, 2017; Carvache-Franco *et al.*, 2020; Han and Li, 2015b; Protogerou *et al.*, 2017; Satta *et al.*, 2016; Weterings and Koster, 2007; Zhou *et al.*, 2019)
KBV	(Abu Hasan *et al.*, 2020; Chen *et al.*, 2016; Peeters and Martin, 2017; Zhang, 2019)
Intellectual Capital	(Cabrilo *et al.*, 2018)
Human Capital	(Ciriaci, 2017; Gagliardi, 2015)
Social Capital	(Rooks *et al.*, 2012; Yuan *et al.*, 2020)
Absorptive capacity	(Kim *et al.*, 2016a; Li *et al.*, 2018; Vinding, 2004)
Knowledge Management	(Gebremichael, 2018; Vătămănescu *et al.*, 2020)
Contingency theory	(Alpkan *et al.*, 2010; Capaldo and Messeni Petruzzelli, 2015)
AMO	(Altarawneh *et al.*, 2018)
Organizational learning	(Cefis *et al.*, 2020; Kafouros *et al.*, 2020; Operti and Carnabuci, 2014; Zhang, 2020)
Social network	(Fang *et al.*, 2017)
Social exchange	(Hurtado-Torres *et al.*, 2018; Shih *et al.*, 2020)
Technical change	(Jiang and Li, 2009)
Transactive memory	(Kaya *et al.*, 2020)
Institutional	(Kotabe *et al.*, 2017)
Attention based	(Laursen and Salter, 2006)
Open innovation	(G. P. Moreira *et al.*, 2016; Gebremichael, 2018; Setini *et al.*, 2020)
Organizational ecology	(Weterings and Koster, 2007)
Resource Dependence	(Wincent *et al.*, 2010)

5. Measurement

The concept and construct of innovative performance have been used extensively in many studies. As discussed above, the concept of innovative performance has no common definition. Similarly, there are no generally recognized measures of innovative performance. However, scholars have employed various measures to operationalize organizational innovative performance. It ranges from general measures of the patent count, patent citation, Research and development expenditure, and product innovation to the specific survey questionnaire. In other words, the contemporaneous literature gives interesting insights as some studies utilize single dimension output and some adopt a broader multi-dimensional scale. In the following, this study briefly reviews innovative performance measurement methods that would enhance an overall understanding of extant literature.

6.1 Multifactor Scale

Innovation is a dynamic and complex process that is characterized by multi-phase activities. Using a single factor to measure innovative performance could not yield proper results as it may neglect the relationship among the various determinants. Hence, innovative performances have been operationalized through scales such as ordinal and Likert. Additionally, a large number of studies have utilized the scale developed by earlier studies of (Hagedoorn and Cloodt, 2003; Laursen and Salter, 2006; Neely and Hii, 1998) .

6.2 Product innovation

Innovative performance is generally referred to and measured as the application of new production, organizational processes, and the introduction of a new product to the market. Most scholars consider a new product in the given number of years as a significant indicator of innovative performance because it mirrors the organizational capability to acquire and exploit changing technologies. Product innovation could be defined as modification in the design, components, or features of a product (Gunawan *et al.*, 2016). In line with the product innovation notion, some studies used three new product indicator for measurement, which was based on the Oslo Manual and widely used community innovation survey. The three statements were related to new product introduction to the market, rate of old product replacement with upgraded products, and share of newly introduced product in the sales.

6.3 Patent Citation

The literature comprises a good number of studies that consider patent citation as a measure of innovative performance (Singh *et al.*, 2016). It is generally assumed that patent citation has a positive relationship with patent quality and it also enhances organizational social value along with financial value (Operti and Carnabuci, 2014).

6.4 Patent

The patent has been considered a significant indicator of innovative performance as they characterize new ideas, designs, and technology (Hagedoorn and Cloodt, 2003; Hurtado-Torres *et al.*, 2018; Satta *et al.*, 2016). Moreover, patents are directly correlated with innovative performance in the form of new product development (Hsiao and Hsu, 2018). Furthermore, Jin *et al.*, (2020) comment that a patent reflects a firm innovative performance because it is only approved for an invention that addresses technological issues precisely or enhances the product quality and performance.

6.5 Research Expenditure

Researchers have increasingly used research expenditure as an indicator of innovative performance. Yamin and Otto (2004) measured innovative performance through the research expenditure per patent. The premise is to provide equal value to the organizations regardless of their size, as the larger firm will naturally have more patents than smaller ones, however, this does not make them more innovative. Hence, they used the research expenditure of the organization regarding patent count for measuring innovative performance.

6.6 Community Innovation survey

Community innovation survey (CIS) primarily provides information on a firm innovative performance based on the innovative activities like the acquisition of the new building, equipment, machinery, and software. The scope of CIS also extends to resolving existing technical problems, new design, training, research and development, and the introduction of new products and processes.

Introduced in the early 1990s, CIS emerged as the largest survey to measure innovative performance based on the number of countries and organizations. The survey was carried out in twenty-nine European countries. According to Arundel and Smith (2013), CIS has also guided and impacted innovative surveys design beyond European borders. Innovation studies in many countries have drawn insight from CIS including Canada, the USA, South Africa, Russia, Japan, New Zealand, and Australia.

The latest community innovation survey's first section records an organization’s general information and then proceeds to measure innovative activities like product innovation, process innovation, acquisition of machinery, software, and marketing for the product and process innovation, R&D activities and expenditure, Government support, collaboration for innovative activities, marketing innovation, organizational innovation, and innovation with environmental gains.

Table V: Operationalization in innovative performance research

Operationalization method	Sources
Multifactor Scale	Protogerou *et al.*, (2017) Adaileh and Abu AlZeat (2017) Altarawneh *et al.*, (2018) (Huang and Li, 2009). Akdogan and Kale (2017) (Alpkan *et*

	al., 2010) (Al-Abbadi and Almomani, 2019a) Jiang and Li (2009) Ansari *et al.*, (2016) Gunday *et al.*, (2011) Alzuod *et al.*, (2017) and Gebremichael (2018) Carvache-Franco *et al.*, (2020) and Saastamoinen *et al.*, (2018) Chen *et al.*, (2011) Li *et al.*, (2019) Fernandes *et al.*, (2014)
Product Innovation	Belderbos *et al.*, (2018) Frosch *et al.*, (2011) (Presutti *et al.*, 2019) used product sales of three years for measurement. Moreover, Liu (2013) Lokshin *et al.*, (2009) Han and Li, (2015a) (Zhou *et al.*, 2019) Cabello-Medina *et al.*, (2011)
Patent Citation	(Operti and Carnabuci, 2014). Capaldo and Messeni Petruzzelli (2015). Zhang *et al.*, (2015) (Zhang, 2019) (Singh *et al.*, 2016)
Research Expenditure	Yamin and Otto (2004)
Community Innovation Survey	(Bayona-Saez *et al.*, 2017; Caloghirou *et al.*, 2004; Cefis *et al.*, 2020; Ciriaci, 2017; Çömlek *et al.*, 2012; Crescenzi, 2018; Gagliardi, 2015; Jantunen, 2005; Peeters and Martin, 2017).

6. Discussion and Conclusion

This systematic review provides a panoramic view of extant innovative performance literature. This studied the antecedents, moderators, mediators, and the range of theories employed in innovative performance. The call for a higher level of rigor in management review studies and to reduce the selection biases (Khosravi *et al.*, 2019; Newbert, 2007), this review utilized a systematic review approach and studied 95 research articles published over the last thirty-one years (1990-2020).

This review contributes to the innovative performance literature in two ways. First, it depicts the range of innovative performance antecedents that have been used in empirical studies. It also reveals the inconsistent findings between the relationship of antecedents, mediator, moderator, and innovative performance. Most of the studies reported a positive role of antecedents, mediators, and moderators with innovative performance, however many studies such as (Alpkan *et al.*, 2010; Berber and Lekovic, 2018; Lazzarotti *et al.*, 2015; Li *et al.*, 2018; Rizki *et al.*, 2019; Sohn and Jung, 2010; Zhou *et al.*, 2019) found no impact or even negative impact of antecedents and mediation-moderation on innovative performance.

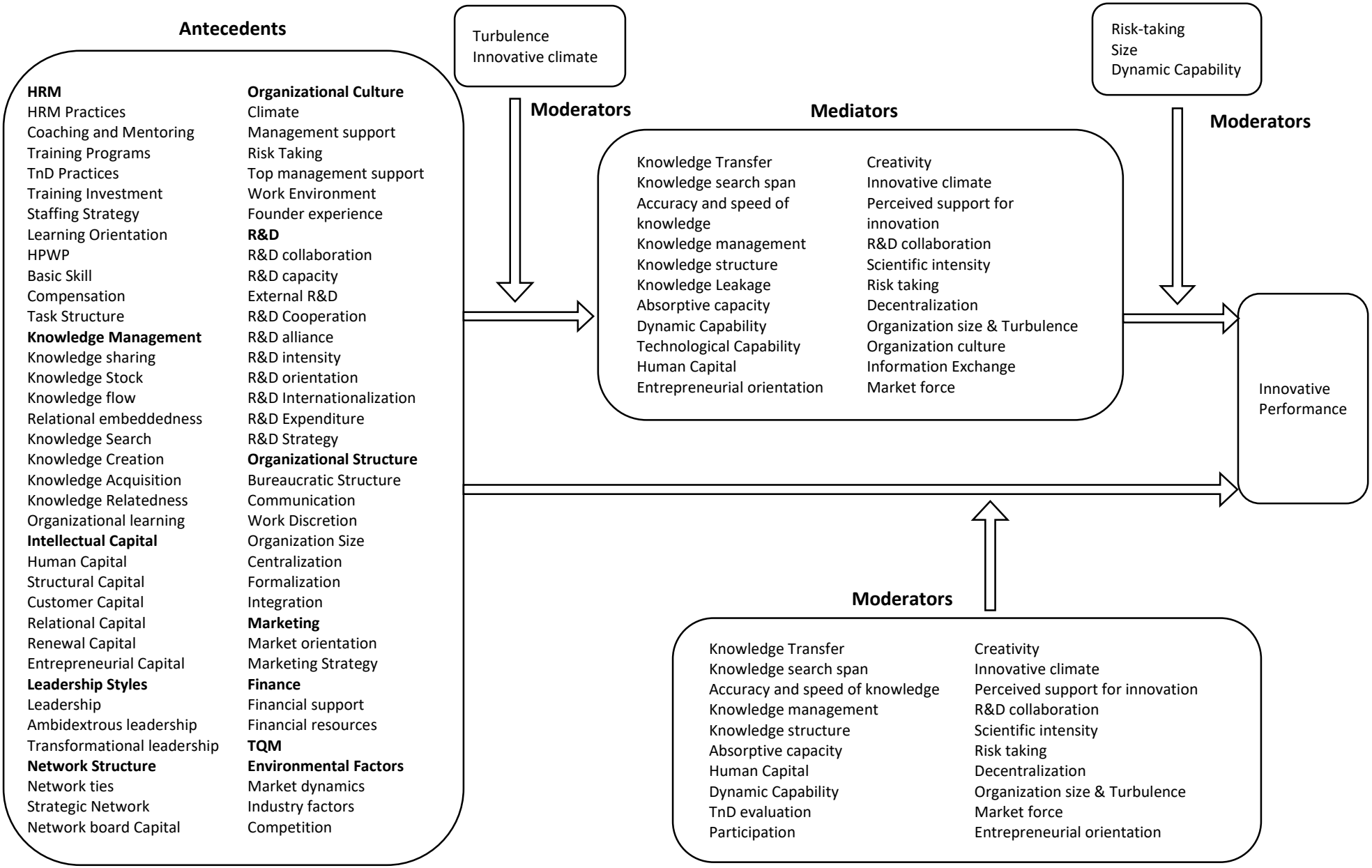

Figure 1. A nomological network of Innovative Performance antecedents, mediators, and moderators.

The rapidly growing interest in the innovative performance by practitioners and scholars encouraged this review study. The objective of this study was threefold. First, we reviewed how innovative performance is understood within the management science and business studies literature. Second, this review portrayed the number of measurement tools that have been utilized in extant literature. Finally, this review also provides a nomological network of the antecedents, mediators, and moderators that have been recognized and discussed in the innovative performance literature. This model demand managers to critically study to develop a deeper understanding of the innovative process.

7. Managerial Implications

This study offers valuable implications for management. The graphical representation of innovative performance drivers might enable managers to develop a strategic and profound understanding of several management, organizational, and environmental concept that improve or impair innovative performance at the organization. The innovative performance depicted in figure 1 could also facilitate managers to see the way many variables are influencing each other in the process of innovative performance.

The R&D in any organization is sine qua non for innovative performance. To deal with expanding knowledge frontiers, the tendency of organizations to focus research internally has been shifted to several emerging ways such as R&D collaboration, R&D alliance, R&D internationalization, and R&D cooperation. This opens an opportunity for the top managers to develop a strategy to exploit external knowledge in combination with internal knowledge.

In addition, this review also encourages managers to reflect on intangible assets such as intellectual capital and its dimensions like human, organizational, and social capital. A better comprehension, appreciation, and management of intangible assets could help managers to improve innovative and business performance. Moreover, intangible capabilities of an organization like absorptive capacity also emerged as one of the important factors, which influence innovation performance. Leveraging upon knowledge absorptive capacity and knowledge management have been rapidly gaining significance, particularly in the current dynamic business environment. This calls upon managers need to closely monitor and refine the processes of knowledge acquisition, assimilation, transformation, and exploitation.

8. Limitations and Future Research

This review reflects that the research on firm innovative performance has witnessed a sharp rise in the last three decades. However, there are still unanswered calls that need to be responded. This review identifies some contradictions in innovative performance literature that could be aligned with management and business literature, such as the role of various leadership types as an antecedent of innovative performance could be further studied. This would add valuable insight to the theory of leadership and innovative performance by explaining why and how a particular set of organizational processes are focused and pursued by leaders. This review also points out that most innovative performance studies are quantitative, the future research could pose profound qualitative questions to develop a deeper understanding of innovative performance phenomena in the socio-economic context of the respective country. Particularly,

China has made significant progress to introduce novel technologies, upgrade products, and improving business performance. Hence, qualitative research contributions from Southeast Asian countries like Singapore and China would be insightful to understand the innovative performance in emerging economies. Furthermore, in emerging countries, governments exercise control over markets in contrast to western economies. Future research could shed more light on the relationship between innovative performance and environmental factors in emerging economies. Most of the reviewed studies have addressed some aspects of management and organization. The studies with a more holistic approach with combinations of variables from a broader environmental context with management, organizational, and business constructs would provide an improved comprehension of the processes of innovative performance.

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