

# Way off the mark? Open innovation failures: Decoding what really matters to chart the future course of action

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## Abstract

With the increasing need for firms to implement innovation in their pursuit of competitive advantage, open innovation has attracted the growing attention of academics and practitioners. However, the current literature has been lopsided, focussing predominantly on the myriad benefits of open innovation. We argue that eulogising only the positive aspects of open innovation is insufficient to help firms and motivate future research. Therefore, we recommend increased attention to the dark side of open innovation, which includes failures that can occur at various stages of the open innovation process. A review of the existing literature reveals that although researchers have, time and again, attempted to document failure in open innovation, this literature is comparatively sparse and fragmented. The extant literature also exhibits an apparent lack of effort to encourage future research, as evidenced by the absence of a comprehensive literature review. We aim to address this research gap by reviewing 76 studies identified by applying a stringent search protocol consistent with the systematic literature review (SLR) methodology. The contributions of this SLR include (a) development of a research profile of the relevant literature, (b) identification of five thematic areas, (c) elucidation of research gaps and suggestion of potential research questions as an agenda for future research on failures in open innovation, (d) formulation of a conceptual framework comprising the antecedents and outcomes of open innovation failure and (e) presentation of the various theoretical and managerial implications for scholars and practitioners.

**Keywords.** Competitive advantage, downsides, failure, open innovation, systematic literature review

## 1. Introduction

Over the past three decades, the concept of open innovation has gained tremendous popularity among academics and practitioners (Dahlander, Gann & Wallin, 2021). Traditionally, firms invested in developing technologies internally and later commercialised them by offering new products and services. Lately, however, the increasing mobility of knowledge workers (Laursen & Salter, 2020), the complexity of the environment (Cruz-González et al., 2015), the emergence of venture capitalists and accelerators (Battistella et al., 2017) and globalisation (Patra & Krishna, 2015) have undermined the efficacy of traditional innovation and highlighted the crucial need for the input of external knowledge. In addition, the data revolution has begun exerting a greater impact by shaping organisational decision-making and transforming value generation through signals from varied external sources, such as crowd, customers (Skourtis et al., 2019) and users (S. Lee et al., 2010; Dahlander et al., 2021). As an illustration, leading firms, such as Procter and Gamble, Philips, and Siemens, have begun externally sourcing knowledge to enhance the efficiency of internal R&D and enhance the probability of product success. Open innovation—defined as purposive knowledge inflow and outflow using monetary and non-monetary mechanisms—is now theorised to be the key driver of competitive advantage (Chesbrough & Bogers, 2014). This is because investment in open innovation allows the acquisition of external knowledge and technologies to complement the internal development of technologies (Lichtenthaler, 2011; Chesbrough & Crowther, 2006); open innovation, moreover, enables the deployment of internal and external sources of ideas to sustain and commercialise innovation (Laursen & Salter, 2006). In sum, the idea of open innovation is aligned with the long-standing notion that no organisation can innovate in isolation; instead, every organisation must engage with the external environment to capitalise on the input of new ideas (Cohen & Levinthal, 1990).

The keen interest of academics and practitioners and the aura surrounding the open innovation process make it seem a novel concept. However, open innovation represents an extension of the existing work. Open innovation builds on the intellectual contribution of the works of Von Hippel related to open and distributed innovation (Chesbrough, 2012). Highlighting the heightened academic interest on the subject, open innovation has been explored in diverse contexts, which include large firms (Brunswick & Chesbrough, 2018), small firms (Hossain & Kauranen, 2016; Bertello et al., 2021), family firms (Casprini et al., 2017), public sector firms (Casprini et al., 2017), high-tech industries (Casprini et al., 2017) and academic entrepreneurship (Chesbrough & Bogers, 2014). Scholars have also

investigated open innovation at multiple levels, including the individual (Giannopoulou et al., 2011), intra-organisational (Minshall et al., 2010), inter-organisational (Jesu, 2007) and regional (Bogers, Zobel et al., 2017). A review of the literature reveals that the concept of open innovation has gained traction due to the various inherent benefits it brings. These benefits include (a) addressing the problems related to the growing complexity of the external environment, technological advancements, shorter product life cycles and the erosion of boundaries between firms and their environment (Enkel et al., 2009; M. H. Lee et al., 2018); (b) facilitating faster market response and increased market access (Rajala et al., 2012); (c) helping organisations resolve their innovation-related issues, which ultimately results in value creation (van de Vrande et al., 2009) and (d) supporting firms as they transcend their boundaries while creating and commercialising innovations by capturing generated value (Chesbrough et al., 2018). In brief, open innovation exemplifies the enrichment of knowledge (Dodgson et al., 2006) and drives competitive advantage in highly uncertain environments (Greco et al., 2019).

In comparison to a substantial body of literature extolling the virtues of open innovation, the attention of academic debate has turned only recently towards the potential challenges associated with pursuing open innovation (e.g. Calof et al., 2018; Chesbrough et al., 2018; Dahlander & Gann, 2010). For instance, Dahlander and Gann (2010) identified potential challenges based upon different types of open innovation, such as inbound open innovation and outbound open innovation. The authors further posited that the benefits of open innovation are contingent upon governance mechanisms and the stage of the technology life cycle. Moving from specific examples to general observation, the challenges associated with open innovation can be grouped into five categories. First, organisations may face barriers while recognising and integrating external information (Remneland-Wikhamn, 2011). For example, organisations may find it difficult to attract partners with complementary knowledge (Tranekjer & Søndergaard, 2013). Second, integrating the diverse external information gathered from varied sources within an organisational context is costly because firms have yet to enhance their knowledge assimilation ability (Calof et al., 2018). Third, organisations may face intellectual property issues concerning innovations developed with external collaborators (Laursen & Salter, 2020). Fourth, potential appropriation issues act as barriers to leveraging the benefits of outbound innovation (Laursen & Salter, 2020). Finally, knowledge spillovers are regarded as inherently and unmanageable.

To put it succinctly, organisations that commit themselves to open innovation face barriers and potential risks, such as the loss of knowledge (Greco et al., 2015), inflated coordination costs (Greco et al., 2019; Gurca et al., 2021) and possible loss of control over created knowledge (Bogers, 2011); these risks, in turn, hinder firms from profiting from open innovation initiatives (Calof et al., 2018). Other potential hazards to which the literature attributes the failure of the open innovation process include a lack of commitment to innovation management, poor employee and customer engagement, and knowledge loss (Dahlander & Gann, 2010). Scholars have thus now recognised open innovation failure as one of the common challenges organisations face (Dahlander, Gann & Wallin, 2021).

Despite this acknowledgement, the extant literature provides an incoherent explanation of the reasons behind open innovation failure. For example, scholars have expressed conflicting views concerning the relationship between open innovation and a firm's competitive advantage due to potential conflicts between knowledge sharing, knowledge protection and the high cost of open innovation (Calof et al., 2018). Many other divergent and fragmented views have emerged as research around open innovation failure has grown across disciplines. This leads us to reinforce the need for reviewing the accumulated knowledge in the area through a rigorous synthesis and consolidation. We contend that such a review of the literature is not merely desirable; rather, it is essential to encourage future research to support practice, as has happened in other fields following recent reviews in areas from food waste to digital innovations (Dhir et al., 2020; Talwar et al., 2020). We observe an urgent need to undertake such a review in light of the pandemic, which has made organisations more vulnerable. Therefore, we propose to use the popular systematic literature review (SLR) approach to assess the relevant literature on open innovation failure systematically.

The purpose of the SLR methodology is to identify, consolidate and review existing literature in mature areas by following transparent and replicable approaches and generating new insights (de Massis et al., 2013). Many recent studies have utilised the SLR effectively to set future research agendas in their selected areas, such as investor resistance (Seth et al., 2020), food waste in educational institutions (Kaur et al., 2021), big data (Talwar et al., 2021), business-to-business (B2B) alliances in healthcare (Madanaguli et al., 2021) and others. Consequently, we believe that undertaking any *other* form of review risks presenting an incomplete picture and a partial view of the problem of open innovation failure for theoretical and practical reference.

To achieve our objective of applying the SLR methodology to synthesise, critically evaluate and organise the current state of open innovation failure research, we propose to answer three research questions: **RQ1**: What is the research profile of the extant literature examining failures in open innovation? **RQ2**: What are the emergent thematic areas of research on failures in open innovation? **RQ3**: What are the potential areas of future research on open innovation failure?

We addressed **RQ1** by identifying and extricating the research profile of 76 congruent peer-reviewed studies based on the conceptual boundary, selected databases and keywords employed. Next, we performed a content analysis to answer **RQ2**. The findings revealed the existence of five predominant themes: cost of openness, firm-level challenges while deploying open innovation, individual-level challenges, types of innovations and failure and contingent/moderation mechanisms. Finally, to answer **RQ3**, we critically assessed the literature to identify existing research gaps and suggest potential questions for future research.

To our knowledge, the current study is the first to review the literature around failures in open innovation and contributes to the area by providing a holistic picture of the risks and costs associated with open innovation failure. The unique contribution of our review derives from the conceptual framework formulated to illustrate the extant research on open innovation failure and provide a point of reference for future research in the area. To elaborate, the framework describes the antecedents and outcomes of open innovation failure. By synthesising various dimensions and aspects of open innovation failure, we contribute to theory building in the area, which has been deficient in past studies.

The rest of the article is structured as follows. The next section presents a closer view of open innovation by discussing its conceptualisation, types and failure. Subsequently, we discuss the SLR methodology and key themes based upon content analysis. Thereafter, we present opportunities for future research followed by the conceptual framework. Finally, we conclude with the theoretical and practical implications and limitations of our study.

## **2. Scope of the study**

### **Open innovation: Benefits and failure**

To classify and analyse prior empirical contributions on open innovation, we must first understand its conceptualisation. Chesbrough (2006) defined open innovation as purposive knowledge inflows and outflows to support internal innovation and expand the external use of internally generated innovation. Open innovation, which entails managing

knowledge flows across the organisational boundary, describes the phenomenon by which an organisation uses external ideas and technologies and allows unused technologies to be exploited by others (Chesbrough & Bogers, 2014). The success of open innovation depends upon the firm's ability to create and capture value using pecuniary and non-pecuniary mechanisms (Chesbrough et al., 2018; Chesbrough & Bogers, 2014). To explain further, value creation implies an organisation's attempt to generate new, valuable resources and achieve desired goals through the open innovation process (Chesbrough et al., 2018). In comparison, value capture implies securing the value created during the process of open innovation (Chesbrough et al., 2018). In sum, the notion of open innovation is based on the creation and utilisation of widely distributed knowledge.

Adding to scholarly interest in the benefits of open innovation, the existing body of research also reveals the downsides of open innovation (Henkel, 2006), suggesting that an excessive focus on open innovation may negatively affect firm performance (Laursen & Salter, 2006). In this regard, scholars have discussed many drivers of open innovation failure.

Open innovation failure represents the downsides of openness (Cruz-González et al., 2015), such as appropriation challenges (Han et al., 2019), transformation of knowledge, (Katila & Ahuja, 2002) and lack of stakeholder commitment (Rojas et al., 2018), which together comprise the high cost of open innovation (Greco et al., 2019). Other reasons for open innovation failure discussed by prior studies include risk aversion (Veugelers et al., 2010), lack of trust (Veugelers et al., 2010), resistance to change (Keupp & Gassmann, 2009) and rigid organisational cultures (Sieg et al., 2010; Parida et al., 2014; Calof et al., 2018). In light of these challenges, firms must apply both formal processes (such as intellectual property rights and patents) and informal processes (such as trust and relational capabilities) to manage knowledge flows. Going beyond the general discussion of open innovation failure, some studies have discussed failures related to specific types of innovation, i.e. inbound, outbound and coupled innovation (e.g. Grimpe & Sofka, 2009; Tekic & Willoughby, 2020; Marullo et al., 2020).

### **Types of innovation: Inbound, outbound and coupled**

A review of the literature reveals the diverse types of open innovation. These include (a) inbound innovation (Elmquist et al., 2009), (b) outbound innovation (Chesbrough & Bogers, 2014) and (c) coupled open innovation (Lichtenthaler, 2009; see Figure 1). Lichtenthaler (2011) theorised inbound open innovation as exploring external knowledge as a part of the innovation process. Inbound innovation enriches the organisation's existing

knowledge base through partnerships with suppliers, customers, consulting companies, competition and other external knowledge sources (Laursen & Salter, 2006; Enkel et al., 2009). The benefits of inbound innovation include the ability of firms to recognise and access external knowledge, which allows them to reconfigure existing internal knowledge (Cohen & Levinthal, 1990). Moreover, access to external knowledge reduces the time required for product development, thereby enabling firms to swiftly achieve product development goals and improve access to existing and new markets (Conboy & Morgan, 2011).

While the inbound type of open innovation involves opening up internal innovation processes to diverse external inputs, outbound innovation is an inside-out process by which organisations allow others to use under-utilised ideas in their own businesses, resulting in knowledge exploitation (Lichtenthaler, 2011). In other words, outbound innovation means leveraging technologies by allowing internally generated ideas to flow outward, selling intellectual property rights and transferring technologies to external organisations (Lichtenthaler, 2009). Organisations investing in outbound innovation focus on externalising their innovations and bringing internal ideas to the market more quickly (Enkel et al., 2009). In sum, outbound open innovation represents the outflow of a firm's knowledge to external subjects (Greco et al., 2019).

While inbound and outbound open innovation is conceptualised as the uni-directional flow of information, coupled innovation is theorised as the multi-directional flow of knowledge, which results in joint value creation (Rouyre & Fernandez, 2019). To elaborate, coupled open innovation describes bi-directional knowledge exchanges. It also implies the combined employment of purposeful inflows and outflows to and from an organisation with a view to commercialising an innovation (Chesbrough et al., 2018). Specifically, it entails innovation through a set of inter-firm relationships, such as alliances and joint ventures, which allow access to complementary knowledge (Mazzola et al., 2012).

**Figure 1 here**

### **3. Methodology**

Our study aimed to comprehensively review the extant research on open innovation failure by employing the SLR methodology. We relied on several suggestions in the literature about the steps to follow while conducting the SLR to ensure the transparency and replicability of our research (Dhir et al., 2020; Seth et al., 2020; Talwar et al., 2020). We chose the SLR methodology due to its interdisciplinary acceptance as the preferred methodology of reviewing prior research and its ability to reproduce similar results (de

Massis et al., 2013; Kushwah et al., 2019). Specifically, we adopted a three-step process, which included planning a systematic review on open innovation failure, specifying the search protocol and screening criteria and extracting data using that protocol, and analysing the content to develop the findings and research gaps (Transfield et al., 2003; Sahu et al., 2020). In the first stage, we defined the research protocol and the boundaries of our research. The next stage involved descriptive and content analysis to map existing research on open innovation and identify gaps. Finally, we integrated our findings to propose an integrative conceptual framework.

### **3.1. Planning the review**

Our SLR was driven by research objectives and research questions from which we defined the search strings for our scientific search (Khanra et al., 2020). Accordingly, we identified four distinct research objectives: (a) to examine the descriptive dimensions of the extant research on open innovation failure, (b) to elucidate key research themes and uncover research gaps in the reviewed literature, (c) to map potential research questions and thereby identify gaps in the reviewed literature and (d) to develop a conceptual framework to drive the agenda for future research. These objectives align with the research questions specified in the preceding part. The first objective aligns with **RQ1**, which we addressed by presenting the research profile of the existing literature on open innovation failure. We presented this research profile by evaluating various descriptive dimensions of the reviewed literature. Towards this end, we first identified *Scopus* and *Web of Science (WoS)* as suitable research databases to search and from which to select congruent studies on open innovation failure. Recent studies have recognised these two databases as the most widely used digital databases in which to search for relevant peer-reviewed literature (Dhir et al. 2020; Behera et al., 2019).

### **3.2. Data collection**

We followed the popularly used two-step process to search for articles available on *Scopus* and *WoS* databases, as suggested by recent reviews (e.g. Kaur et al., 2020). Given our aim to capture all relevant literature on open innovation, we did not limit our search to a particular time frame; rather, we selected all articles published before 2 April 2021. In the first step, we used the following search commands and keywords: *TITLE-ABS-KEY ('Open innovat\*' OR 'co-creat\*' OR 'value co-creat\*') AND TITLE-ABS-KEY ('failure\*')*. Next, we applied the pre-specified inclusion and exclusion criteria to shortlist the relevant studies and eliminate the incongruent ones.



In this regard, we included peer-reviewed empirical articles and excluded conceptual papers, systematic reviews, book chapters, editorials, conference proceedings and commentaries. We further eliminated duplicate studies and studies lacking congruence with our focus on open innovation failure. Our initial search resulted in 420 potentially relevant studies (excluding duplicate studies). Following existing literature reviews (Thirumalesh Madanaguli et al., 2021), we read these articles' titles and abstracts to decide whether to include them in our review. Next, we read the full articles and excluded those with only a passing reference to open innovation failure. The initial search yielded 43 documents.

After processing these 43 papers, we realised that our initial search had failed to include keywords such as 'cost', 'limit', 'downside' and 'challenge'. Accordingly, in the second step, we used the following keywords to search all relevant articles published before 3 May 2021, using the following search command and keywords: *TITLE-ABS-KEY:* (('Open innovation\*') AND *TITLE-ABS-KEY:* ('failure\*' OR 'downslide\*', OR 'cost\*' OR 'limit' OR 'challenges')). Again, we applied the inclusion and exclusion criteria mentioned above. This search yielded an additional 15 documents, for a total of 58 articles. Next, to ensure that we had not omitted any relevant studies, we also conducted a citation chaining search, i.e. a forward and backward reference search of the works cited in these 58 articles. This step yielded eight additional articles.

Finally, realising that we might have overlooked recently published articles, i.e. those published in 2021, we conducted a follow-up keyword search of articles published before 23 October 2021. Consistent with our prior search criteria, we broadened our list of keywords as follows: *TITLE-ABS-KEY:* 'Open innovat\*' OR 'co-creat\*' OR 'value co-creat\*') AND *TITLE-ABS-KEY:* ('failure\*' OR 'downside\*' OR 'cost\*' OR 'limit\*' OR 'challenge\*'). We followed the same selection criteria as elaborated earlier. The follow-up search yielded ten additional studies, resulting in our final sample of 76 relevant studies.

Having identified these 76 peer-reviewed articles, we analysed them to extract the required information. In this context, we undertook the descriptive analysis of the extracted research articles to capture the details necessary to present the research profile; the next section discusses this process in detail. Similarly, we undertook a content analysis to understand the key relationships theorised in the literature, synthesise our findings and prepare a conceptual framework. Figure 2 exhibits the research methodology we employed to execute our SLR search.

### 3.3. Research profiling

We developed the research profile of the relevant studies by consolidating details related to the annual scientific production of research articles, publication sources, data collection approaches and theoretical underpinnings. The figures below visually depict this information, which we have also explained descriptively in the following text.

Figure 3 suggests that the scientific production of research articles examining open innovation failure is steadily increasing, indicating rising research interest. In terms of key publication sources, which are presented in Figure 4, journals with the highest number of publications are the *Journal of Business Research* and *Research Policy*.

As illustrated in Figure 5, the selected studies utilised a variety of methodologies spanning quantitative, qualitative and mixed-method approaches for data collection. However, the share of articles employing a mixed-method approach is quite low. Next, our analysis revealed that the selected studies employed varied theoretical lenses to ground the examined variables. As Figure 6 illustrates, the major theories applied include absorptive capacity, attribution theory, justice theory and paradox theory. However, we observed a lack of theory building, with more than 50% of the studies employing no theory. This indicates a significant scope for future research aimed at theory building. Some studies, meanwhile, employed a multi-theoretical lens, using combinations such as the resource-based view, the knowledge-based view and absorptive capacity theory.

**Figures 2-6 here**

### 4. Thematic areas

Content analysis is a methodology for overviewing the existing literature and mapping a research area's intellectual structure by purposefully extracting information from the text and providing deeper insights (Gaur & Kumar, 2018). Following the recommendations of recent SLR-based reviews (e.g. Talwar et al., 2020), we performed an in-depth evaluation of each selected study to uncover common themes. Because content analysis is executed through an iterative coding process, we employed open coding and axial coding to uncover the various thematic research areas using MS Excel and MAXQDA (Saillard, 2011). In the first step, we thoroughly read the selected 76 articles to understand the research problem, results and conclusion. In the second step, we applied content analysis to identify sub-themes and then grouped these sub-themes under their respective themes. From these efforts, five key themes emerged, as exhibited in Figure 7: (a) cost of openness,

b) firm-level challenges while deploying open innovation, (c) individual-level challenges, (d) types of open innovation and failure and (e) contingent/moderation mechanisms.

**Figure 7 here**

#### **4.1. Cost of openness**

A central part of open innovation is the search for new external knowledge, which requires firms to make a considerable investment (Chesbrough, 2012). The premise of openness encompasses the voluntary and non-voluntary disclosure of information to outsiders (von Hippel, 1988). We find an agreement in the literature that openness increases the alertness of firms to new market opportunities and provides access to external knowledge (Bogers, 2011). On the flip side, however, openness also results in the generation of excessive amounts of data (Dahlander, Gann & Wallin, 2021). The sheer volume of external information complicates the efforts of organisations to generate insights from such diverse data. Thus, firms face a constant dilemma: while openness increases alertness and access to new knowledge, this broad access to external knowledge produces a large volume of data that leads to high integration costs. In sum, the cost of openness entails the over-search of external knowledge and the high integration cost of the data thus generated.

Appreciating the value of openness and external knowledge, scholars have granted it adequate attention. For instance, Laursen and Salter (2006) examined the influence of knowledge search on open innovation performance. They theorised ‘*search breadth*’ and ‘*search depth*’ as two components of openness and explored how search breadth and search depth uniquely influence open innovation. Analysis of data revealed a curvilinear relationship between search strategy and open innovation. The implication for the curvilinear effect is that openness does not guarantee pecuniary benefits due to knowledge misappropriation issues (Dahlander & Gann, 2010). Likewise, Salter et al. (2015) theorised that the relationship between openness to external knowledge and innovation outcomes is curvilinear. They argued that openness contributes to the individual-level ideation process up to a certain point—only until the integration cost negates the benefits of increased openness. In a similar vein, Katila and Ahuja (2002) noted the cost associated with the over-search of external knowledge. Their findings reveal that excessive search negatively influences the firm’s ability to respond to diverse new knowledge. In brief, our review of the literature reveals ambiguity regarding the benefits and pitfalls of openness. In particular, we observe variance in the relationship between openness and performance outcomes.

## 4.2. Firm-level challenges

Firms face geographical, cultural and cognitive barriers while searching for and identifying the relevance of external knowledge. Therefore, it is crucial to understand the vital role of firm-level activities in open innovation, such as knowledge search and gatekeeping (Salge et al., 2012). It is important to note that the ability of firms to recognise and acquire external knowledge depends upon the similarity of the knowledge base across organisations, and the acquisition of new knowledge across organisational boundaries remains challenging due to the lack of common language required for effective interactions (Gurca et al., 2021). In fact, organisations must invest in R&D capabilities to effectively grasp external knowledge (Greco et al., 2019). In addition, to fully appreciate the usefulness of external knowledge, firms must develop internal knowledge (Cohen & Levinthal, 1990).

In this regard, prior literature has discussed knowledge management challenges in open inbound innovation related to costs associated with the acquisition, assimilation and integration of external knowledge (Salge et al., 2013; Lichtenthaler, 2011). In general, organisations face numerous challenges while interpreting, assimilating and exploiting external knowledge for the following reasons. First, the ability of firms to incorporate knowledge depends upon the nature of that knowledge. On the one hand, an excessive similarity of external knowledge with a firm's existing internal knowledge may result in the firm's inability to generate novel solutions; on the other hand, however, extremely unfamiliar new external knowledge may hinder a firm's efforts to grasp the usefulness of that knowledge (Lichtenthaler, 2011). Second, external knowledge must be internalised, and this is often a time-consuming process. Extant research has highlighted the 'not-invented-here' (NIH) syndrome and lack of motivation to gain knowledge as potential barriers to external knowledge assimilation (van de Vrande et al., 2009). The NIH syndrome prompts organisation members to reject external knowledge because they assume that knowledge is inferior to internally created knowledge (Schaarschmidt & Kilian, 2014). Finally, the effective implementation of knowledge management is crucial to commercialising knowledge developed during the open innovation process. Organisations face challenges in aligning externally generated data with internal data to enhance efficiency (Dahlander, Gann & Wallin, 2021). The issues related to intellectual property rights impede knowledge exploitation (Salge et al., 2013). For example, legal issues regarding the ownership of data generated during open innovation pose another potential barrier to the utilisation of newly acquired knowledge (Dahlander, Gann & Wallin, 2021).

Apart from the knowledge management challenges, a comprehensive review of the literature reveals numerous intra-firm and inter-firm mechanisms that can impede the success of open innovation. In this regard, various intra-firm factors have been identified as potential barriers to open innovation implementation (Salge et al., 2013), including organisational and knowledge-related barriers (Tekic & Willoughby, 2020). The reasons for organisational barriers include cultural differences (van de Vrande et al., 2009) and business models (Brunswick & Chesbrough, 2018; Zhu et al., 2019). The success or failure of open innovation depends upon the ways in which resources are developed and utilised during knowledge sharing (Pullen et al., 2012). Scholars have noted that business model fit also plays a crucial role in a firm's ability to utilise externally generated knowledge effectively (Saebi & Foss, 2015). The lack of fit between external technology and a firm's business model has been identified as among the reasons for open innovation failure (Zhu et al., 2019). Underscoring this, Braun (2015) argued that clarity regarding a firm's business model and its partnering firm's business model is crucial for open innovation success.

Similarly, past studies have considered several inter-firm factors as potential barriers. For instance, Greco et al. (2019) noted that open innovation depends upon the nature of the relationship between partner firms, which can create potential barriers and lead to the failure of open innovation. In particular, external partners must be convinced to share relevant external knowledge (Salge et al., 2013). This indicates that a lack of trust represents a potential barrier to inter-firm cooperation (Hewitt-Dundas & Roper, 2018; Nahapiet & Ghoshal, 2009; Rojas et al., 2018). Furthermore, we note that cognitive, cultural and institutional differences between partner firms are potential barriers to effective collaboration between partners (van de Vrande et al., 2009; Braun, 2015). To elaborate, inter-firm cooperation is likely to fail due to a lack of 'goal complementarity', 'resource complementarity' and 'trust' between partnering firms (Pullen et al., 2012; Hewitt-Dundas & Roper, 2018). 'Goal complementarity' implies that the partnership's objectives are clearly stated to ensure the flow of information between partner firms (Pullen et al., 2012).

In sum, content analysis reveals the crucial role of knowledge management as well as intra-firm and inter-firm factors as potential barriers to open innovation success.

### **4.3. Individual-level challenges**

While the original conceptualisation of open innovation is firm-centric (Calof et al., 2018), another stream of research emphasises the need to understand the role of individuals,

such as employees (McQuilken et al., 2018), customers and users (Sthapit & Bjørk, 2020; Bogers, Afuah & Bastian, 2010; Alassaf et al., 2020).

While performing their open innovation roles, employees gain increased access to the internal knowledge required for engagement with external partners (Felin & Zenger, 2014). However, as gatekeepers in value creation opportunities, individual employees are exposed to numerous challenges because they must continuously interact with the external environment. Prior studies have highlighted this fact. For instance, Dahlander and Gann (2010) examined the cognitive limits of individual employees in understanding the usefulness of external knowledge. Individuals pursuing external knowledge beyond organisational boundaries must decide how to allocate their attention to numerous sources of external knowledge (Dahlander, O'Mahony & Gann, 2016).

The potential loss of value due to employees' misappropriation of knowledge can act as a barrier to the success of open innovation (Laursen & Salter, 2020). Furthermore, negative employee attitudes towards the usefulness of external knowledge, for example, the NIH syndrome, is another crucial barrier in this regard (Lichtenthaler, 2011).

In addition to the barriers mentioned above, existing scholarship has also acknowledged the influence of individual emotions on the success or failure of open innovation. For example, McQuilken et al. (2018) noted the crucial role of employees' emotional competencies and self-efficacy in service recovery following open innovation failure. To summarise, employees' cognition, emotions and attitudes towards open innovation may impede the development of firm-level open innovation capabilities.

The role of customers and users is another potential reason for open innovation failure (Dahlander, Gann & Wallin, 2021). We find discussions in the literature regarding the failure of co-creation involving customers (Hsu et al., 2021). As an illustration, Liu et al. (2020) clarified the inverted U-shaped relationship between users' prior experiences in idea implementation. They noted that this relationship is contingent upon the nature of feedback. In addition, customers' perceptions of resource misutilisation are a crucial driver of co-creation or co-destruction. Specifically, customers are likely to participate in co-destruction when they perceive an organisation misusing resources during the open innovation process (Hsu et al., 2021). In brief, the perceived unfairness of open innovation outcomes may result in unrest and negative word of mouth, adversely influencing open innovation outcomes (Mody et al., 2020).

A review of past findings also reveals the crucial role of customers' emotions and motivation. In this context, Drewery and McCarville (2020) uncovered the role of customer

emotion as an antecedent of co-recovery following open innovation failure. Utilising justice theory, they identified customer anger as an important factor driving customer involvement in co-recovery following open innovation failure. In a similar vein, Skourtis et al. (2019) examined the antecedents of customers' co-recovery behaviour. They asserted the mediating role of customers' motivation in the relationship between the customers' ability to co-recover and value recovery.

In sum, past studies have shown that because open innovation is a multi-level phenomenon, its success depends upon micro-level factors (Lichtenthaler, 2011). Expounding upon this thought, the literature has highlighted the role of an individual's prior experience and knowledge (Liu et al., 2020; Laursen, 2011), emotions (Drewery & McCarville, 2020), perceptions (Hsu et al., 2021) and motivation (Kourtis et al., 2018) in impacting open innovation outcomes.

#### **4.4. Types of open innovations and failure**

Scholars have discussed various factors driving open innovation failure while also focussing on different types of innovation, i.e., inbound, outbound and coupled open innovation. In the case of inbound open innovation, the associated costs are a grave concern because this type of innovation requires firms to invest in implementing a market intelligence system, which results in high search costs (Grimpe & Sofka, 2009). In addition, geographical and cultural distance as potential barriers to the source of external knowledge can also be quite high (Rosenkopf & Nerkar, 2001; West & Gallagher 2006; Calof et al., 2018). Accordingly, because interaction with external sources of knowledge is often difficult and costly, firms must invest in their absorptive capacity and enhance their readiness to access external knowledge (Cohen & Levinthal, 1990).

A review of the literature reveals different obstacles that often prevent firms from leveraging the benefits of outbound innovation. These obstacles exist due to firms' disinclination to commercialise technologies for the following reasons (Chesbrough & Rosenbloom, 2002). First, knowledge hoarding within organisations may happen because of the over-evaluation of internally generated knowledge and the perceived risk of sharing potential ideas with the outside world. Second, the overcommitment of firms to commercialise the benefits of open innovation in-house as well as potential intellectual property rights issues may prevent firms from leveraging the benefits of outbound innovation (Tekic & Willoughby, 2020). Third, firms may lack a strategy for commercialising the benefits of outbound innovation (Lichtenthaler & Ernst, 2007).

Finally, we enumerate challenges related to coupled innovation, which encompasses both inbound and outbound innovation. First, organisations may face challenges while pursuing coupled open innovation due to possible concerns related to intellectual property infringement and costs related to identifying appropriate partners for technology collaborations (Keupp & Gassmann, 2009; Marullo et al., 2020).

Second, organisations may face tension between knowledge protection and knowledge sharing due to the diversity of partners, and this tension may result in knowledge management challenges (Rouyre & Fernandez, 2019). Firms may also need to customise newly acquired knowledge and provide critical resources to partner firms (Greco et al., 2019). These partner firms, in turn, may attempt to manipulate information, which presents the risk of knowledge leakage and spillover.

Synthesising the preceding discussion, Figure 8 illustrates the potential drivers of open innovation failure.

**Insert Figure 8 here**

#### **4.5. Contingent/moderation mechanisms**

A review of the relevant literature further reveals that variance in the open innovation performance relationship is due to various contingent/moderation mechanisms. Accordingly, the extant research has theorised the crucial role of contingent/moderation mechanisms, including internal and external factors. Internal factors include knowledge-related mechanisms, such as in-house R&D capabilities (Sofka & Grimpe, 2010), search strategy (Laursen & Salter, 2006), breadth of internal knowledge (Salter et al., 2015), knowledge protection mechanisms (Zhang & Groen, 2021), strategic orientation (Cheng & Huizingh, 2014), leadership (Salge et al., 2013) and network profile (Pullen et al., 2018). These internal factors strengthen open innovation performance.

Specifically, Salge et al. (2012) theorised the moderating role of innovation management in leveraging the benefits of open innovation. In a similar vein, Zhang and Groen (2021) emphasised the crucial role of knowledge protection mechanisms to leverage the benefits of openness. Their study argued that both legal and strategic mechanisms allow firms to protect innovation from imitation. Salter et al. (2015) theorised the moderating roles of time horizon in R&D, individual-level openness and individual ties to senior managers in leveraging benefits of openness. The study posited that long-term R&D efforts allow individuals to identify, understand and exploit external sources of knowledge. Cheng and Huizingh (2014) uncovered the role of strategic orientation as a moderator of the open



innovation performance relationship. Their study noted a more substantial effect for entrepreneurial orientation compared to market orientation and resource orientation. Nonetheless, the relative lack of understanding of the contingent/moderation mechanisms impacting open innovation remains an unaddressed research gap (Dahlander, Gann & Wallin, 2021). In addition, further research is required to clarify the role of contingent/moderation mechanisms at various stages of open innovation (Bogers, Zobel et al., 2017).

## **5. Research gaps and future research avenues**

Identification of research gaps is important to motivate future research in any area. Therefore, we critically evaluated the selected studies to understand both under-explored and completely unexplored avenues, which urgently require the attention of scholars to develop the literature on open innovation failure into a more wholesome and useful accumulation of pertinent knowledge. Analysing both the research profile and themes helped us identify gaps in the literature on open innovation failure, which served as the basis for proposing future research questions that could address these visible deficiencies. Basing our efforts to identify gaps on both thematic areas and the research profile enabled us to identify limitations more comprehensively in the literature because employed individually, neither of these approaches would yield an exhaustive list.

### **5.1. Gaps and future research areas based on the research profile**

The research profile helped us uncover gaps related to methodological concerns. Here, we observed the dominance of both quantitative and quantitative approaches in analysing specific issues of open innovation failure (Lichtenthaler, 2011); meanwhile, surprisingly few studies have adopted the mixed-method approach. Further, the prevailing qualitative and quantitative approaches lack variety and imagination. Qualitative studies were largely based on case studies answering why and how questions related to open innovation failure (West et al., 2014), whereas most quantitative studies were based on data collected from a single source. The focus on cross-sectional studies is particularly concerning because the use of single sources and instruments may result in common method bias. Furthermore, cross-sectional data cannot be used to establish causality.

At the same time, longitudinal quantitative studies examining open innovation failure are relatively sparse (e.g. Laursen & Salter, 2006). Thus, future researchers should utilise this approach to generate more generalisable and robust findings. Finally, we observed a

comparative lack of research employing a multi-level approach to empirically examine the genesis and consequences of open innovation failure (West et al., 2014); this, too, presents a potentially fertile area for future research.

## **5.2. Gaps and future research areas based on identified themes**

As discussed in the preceding parts, we identified five common themes in the extant literature: cost of openness, firm-level challenges while deploying open innovation, individual-level challenges, types of open innovation and failure and contingent/moderation mechanisms. While these themes present useful insights, a closer look reveals deficiencies that must be acknowledged and addressed. Accordingly, we systematically identify gaps in each thematic area and suggest potential questions that future researchers can address to better illuminate various aspects of open innovation failure, as presented in Table 1.

**Insert Table 1 here**

## **6. Conceptual framework**

Content analysis of selected studies in our SLR helped us identify the dominant themes and research gaps that call for further research. Accordingly, building upon our insights obtained from the thematic analysis, we propose a framework comprising the antecedents, moderators, and outcomes of open innovation. Specifically, our objective is to provide a conceptual framework elucidating the crucial role of individual-level and firm-level factors that affect open innovation failure. The proposed framework, which is presented in Figure 9, provides a comprehensive overview of both the drivers and the contingent/moderation mechanisms involved in open innovation failure.

**Insert Figure 9 here**

Our framework presents two broad antecedents of open innovation failure: firm- and individual-level factors. The former is captured through inter-firm and intra-firm factors. These factors are identified on the basis of their ability to influence open innovation outcomes. Our framework includes several firm-level factors as key antecedents of open innovation failure based on the prior literature. In this regard, we draw upon the extant findings (e.g. Tekic & Willoughby, 2020; Salge et al., 2013; Lichtenthaler, 2011) to underscore the importance of both inter- and intra-firm factors. The inter-firm factors include cognitive and cultural challenges, trust issues, goal complementarity and appropriation while the intra-firm factors include the level of openness, knowledge management processes, governance, leadership, lack of resources and

capabilities and business model fit. Regarding the inter-firm factors, we recommend a deeper investigation of the ways in which competitive relationships can impinge upon the success/failure of the open innovation process. In the case of intra-firm factors, we posit that it is critical to understand how firms leverage individual knowledge by examining the ways in which organisational strategies shape individual-level openness and the potential pitfalls of data breaches and privacy issues (Dahlander, Gann & Wallin, 2021). Another area that can be examined to understand open innovation failure encompasses the efforts of organisations to handle voluminous user-generated data by employing digital technologies and aligning business models.

Similarly, past studies have established that the success or failure of open innovation depends upon individual-level factors (e.g. McQuilken et al., 2018; Sthapit & Bjørk, 2020; Bogers, Afuah & Bastian, 2010; Alassaf et al., 2020). Although the extant research has acknowledged both customers and employees among those who can influence open innovation outcomes, scholars have emphasised the key role of employees, especially those in knowledge search roles, in driving the open innovation process and its consequences. Nevertheless, the influence of individual personality, traits, emotions, experiences and competencies on open innovation success or failure is not well understood (Dahlander, O'Mahony & Gann, 2016). Moreover, it is unclear how variance in individual-level openness influences open innovation outcomes (Salter et al., 2015). Therefore, we argue that the inclusion of individual-level factors, theorised in our conceptual framework to include emotions, motivations, competencies and prior experience, can serve to better illuminate open innovation failure. Succinctly, we reinforce the fact that open innovation success or failure depends upon individual-level factors and factors internal and external to the firm, and we call for a deeper investigation of each.

In addition to clarity related to antecedents, we also highlight the need to enrich the literature on open innovation failure by examining the role of contingent/moderating variables that influence open innovation outcomes by affecting its various stages. Our call in this regard echoes those of recent studies (Dahlander, Gann & Wallin, 2021; Bogers, Zobel et al., 2017). The thematic analysis reported in the preceding parts suggests the importance of utilising individual and demographic variables, such as individual age, gender and education; firm age, size, industry and level of technology applied; and other moderating variables in future studies to better explain the hypothesised associations. Past studies (e.g. Zhang & Groen, 2021; Pullen et al., 2018) have discussed some internal and external mechanisms in this regard. Acknowledging these contributions, we include both internal and external factors from an organisational standpoint as moderators to make our framework more versatile and useful.

Specifically, we propose environmental and institutional factors as external factors that can influence the strength of the associations between the proposed antecedents and open innovation failure. For instance, the crisis created by the COVID-19 pandemic has injected uncertainty into the external environment, impelling firms to take additional steps to manage these external uncertainties (Bertello et al., 2021). Next, we propose founder characteristics as well as firms' exposure to R&D, strategic orientation, culture and absorptive capacity as internal factors that can play a moderating role in this context. Moreover, we suggest that the effect of contingent/moderating variables should be examined at various stages of the open innovation process.

Finally, to provide a complete picture of the process, we also include the consequences of open innovation failure. In this regard, we theorise the impact of open innovation failure on firm- and individual-level outcomes to encourage future research that highlights the extent to which failures can erode outcomes at these levels. The firm-level consequences our framework proposes investigating include financial performance, new product development and service recovery while the individual-level consequences include implementation of individual ideas and customer loyalty.

## **7. Discussion and Conclusion**

Research on open innovation failure has gained increasing attention among scholars (Dahlander & Gann, 2010). Open innovation is complex and usually encounters failure due to intra-organisational, inter-organisational and individual-level issues. Although the extant research has debated the potential downsides of open innovation, research gaps remain in the literature's comprehensive view of open innovation failure. We attempted to address this gap by systematically reviewing relevant past research on open innovation failure. Succinctly, we contribute to advancing research in the area by presenting the knowledge structure of the prior literature on open innovation failure. We began by specifying three research questions to be addressed through a well-planned SLR. We applied a robust search protocol, including stringent exclusion and inclusion criteria, to select 76 relevant studies from two key databases: *Scopus* and the *Web of Science (WoS)*. To ensure that we included all relevant studies, we also performed a forward and backward citation chaining search to identify any relevant studies that were not listed in the selected databases or that were excluded in the first phase. Thereafter, to address **RQ1**, we prepared a research profile of short-listed studies in terms of the annual scientific production of research articles, publication sources, data collection approaches and theoretical underpinnings. The profile

thus generated revealed year-wise publication trends and key journals. From a methodological perspective, research profiling revealed a bias in the literature, with an overwhelmingly large number of cross-sectional survey-based studies. Similarly, we observed a limited use of theory in the extant literature, with our analysis revealing that only 25% of selected studies explicitly employed a particular theory. These results served as the basis for the identification of methodological and theoretical gaps.

We performed content analysis to respond to **RQ2**, which queried emergent thematic research areas on open innovation failures. As a result, we delineated five themes: cost of openness, firm-level challenges while deploying open innovation, individual-level challenges, types of innovations and failure and contingent/moderation mechanisms. Finally, we addressed **RQ3** by identifying research gaps to pinpoint potential research questions for future work on open innovation failure. Some of the gaps identified through our analysis are as follows. (a) Despite its call for a better understanding of the theoretical implications of open innovation, the open innovation literature is characterised by a lack of theory building. Indeed, much prior work has been practice oriented. (b) A comparative dearth of research examines the competitive advantage associated with various types of open innovation, i.e., inbound, outbound and coupled innovation. (c) There is a need for a broader understanding of the costs and benefits of openness. (d) Research in the area requires a methodological deepening in terms of design, scope, context and geographical coverage.

Our study also offers interesting implications for theory and practice, as summarised below.

### **7.1. Theoretical implications**

Our study proffers five theoretical implications. First, we attempt to provide a comprehensive summary of the literature theorising open innovation failure. In doing so, we extend the existing research into how and why firms derive value from open innovation. The existing literature has related open innovation challenges to a wide variety of perspectives, such as knowledge sourcing (Laursen & Salter, 2006), crowdsourcing (Kohler & Nickel, 2017) and inter-firm partnerships (Battistella et al., 2017), while accounting for the roles of individuals (Salter et al., 2015), such as customers (Sthapit & Bjørk, 2020), employees (McQuilken et al., 2020) and suppliers (Salge, Farchi et al., 2013). Accordingly, open innovation research is at risk of becoming quite incoherent and disconnected. To counter this potential risk, we consolidate the relevant literature to encourage a more systematic approach in the future. We also provide a conceptual framework explaining the relationships between

factors at various levels based on our thematic analysis, which reveals the multi-level (e.g. individual, intra-firm, and inter-organisational level [Lichtenthaler, 2011]) nature of open innovation research (Bogers, Zobel et al., 2017).

Second, our literature review provides evidence of an ambiguous relationship between the firm's degree of openness and open innovation performance. Specifically, the thematic analysis revealed that mere access to external knowledge is insufficient to leverage the benefits of open innovation (Greco et al., 2019). In fact, external knowledge sourcing is possible only by managing monetary and non-monetary costs (Salge, Farchi et al., 2013), and the cost of open innovation may exceed the benefits of open innovation beyond a certain point (Salge, Farchi et al., 2013). Therefore, organisations must design knowledge management strategies at various stages of open innovation. Further, we observe that to date, most of the open innovation research has focussed on firm-level factors/issues, with relatively sparse research related to factors at the individual project and team level (Dahlander, Gann & Wallin, 2021). Potential differences might also appear in open innovation outcomes at different levels due to differences in the degree of openness. It is important to understand the influence of interactions at various levels on open innovation's success or failure. Our observation that open innovation research spans multiple levels and our call for studies investigating it at different levels are consistent with the prior literature (e.g. Bogers, Zobel et al., 2017).

Third, our content analysis revealed that open innovation has been phenomenon-driven and thus lacks the appropriate theoretical underpinnings. Accordingly, we note that it is essential to advance theoretical development in the area to generate more rigorous findings related to open innovation failure. For example, future research can focus on theories that provide a suitable framework for measuring various aspects of the crucial role of individuals in open innovation. As an illustration, employees' vulnerability to the NIH syndrome is a crucial barrier to developing firm-level absorptive capacity (Lichtenthaler, 2011), which requires further theorising.

Fourth, from a methodological perspective, we highlight the need for more rigorous research designs, such as longitudinal research to critically examine the effects of open innovation on firm's performance, especially in cases of radical and incremental innovation. At the same time, we underscore the need to broaden the scope of research in the area to encompass varied contexts, such as start-ups (Hutter et al., 2021), small businesses (Marullo et al., 2020) and diverse geographical settings. Currently, the literature lacks studies analysing open innovation failure across cultures (Greco et al., 2019).

Finally, our findings strengthen the emerging perspective regarding the potential effect of contingencies (Salge, Bonhé et al., 2012) or moderating variables on the association of the conceptualised individual or firm-level antecedents on open innovation failure. In this regard, we contend that organisations must recognise that the effective leveraging of open innovation outcomes is context-specific and depends on organisational, managerial and environmental contingencies (Salge, Farchi et al., 2013). For example, excessive investment in external searches may limit the potential benefits of open innovation (Katila & Ahuja, 2002). Moreover, the effective implementation of open innovation is also contingent upon the nature of internal knowledge (Marullo et al., 2020). Thus, an increased understanding of the potential role of contingencies is a viable area of future research.

## **7.2. Practical implications**

The six managerial implications of our findings are as follows. First, we highlight the fact that mere access to external knowledge provides firms with no benefits unless they can identify relevant knowledge and commercialise it. The commercialisation of external knowledge requires that firms invest in absorptive capacity and exhibit a willingness to utilise external knowledge. Further, as suggested by existing scholarship (e.g. Greco et al., 2019), we recommend that managers encourage cooperation between partner firms to negate opportunistic behaviour and the potential loss of intellectual property rights. At the same time, we observe a need for firms to examine the complementarity of partners while scouting and selecting them. This recommendation aligns with prior findings, which have shown that improper mapping of potential partners and goal incongruence are crucial barriers to open innovation (Barham et al., 2020). Furthermore, as scholars (e.g. Eftekhari & Bogers, 2015) have noted, managers must manage tensions between knowledge sharing and knowledge protection while leveraging open innovation. In sum, managers would be ill-advised to assume that the performance effect of investment in open innovation is universal across all contexts.

Second, we summarise past studies to suggest that effectively leveraging the benefits of open innovation requires firms to develop a corporate culture that facilitates openness, external knowledge sourcing and knowledge exchange (Alassaf et al., 2020). An open corporate culture is essential to recognise the value of external innovations and to overcome the NIH syndrome (Chesbrough, 2003). An open environment enables firms to enhance networking skills and learn about the external environment (Eftekhari & Bogers, 2015). It also allows employees to gain external knowledge and contribute to organisational goals.

Third, firms must maximise the return on open innovation investments by creating new knowledge, collaborating with stakeholders and leveraging the benefits of open innovation. At the same time, firms must pay adequate attention to the fit between the proposed open innovation process and the firm's own business model; indeed, it is unrealistic to efficiently leverage the benefits of open innovation if the innovation process is not aligned with the firm's business model (Lichtenthaler, 2011). Fourth, because the success of the open innovation process depends, to a large extent, on users, customers and employees (Eftekhari & Bogers, 2015), managers must engage well with these individuals and proactively address any issues that may arise. For instance, while customer- and user-based collaboration helps firms to develop innovative products, managers must have a well-defined plan to handle the intellectual property issues that may arise when accepting external knowledge from a wide community of unknown contributors, such as customers. Similarly, because employee perception of top management support is a crucial determinant of open innovation success (Barham et al., 2020), we suggest that top management plan specific training programmes to prepare employees for handling openness, assimilating external knowledge, carefully managing internal knowledge and responding positively to the requirements of the open innovation process.

Fifth, the findings of our review offer crucial insights for management education, especially for courses such as technology and innovation management. To better prepare them for careers in the industry, students must be sensitised to the notion that innovation is an inter-organisational phenomenon and that an exclusive focus on innovation as the product of internal R&D is insufficient, particularly because open innovation allows organisations to negate the potential ill-effects of inadequate internal technological development. Students must also become aware of the cross-functional nature of open innovation. Further, a complete understanding of open innovation can prepare students to better handle work demands—for example, by reducing the tendency to exhibit the NIH syndrome, which can be counter-productive both for them and for their organisations. Furthermore, the inclusion of open innovation in curricula can foster an entrepreneurial spirit and encourage students to practice it in technology organisations, small businesses, family businesses and start-ups.

Finally, government policymakers must work to stimulate open innovation at the ecosystem level and thereby protect businesses from various environmental uncertainties. For example, the crisis created by the COVID-19 pandemic entails uncertainty in the external environment, which has left many businesses vulnerable. We recommend that organisations,



academicians, industries and governments work collaboratively to pursue open innovation as a way to develop resilience and sustain competitiveness even during crises.

### **7.3. Limitations and future work**

We aimed to provide a systematic review of open innovation failure and identify research gaps and future research directions. Nevertheless, our study has certain limitations. First, the keywords that we utilised for the literature search may not be exhaustive. Therefore, we could have missed some relevant studies on open innovation failure. However, the possibility of such exclusions is quite low because we employed keywords to search the literature in a three-stage search process. Still, we suggest that future researchers endeavour to include additional keywords. Second, we included only peer-reviewed research published in the English language and thus excluded book chapters, dissertations, theses, conference proceedings and studies published in other languages from our sample. Hence, our review may have omitted some relevant studies. Future researchers may include other publication sources and studies published in other languages to capture open innovation failure. Third, although *Scopus* and *WoS* are comprehensive databases that include relevant literature on open innovation failure, we also may have overlooked some relevant studies by limiting our search to only these two databases. Furthermore, we manually screened the selected studies, which means that our efforts were subject to human error. To negate this potential error, we repeated the process after a gap of 15 days to validate the consistency of the selection process. Future researchers should likewise adopt a robust screening process to tackle human errors in the screening process. Finally, another potential research area is the employment of alternate review techniques, such as bibliometric analysis and citation content analysis, to gain a fine-grained understanding of open innovation failure.

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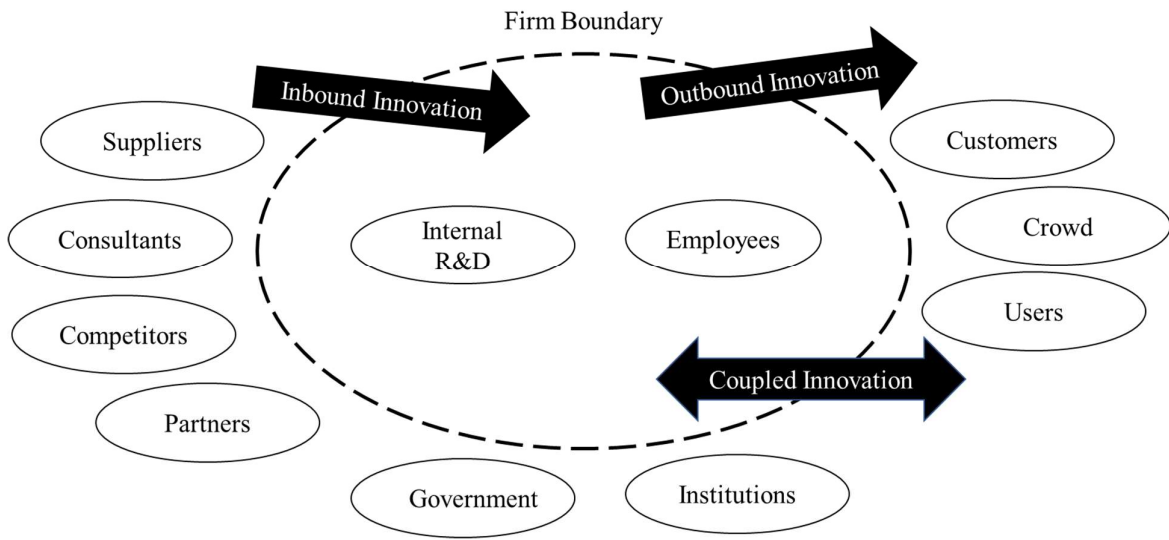
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**Figure 1. The conceptualisation of open innovation**

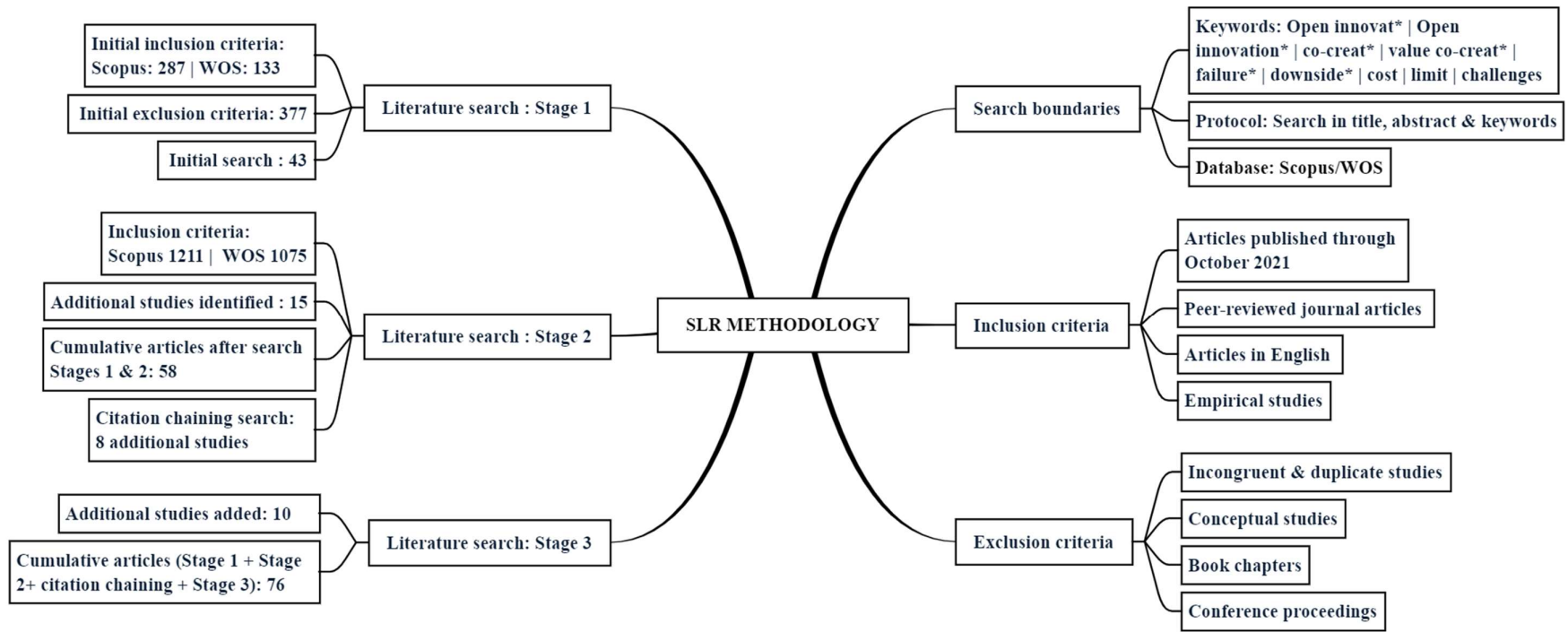
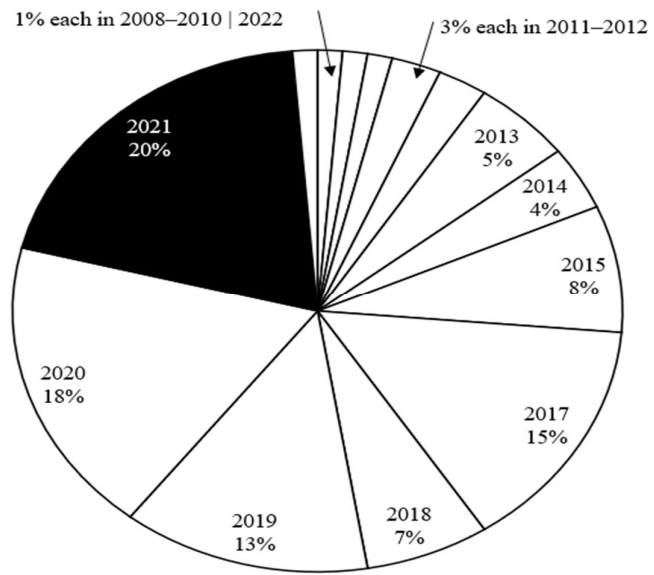
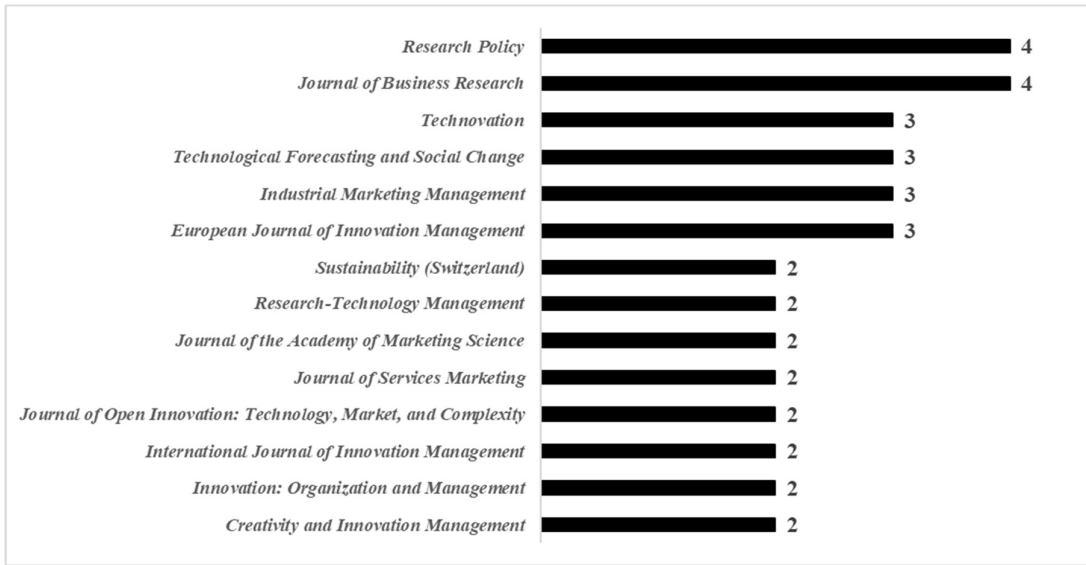


Figure 2. Research methodology

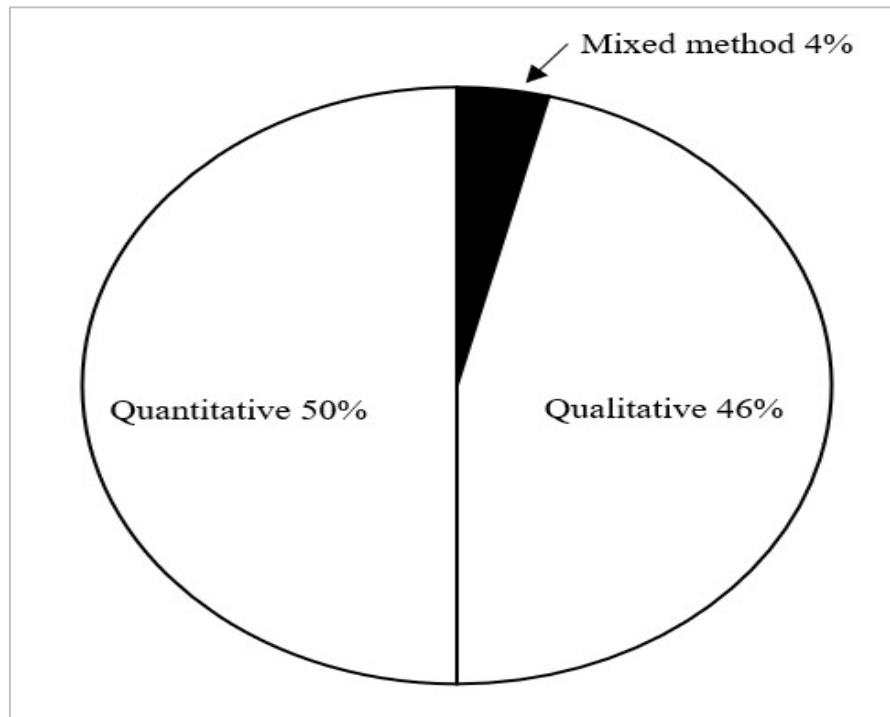




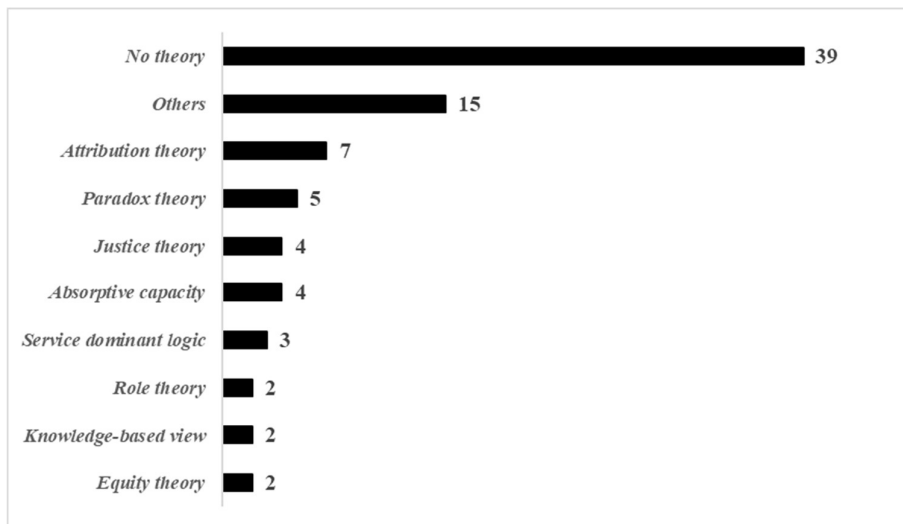
**Figure 3. Annual scientific production of research articles**



**Figure 4: Key publication sources**

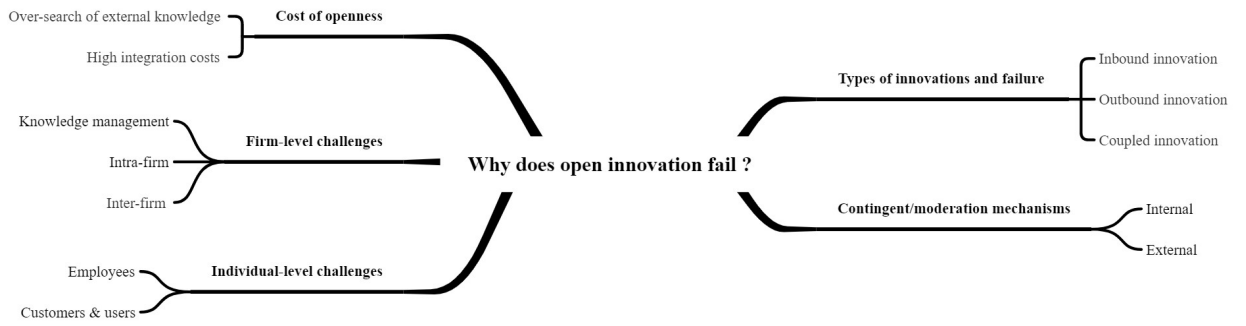


**Figure 5. Data collection approaches**

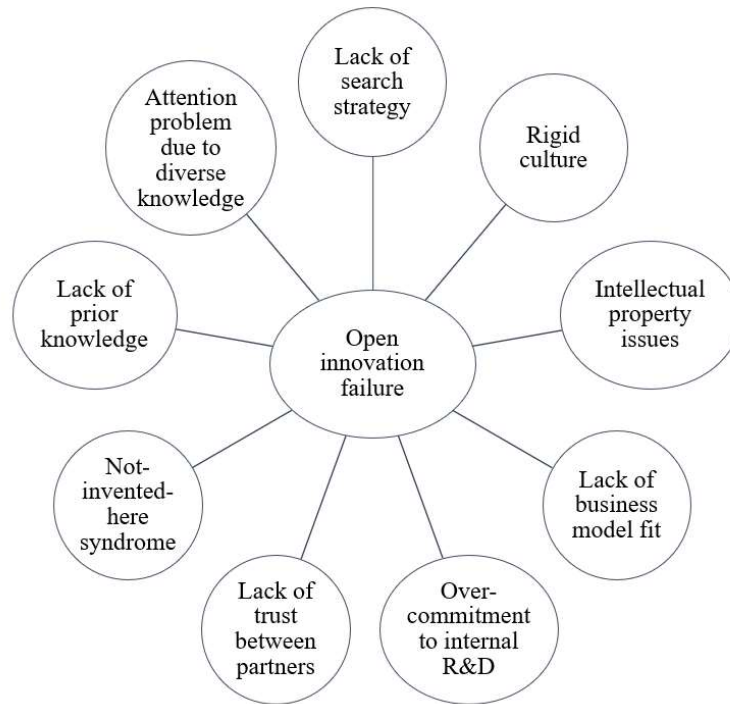


Note: The category 'Others' represents theories that have been used by only one study. These include the bargaining power lens, co-creation theory, conservation of resources theory, dynamic capabilities theory, expectancy theory, fairness theory, network theory, pecking order theory, psychological coping theory, resource-based view, self-determination theory, social network theory, social power theory, theory of the firm & two-sided market theory.

**Figure 6. Theoretical underpinnings**



**Figure 7. Thematic foci of research on open innovation failure**



**Figure 8. Open innovation failure**

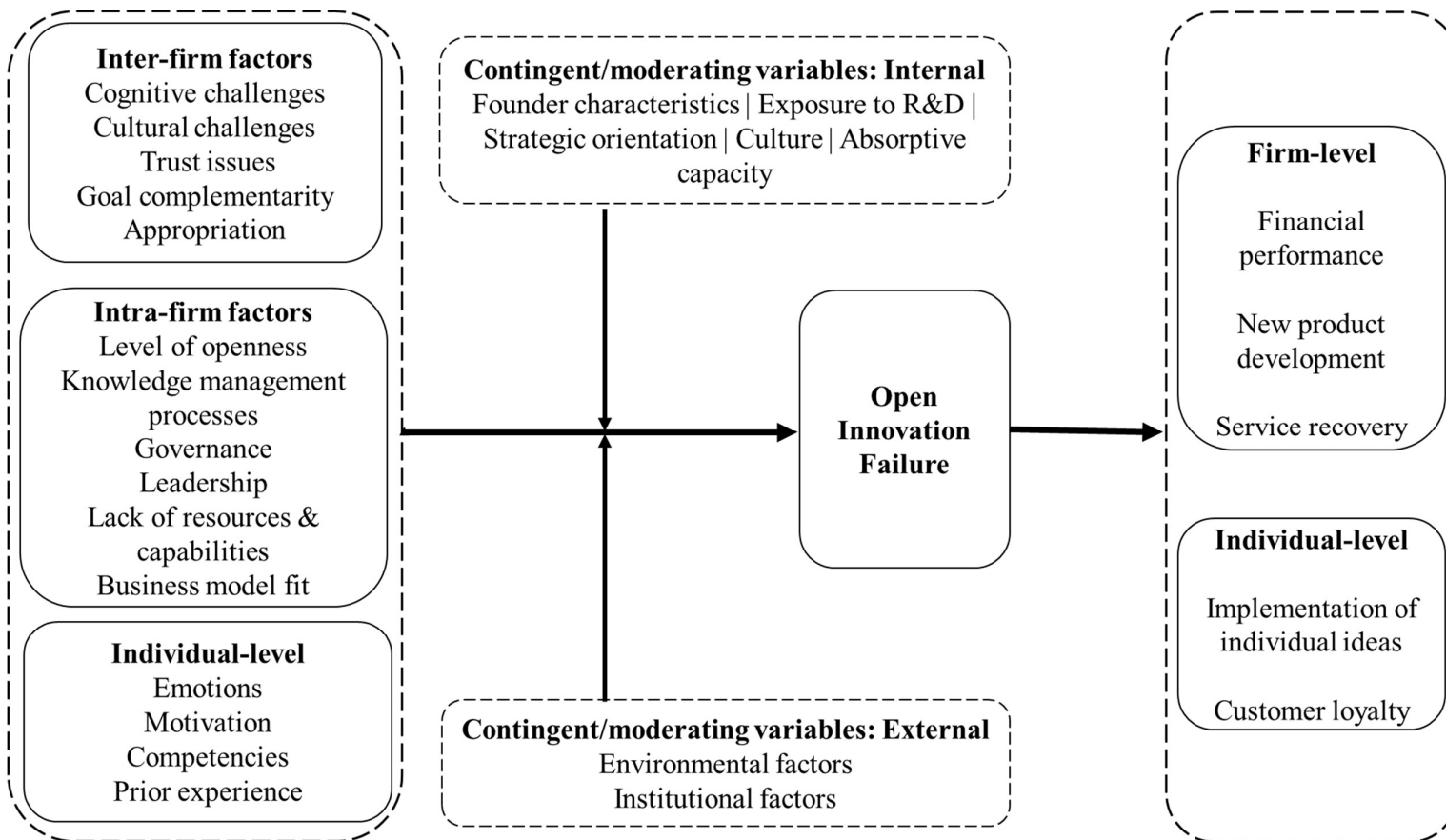


Figure 9. Conceptual framework

**Table 1. Gaps and future research areas**

Theme	Sub-theme	Gaps	Research questions
<b>Cost of openness</b>	Cost of openness	<ul style="list-style-type: none"> <li>• Limited understanding of the cost of openness and conditions under which openness is beneficial and problematic.</li> <li>• Persistent ambiguity in explaining the relationship between openness and performance.</li> <li>• Lack of research clarifying the effect of openness over a period of time.</li> </ul>	<p><b>RQ1.1</b> What potential challenges in the pursuit of openness cause some firms to lose while others gain?</p> <p><b>RQ1.2</b> How do search breadth and depth influence open innovation? How can firms manage openness efficaciously over time?</p>
<b>Firm-level challenges</b>	Knowledge management	<ul style="list-style-type: none"> <li>• Limited clarity about the role of pecuniary and non-pecuniary mechanisms in the effective management of external knowledge.</li> <li>• Limited insights on the management of paradoxes in knowledge management processes.</li> </ul>	<p><b>RQ2.1</b> To what extent do knowledge management processes as antecedents affect the success or failure of inbound, outbound and coupled innovation? How does an organisation manage multiple sources of knowledge while acquiring external knowledge?</p> <p><b>RQ2.2</b> How can firms deploy monetary and non-monetary mechanisms effectively to filter and leverage the knowledge acquired in the open innovation process?</p> <p><b>RQ2.3</b> What are the potential pitfalls of the excessive protection of knowledge within firms pursuing open innovation? How can organisations better manage the tensions of internal knowledge protection while commercialising internal information?</p>
	Intra-firm	<ul style="list-style-type: none"> <li>• Limited research on the role of business models in effectively deploying open innovation.</li> <li>• Limited understanding of ethical dilemmas in open innovation implementation.</li> <li>• Nascent research on the linkage between organisational culture and open innovation.</li> </ul>	<p><b>RQ2.4</b> What are the firm-related barriers to sourcing, enabling, incentivising and contracting external information?</p> <p><b>RQ2.5</b> Why is it challenging to implement radical innovation in the open innovation context? What form of organisation is best suited to enable radical innovation?</p> <p><b>RQ2.6</b> Do dimensions of organisational social capital influence open innovation?</p>

		<ul style="list-style-type: none"> <li>Deficient findings related to the role of governance in the effective utilisation of knowledge within the firm.</li> <li>Lack of understanding of governance mechanisms to manage openness effectively.</li> </ul>	<p><b>RQ2.7</b> How do relationships with collaborators influence open innovation outcomes for a firm?</p> <p><b>RQ2.8</b> What role do founders play as the facilitator of open innovation success?</p> <p><b>RQ2.9</b> How do strategic choices related to staffing influence open innovation outcomes?</p> <p><b>RQ2.10</b> Why is synergy between open innovation and the business model crucial?</p> <p><b>RQ2.11</b> How do business models constrain or enable a firm to leverage the benefits of open innovation?</p> <p><b>RQ2.12</b> What challenges involving the acquisition and application of data are associated with data-driven business models?</p> <p><b>RQ2.13</b> How do organisations manage ethical dilemmas related to the ownership and usage of customer-generated data that becomes available while implementing open innovation?</p> <p><b>RQ2.14</b> How do formal and informal coordinating mechanisms influence open innovation outcomes?</p> <p><b>RQ2.15</b> How does the strategic orientation of the firm affect open innovation success or failure?</p> <p><b>RQ2.16</b> What role do firms' internal and external networks play in shaping individual openness?</p> <p><b>RQ2.17</b> How does the lack or abundance of firm resources influence open innovation outcomes?</p>
	Inter-firm	<ul style="list-style-type: none"> <li>Limited research on the impact of the asymmetric relationship between collaborating partners in open innovation failure.</li> <li>Need for additional insights on the micro foundation of knowledge sharing and integration mechanisms.</li> </ul>	<p><b>RQ2.18</b> What are the potential barriers to outbound and inbound innovation for different organisational forms?</p> <p><b>RQ2.19.</b> What role does absorptive capacity play as a determinant of open innovation success?</p> <p><b>RQ2.20</b> How does the level of trust influence open innovation success or failure?</p>
<b>Individual-level challenges</b>	Customers and users Employees	<ul style="list-style-type: none"> <li>Limited research on circumstances that induce customers to co-create or co-destruct value.</li> </ul>	<p><b>RQ3.1</b> How can firms facilitate customers' engagement and active participation in co-creation activities?</p>



		<ul style="list-style-type: none"> <li>• Limited understanding of the consequences of co-destruction.</li> <li>• Limited research on drivers of co-recovery following co-creation failure.</li> <li>• Limited findings related to the influence of customer complaints on service recovery after an episode of failure.</li> </ul>	<p><b>RQ3.2</b> To what extent do the nature and duration of the relationship between a firm and customers influence co-creation?</p> <p><b>RQ3.3</b> How does misalignment between customers and the organisation's value proposition influence open innovation outcomes?</p> <p><b>RQ3.4</b> How does co-creation failure influence customers' evaluations of an organisation in terms of ethics and fairness?</p> <p><b>RQ3.5</b> How does perceived resource misuse influence co-destruction in varied self-service contexts?</p> <p><b>RQ3.6</b> How does customer trust in the brand influence service recovery?</p> <p><b>RQ3.7</b> What are the intervening mechanisms in the relationship between customers' ability to co-create and customers' perceived value?</p> <p><b>RQ3.8</b> How do customers' emotions following the failure of co-creation efforts influence subsequent co-recovery?</p> <p><b>RQ3.9</b> Does prior customer experience in idea generation influence open innovation outcomes?</p> <p><b>RQ3.10</b> How do customers' emotions following the failure of co-creation efforts influence subsequent co-recovery?</p> <p><b>RQ3.11</b> How do employees influence open innovation outcomes?</p>
<p><b>Types of open innovation and failure</b></p>	<p>Inbound open innovation</p> <p>Outbound open innovation</p> <p>Coupled open innovation</p>	<ul style="list-style-type: none"> <li>• Limited research on the association of trust between partners and open innovation failure/success.</li> <li>• Need for additional research into the effect of goal complementarity between partner firms.</li> <li>• Continued ambiguity about financial outcomes of outbound and inbound innovation.</li> </ul>	<p><b>RQ4.1</b> How does distance between partner firms impact the choice and outcome of various types of open innovation?</p> <p><b>RQ4.2</b> How do the breadth and depth of relationships with partner firms influence the success or failure of the open innovation process?</p> <p><b>RQ4.3</b> How does the fit between a firm's open innovation strategy and external environment influence open innovation success or failure?</p>

<b>Contingent/moderation mechanisms</b>	External mechanisms  Internal mechanisms	<ul style="list-style-type: none"> <li>Limited research in open innovation failure literature on contingent/moderation mechanisms related to environmental, institutional and cultural factors.</li> </ul>	<p><b>RQ5.1</b> How does crisis shape and reshape collaboration between organisations?</p> <p><b>RQ5.2</b> How do different stages of the technology and product life cycle influence open innovation success and failure?</p> <p><b>RQ5.3</b> How do search breadth and search depth influence performance outcomes under different environmental contexts?</p> <p><b>RQ5.4</b> How does culture influence the effect of openness on performance outcomes?</p>
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