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REVIEW PAPER

Innovation and firm survival: a systematic literature review and future research directions

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Abstract

This study systematically reviews the literature on the impact of innovation on firm survival, aiming to synthesize existing knowledge and identify future research directions. We assess 73 articles published between 1990 and 2022 using the TCCM framework to evaluate theory, context, characteristics, and methodology. Our findings reveal that the field is predominantly grounded in economics-oriented theories (e.g., RBV, evolutionary theory), and focuses on product innovation in manufacturing industries from developed economies. Moreover, research in this area heavily relies on public records data and econometric models to track firm survival. These contextual, conceptual, and methodological limitations highlight the need for multiple dynamic theoretical perspectives, greater exploration of emerging economies, healthcare industry, patient innovation, further clarification of innovation-firm survival relationships and constructs, and consideration of more flexible and non-economic indicators of firm survival. Finally, we offer methodological recommendations to improve data validity, incorporate time-varying covariates, and apply advanced methods such as fsQCA in future research.

Keywords Innovation · Firm survival · Systematic literature review · TCCM

JEL classification O32

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1 Introduction

Over the last three decades, we have witnessed a substantial increase in the number of studies addressing the impact of innovation on firm performance in general (Rosenbusch et al. 2011) and firm survival in particular (Ugur and Vivarelli 2021). Nevertheless,existing studies on the link between innovation and firm survival remain fragmented, offering positive (e.g., Sharif and Huang 2012; Wojan et al. 2018), non-significant (e.g., Colombelli et al. 2016; Børing 2015), non-linear (e.g., Ugur et al. 2016), or even negative associations (e.g., Hyytinen et al. 2015; Garcia Martinez et al. 2019). This disjointed picture may be due to the multi-perspective nature of this relationship stemming from the various dimensions of innovation (Crossan and Apaydin 2010; Gopalakrishnan and Damanpour 1997) and different conceptualizations of firm survival (Cefis et al. 2021; Josefy et al. 2017). Furthermore, domain or disciplinary differences (e.g., economics, strategic management, innovation and technology management, international business) in theorizing and approaching innovation and firm survival links pose challenges to a more holistic understanding of the discipline-isolated research findings (Damanpour 2020).

While firm survival and firm performance are closely related, they are distinct concepts in their own right ((Josefy et al. 2017). This intertwined nature, however, results in the centrality and popularity of the literature on innovation-performance relations, overshadowing firm survival and its association with innovation across various fields. This is evident in the ever-increasing number of systematic review studies on innovation and firm performance relationships published in leading business and management journals (e.g., Song et al. 2008; Rosenbusch et al. 2011; Rubera and Kirca 2012; Rousseau et al. 2016), while there are few structured reviews tapping on innovation and firm survival prospects. There can also be potential differences in the determinants of firm survival and performance (Pajunen and Järvinen 2018). From this perspective, it is important to understand whether innovation activities at the firm level, as a driver of firm performance, can enable firms to stay alive. Therefore, firm survival and its relationship to innovation must be tackled separately. Several prior studies have attempted to compile and document the accumulated body of knowledge on the topic. Despite providing useful insights, these studies have alimited focus. For instance, the earliest review by Dalglish and Newton (2002), as they claimed, concentrated on a narrow subsection of the topic to look at the empirical studies that examine innovation and firm survival links. As for Ugur and Vivarelli's (2021) work, it is the most comprehensive one that systematically reviewed at least 32 articles mainly in the field of economics, focusing on the sources of heterogeneity and providing implications for future research; however, it draws mainly on a range of theories from the field of economics, such as evolutionary economics (Nelson and Winter 1982), passive and active learning model (Jovanovic 1982; Ericson and Pakes 1995), and the Schumpeterian concepts of competition, innovation, and creative destruction to explain the focal relationship. Nonetheless, neither of the previous efforts accounts for the empirical assessment in terms of a conceptual approach to innovation and firm survival. Therefore, a systematic literature review that touches upon the firm-level constructs and conceptualizations of innovation and firm survival is still needed to contribute to the innovation management literature.

As a response to this gap, by using the TCCM framework (Theory-Context-Characteristics-Methodology) (Paul and Rosado-Serrano 2019), this study provides a systematic review of scientific articles on the impact of innovation on firm survival between 1990 and 2022. Accordingly, our research objectives are as follows: 1) to deal with the theoretical underpinnings and conceptual approaches adopted in the literature; 2) to investigate the contexts in which this extant relationship occurred; 3) to understand the methodological approaches of these studies; and 4) to identify research gaps and chart out future research directions. This study contributes to business and management research in several ways. First, although this review draws primarily from microeconomics, it focuses on management and strategy, where systematic discussions on this topic are scarce. Second, this review offers an up-to-date, holistic review of the theoretical and empirical research foundations related to the link between innovation and firm survival. Third, building on insights from the systematic review, we outline a comprehensive future research agenda. The review reveals that economic-oriented theories (e.g., RBV, active learning theory) dominate the field and primarily serve as a background. Future studies should adopt dynamic and multiple theoretical perspectives, such as configurational theory, to account for the complex causal configuration of diverse internal and external conditions and innovation activities,leading to firm survival. Most empirical studies focus on manufacturing industries in developed economies and examine the impact of innovation—defined in various ways (e.g., resources, capability, behavior, ability, technology adoption, or tendency)—on firm survival, often framed as the inverse of firm failure. Thus, more research is needed on emerging economies, the healthcare industry (particularly patient innovation), non-technological innovation, and non-economic indicators of firm survival, such as moral failure. Additionally, greater conceptual clarity is required for both innovation and firm survival. Finally, we offer methodological suggestions to enhance data validity, incorporate time-variant innovation variables, include frailty and sensitivity analysis in model specifications, and use advanced techniques in future research. Accordingly, the following research questions were developed as a guide.

RQ1 Which theories, contexts, constructs, and methodologies are incorporated into the literature of innovation and firm survival?

RQ2 What are the probable future research directions for innovation and firm survival?

2 Research methodology

This study adopted a systematic literature review to provide a state-of-the-art understanding of the extant topic by critically examining the related literature in a transparent, rigorous, and replicable manner (Tranfield et al. 2003). Following the research objectives, we applied the TCCM (Theory-Context-Characteristics-Methodology) framework to identify knowledge gaps and suggest novel future research directions

concerning theory, context, characteristics, and methods (Paul and Rosado-Serrano 2019).

2.1 Search strategy

To identify eligible studies, we adopted the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) (Moher 2009; Snyder 2019). In the *identification* stage, we conducted an extensive keyword search for 'innovation' OR 'innovative*' AND 'survival' including titles, abstracts, and keywords in the Web of Science and Scopus databases. Several inclusion and exclusion criteria were applied in this study. First, we set the time frame from 1990 to 2022, as this period marks the beginning of an upward trend in academic research on innovation (Damanpour 1991). Second, we limited the subjects to Management, Business, Economics and Econometrics, and Social Science to allow for disciplinary diversity in the included studies. Third, we restricted the document types to 'articles' to ensure peer-reviewed studies and limited the document language to 'English',as it was the working language of the review. The initial search yielded 3592 articles. After removing duplicates, 2892 articles remained.

During the *screening* phase, the identified articles were subjected to title and abstract reading and the introduction was examined when necessary. We included only those articles that focused on the impact of innovation on firm survival, excluding studies on the drivers or antecedents of innovation and the survival of innovation in a general sense. We obtained 93 articles for full-text review.

In the final *eligibility* check, we tightened the inclusion criteria and set conceptual and empirical boundaries for the remaining 93 studies. We focused exclusively on firm-level innovation, innovation-generating and innovation-adopting firms (Damanpour 2020), excluding studies on the impact of regional or industry-level innovation on firm survival. Furthermore, we required the articles to be empirical, so that each study reported clear constructs and measurements, excluding conceptual papers, case studies, and qualitative reviews. Additionally, articles published in academic journals that were not listed in the ABS Academic Journal Guide were excluded. The search process yielded 66 articles, in addition to retracted and inaccessible articles. We then manually searched the reference sections of these articles, which led to 7 additional studies. All in all, 73 articles were selected for a detailed review. All 73 articles included in the review are marked with an asterisk in reference. The selection steps (PRISMA framework) for the review are shown in Fig. 1.

We conducted a content analysis of the selected studies using a pre-developed coding protocol (Lipsey and Wilson 2001). To ensure coding reliability, two authors coded each study manually, focusing on theoretical underpinnings, contexts (including country of origin, industry, and firm stage of development), conceptual approaches to innovation and firm survival, moderators and mediators in the relationship, and methodological issues (including sample size, data collection method, time emphasis, and analytical approach). Intercoder reliability ranged from 90% −95%.

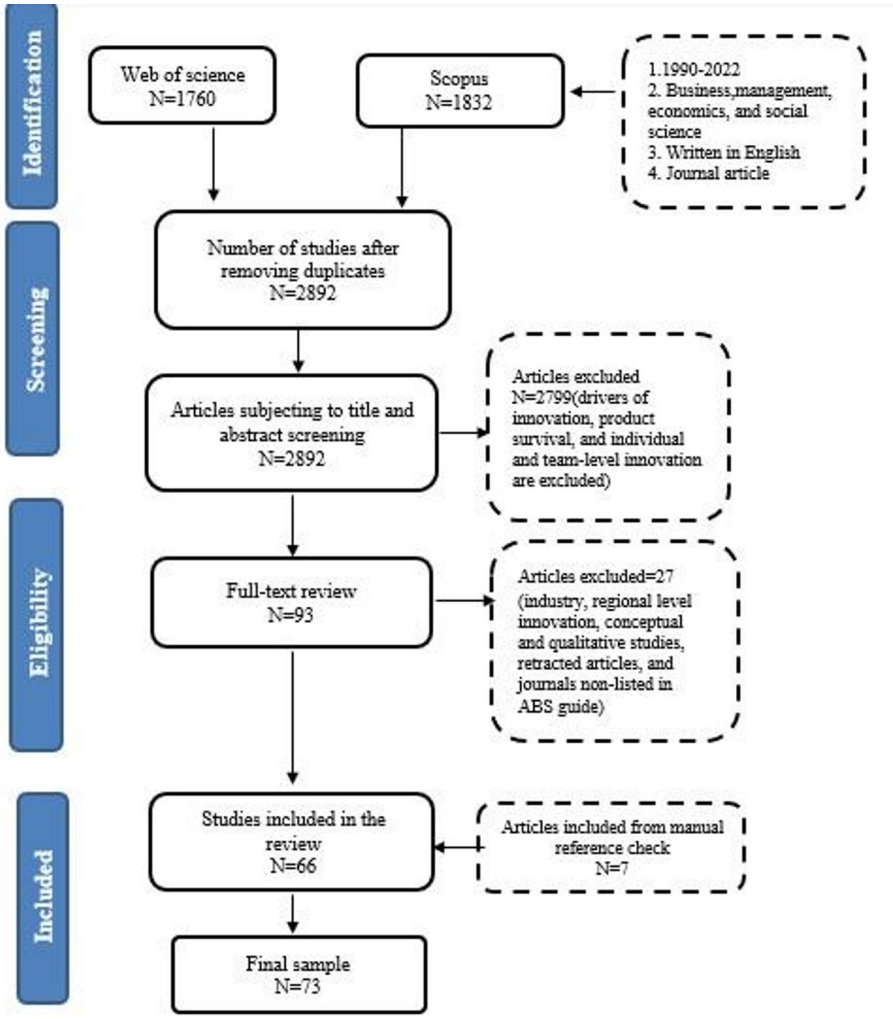


Fig. 1 PRISMA Framework

3 General overview

Figure 2 presents a simplified overview of the literature on the impact of innovation on firm survival. Studies commonly examine the impact of either one dimension of innovation (e.g., technological product and/or process innovation) or a combination of two pairs of innovation dimensions (e.g., product-process innovation with radical-incremental innovation) on firm survival, which is primarily conceptualized as the continued operation or market persistence of firms. The focal relationship is further clarified by considering several boundary conditions, as well as the mechanisms that may influence the relationship between innovation and firm survival. Boundary conditions such as macro- and micro-environmental factors might shape the innovation activities of firms, which in turn increases the profitability and productivity of firms

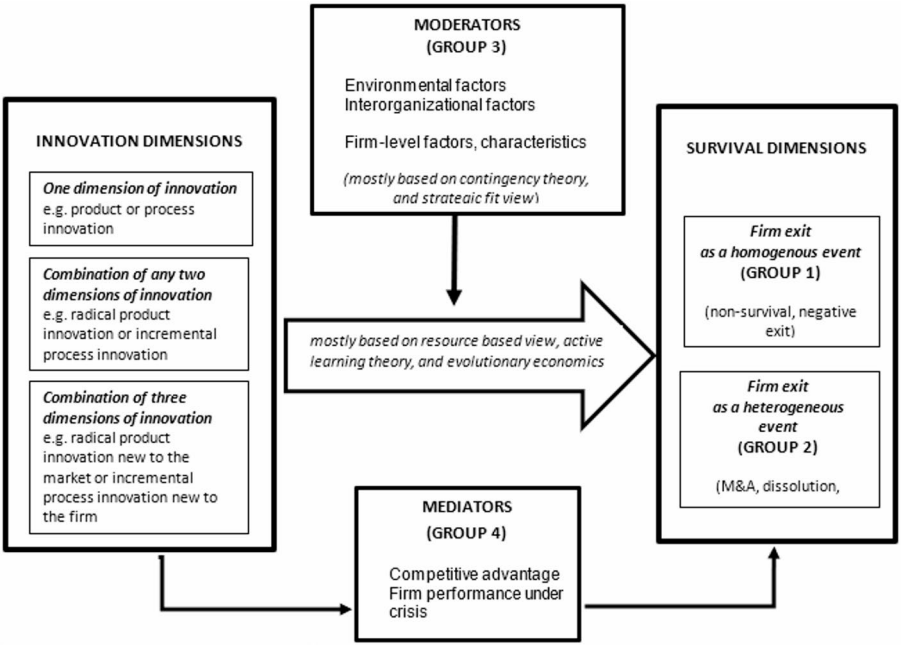


Fig. 2 Overview of research on the impact of innovation on firm survival

in an evolutionary landscape (evolutionary economics theory; Nelson and Winter 1982); alternatively, these boundary conditions act as a contingent factor with which firms' innovation strategies must align to ensure firm survival prospects (contingency theory and strategic alignment theory; Venkatraman 1989). Further, firms actively engage in innovation, such as research and development, even if the expected gain in firm survival is uncertain (active learning theory; Ericson and Pakes 1995).

Reviewed studies used different models to examine the relationship between innovation and firm survival. As shown in Fig. 2,we identified four groups of studies. The first group of studies (Group 1) focused primarily on the types or magnitudes of innovation and their differential effects on firm survival, where firm survival is treated as a complementary status of firm exit (firm exit as a homogeneous event). For example, Ortiz-Villajos and Sotoca (2018) disaggregated innovation types to examine their relevance to firm survival. The second group of studies (Group 2) examined the impact of innovation on different exit forms (firm exit as a heterogeneous event). For instance, Cefis and Marsili (2012) examined how innovation capabilities influence firm exit decisions, such as business closures, M&As, and radical restructuring. The third group (Group 3) investigated the conditions under which innovation might enhance or impair firm survival, considering various firm and environmental moderating variables. For instance, Howell (2015) investigated the moderating role of these factors on innovation and firm survival. Finally, the fourth group (Group 4) focused on the mechanisms linking innovation and firm survival. Naidoo (2010) built a conceptual model linking market orientation, marketing innovation, competitive advantage, and firm survival.

4 Findings using the TCCM framework

Following the TCCM framework (Paul and Rosado-Serrano 2019), we reviewed and categorized theoretical perspectives;regional, industrial, and firm-level contexts; variable types and dimensions, and research methods used in the reviewed studies examining the relationship between innovation and firm survival.

4.1 Theory(T)

In this section, we elaborate on the theoretical frameworks most commonly used to explain the relation of innovation to firm survival. We found that one-third of the studies used a single theory (n=21, 28.7%), another one-third (n=26, 35.6%) drew on multiple theories, and the remaining studies incorporated theories from various fields, such as economics and management, and related to many subfields of management, such as strategic management, organization studies, and entrepreneurship, showing the multi-perspective nature of the topic. Regarding the evolution of the theoretical approaches, contingency theory and resource-based view have gained prominence in the last decade, while theories on active learning and organizational change have somewhat declined.

4.1.1 Contingency theory and strategic alignment

According to Contingency Theory, no single strategy is suitable for all firms without considering their environmental context and relevant organizational structure (Venkatraman 1989). Therefore, the behavior and organization performance depend on some internal and external contingencies (Mintzberg et al. 2020). In this review, contingency theory- the most frequently used approach with an increasing trend over time (see Table 1), concentrated on the moderating role of external environmental factors (e.g., Levitas et al. 2006; Kim and Lee 2016) and firm characteristics (e.g., Lee et al. 2011; Sandberg et al. 2019). Another application of this theory was to examine the contingent effect of risk on the extant relationship (e.g., Fernandes and Paunov 2015; Howell 2015). Other boundary conditions were also considered concerning interfirm relations, international experience, and internationalisation strategy (e.g., Lee et al. 2011; Velu 2015). Additionally, the concept of strategic alignment, which has a theoretical root in contingency perspectives (Zajac et al. 2000), is closely related to contingency theory. Studies anchored on strategic alignment theory were relatively few (2.73%). They examined the complementary effect of firm capabilities and innovation-related competitive actions on firm survival (Li et al. 2010) and explored the fit between firms' degree of business model innovation and third-party alliance with complementary assets on firm survival (Velu 2015).

4.1.2 Resource-based view (RBV) and dynamic capability (DC) approach

According to RBV, firms must have valuable, rare, imperfectly imitable, and non-substitutable resources to achieve sustainable competitive advantage (Wernerfelt 1984; Barney 1991). RBV examines an organization's internal capacity to under-

Table 1 Theories used to explain the impact of innovation on firm survival linkage in the last three decades

Percentage Theories	1990–1999 %	2000–2009 %	2010–2022 %	Total %
Theories in rise				
Contingency theory	14.2	17.6	32.6	27.3
Resource-based-view	–	17.6	26.5	21.9
Evolutionary economics	–	5.88	8.16	6.84
Strategic alignment	–	–	4.08	2.73
Theories in decrease				
Active learning theory	–	11.7	10.2	9.58
Organizational change theory	14.2	11.7	–	4.10
Knowledge-based view	–	5.88	4.08	4.10
First-mover advantage theory	14.2	5.88	2.04	4.10
Industrial organization	–	11.7	–	2.73
Organizational ecology	–	11.7	–	2.73
Product life cycle	–	5.88	2.04	2.73
Other theories	14.2	17.6	16.3	16.4
No guiding theory	57.1	23.5	36.7	35.6
Total number of studies				103

stand how resources and capabilities contribute to exceptional market performance (Barney 1991). The DC approach, concerning firms' ability to deploy resources effectively, emerged as an extended form of the RBV (Eisenhardt and Martin 2000; Teece et al. 1997). 21.9% of the studies in our sample articles applied both theories with an increasing trend over time by framing innovation as an organizational resource (e.g., Cefis and Marsili 2019). Another common application of these theories was examining the complementary effect of firms' R&D capability and innovation-related competitive actions on firm survival (Li et al. 2010), as well as the compensatory effect of innovation on the link between firms' market experience and firms' exiting from the emerging market(Sandberg et al. 2019). In addition, studies explored the interrelations among marketing innovation, competitive advantage, and firm survival prospects (e.g., Chatzoudes et al. 2021; Naidoo 2010) and the moderating role of the technological regime on firms' post-entry innovation effort and survival prospects (Kim and Lee 2016) through the lenses of RBV and DC.

4.1.3 Active learning theory

Contrary to the passive learning theory, which suggests that firms improve their level of efficiency as they gain knowledge and expertise through industry experience (Jovanovic 1982), active learning theory emphasizes the firms' deliberate search for new knowledge through research and development (R&D) to improve competitiveness and performance (Ericson and Pakes 1995). In our review, this theory, which has shown a diminishing trend over time, was applied either explicitly or implicitly to shed light on the link between firms' R&D activities and their survival likelihood (e.g., Esteve-Pérez et al. 2010). Additionally, instead of examining the direct relationship between R&D activities and subsequent survival, Kim and Lee (2016) examined

whether the types of technological regimes moderate the link between post-entry active learning and firm survival.

4.1.4 Evolutionary economic theory

Rooted in the Schumpeterian tradition, Nelson and Winter's (1982) evolutionary economic theory attributes firms' exit behavior to the process of learning and market selection (Cefis and Marsili 2006). The selection mechanism penalizes firms with a low level of productivity, profitability, or environmental fit by eliminating them from the industry (Nelson and Winter 1982).[1] In this framework, innovation is linked to profitability and productivity, with firms exhibiting higher profits or higher productivity positioning themselves to increase their market share and survival rates (Ugur and Vivarelli 2021; Fontana and Nesta 2009).[2] In response, firms carry out innovation activities to improve efficiency and their relative position regarding productivity and environmental fit (Howell 2015). Evolutionary theory accounted for 6.84% of studies, with a slight increase after the 2000s. Most studies used the theory as a mere background (e.g., Cefis and Marsili 2006, 2011), while a few explicitly applied it to develop hypotheses and/or predictions, exploring the impact of firms' innovation activities on firm survival in times of crisis and testing the effect of selection mechanisms (e.g., Cefis and Marsili 2019; Guerzoni et al. 2021).

4.2 Context (C)

4.2.1 Industry

Regarding industrial context, nearly three-quarters of the studies (76.7%)were sampled from a single industry, although this percentage declined after the 2010s. In contrast,21.9% of the studies covered multiple industries, with a noticeable increase in such studies from the 2010s onward (Table 2). Meanwhile, the manufacturing industry is the most popular industrial context in this thrust of research accounting for 53.4% of the total studies.

4.2.2 Country and region

The results indicate that the USA (26%) is the most frequently examined country as a research setting despite the decreasing tendency over time. This is followed by China (13.6%), the UK (8.21%), the Netherlands (6.84%), and Italy (6.84%).

[1] Other theories include dominant design theory (Christensen et al. 1998), network externalities (Srinivasan et al. 2004), scope economies (Cottrell and Nault 2004), path dependence theory (Aspelund et al. 2005), competitive dynamic theory (Li et al. 2010), relocation theory, institutional theory (Sharif and Huang 2012), red queen competition theory (Talay et al. 2014), liability of newness and smallness (Hyytinen et al. 2015), Schumpeterian competition and innovation model (Ugur et al. 2016), agglomeration externality (Ebert et al. 2019), behavioral theory of the firm (Wang and Zhou 2022).

[2] The number of theory applications amounts to 103 since over one-third of the studies used multiple theories to explain the associated hypothesis (35.6%) (e.g., Tan and Sousa 2019; Ebert et al. 2019; lee et al. 2011; Li et al. 2010).

Table 2 Research settings used in studies on innovation-firm survival in the last three decades

Percentage Context	1990–1999 %	2000–2009 %	2010–2022 %	Total percentage %
Industry				
Single	100.0	94.1	67.3	76.7
Multiple	–	5.8	30.6	21.9
Not specified	–	–	2.04	1.36
Country				
USA	85.7	35.2	14.2	26.0
China	–	–	20.4	13.6
UK	14.2	5.8	8.16	8.21
Netherland	–	11.7	6.12	6.84
Italy	–	5.8	8.16	6.84
S. Korea	–	–	6.12	4.10
Spain	–	11.7	6.12	6.84
France	–	–	6.12	4.10
Canada	–	–	4.08	2.73
Germany	–	5.8	2.04	2.73
Australia	–	5.8	2.04	2.73
Multiple countries	–	17.6	4.08	6.84
Other countries	–	–	12.2	8.21
Region				
Europe	14.2	47.0	48.9	45.2
North America	85.7	35.2	18.3	28.7
Asia	–	–	28.5	19.1
Pacific	–	5.8	2.04	2.73
South America	–	–	2.04	1.36
Firms' development stages				
Start-ups, new ventures	–	5.8	48.9	34.2
Diversified firms	14.2	–	6.12	4.10
Mixed or unspecified	85.7	94.1	44.8	60.2
Total number of studies	7	17	49	

Notably, there were significant changes over time, including a sharp decline in studies from the USA and a marked increase in studies from China (20.4%) and South Korea (6.12%) after 2010. Regarding continental comparison, Europe hosts most of the studies (45.2%), followed by North America (28.7%) and Asia (19.1%). Additionally, 6.84% of the studies took a multi-country view; however, none conducted cross-cultural comparisons.

4.2.3 Firm stage of development

We categorized the firms based on Miller and Friesen's (1984) typology: new ventures and diversified firms. Over one-third of the studies (34.2%) explicitly used samples of new ventures and start-ups. Unfortunately, 60.2% of the studies did not explicitly refer to the firms' stage of development in their samples; instead, they used firm size and age to describe their sample. Only four studies (4.10%) included estab-

lished/diversified firms. Regarding the evolution of the development stage, there has been an increasing focus on startups since the 2010s.

4.3 Characteristics and constructs (C)

This section examines the characteristics and constructs of innovation and firm survival, including their conceptualization and measurement. We also clarify how scholars model the relationship between innovation and firm survival by summarizing the variables used (e.g., dependent, independent, mediating, and moderating).

4.3.1 Conceptualization and measurement of innovation

Development of the conceptualization of innovation. The early conceptualization of innovation (1990–2000) in the focal domain primarily regarded technology as a key driver of efficiency and profitability (Doms et al. 1995; Colombo and Delmastro 2001). This perspective was later expanded by Sinha and Noble (2008), who viewed technology adoption as a tool for enhancing firms' competitive advantage. A second group of scholars conceptualized innovation as organizational change, emphasizing its disruptive effects on routines and inertia (Carroll and Teo 1996). This view assumes that innovation is inherently risky and destabilizing. During this period, evolutionary theory and organizational ecology played a significant role in shaping the conceptualization of innovation. In the subsequent period (2001–2011), the conceptualization of innovation evolved from broad definitions to more nuanced perspectives, including product radicalness, architectural innovation, component innovation, incremental innovation, and marketing innovation. The resource-based view (RBV) and industrial organization theories have influenced these conceptual developments. In the most recent period (2011–2022), innovation has been defined in increasingly diverse ways, including as firm resources (Sui and Baum 2014; Yang et al. 2017), R&D effort (Ugur et al. 2016; Wang and Zhou 2022), learning (Kim and Lee 2016), knowledge (Colombelli et al. 2013), capability (Tan and Sousa 2019; Zhang et al. 2020), tendency (Jung et al. 2018; Ali 2022), orientation and behavior (Wojan et al. 2018), and intellectual property (Kato et al. 2021). This lack of conceptual clarity and the proliferation of innovation-related variables have contributed to heterogeneous findings and impeded the development of a unified understanding of organizational innovation (Garcia and Calantone 2002; Ugur and Vivarelli 2021). The concept of innovation has evolved, resulting in various definitions and views. However, a more detailed understanding requires an examination of the innovation dimension.

Dimensional issues of innovation. We coded innovation dimensions based on the following categories: innovation types (product, service, process, marketing, management, organization, business model innovation, technological, organizational innovation), innovation referent (new to world, country, industry, and firm), and innovation magnitude (radical, incremental) (Gopalakrishnan and Damanpour 1997; Crossan and Apaydin 2010). Most studies (see Table 3) touched upon certain elements of innovation dimensions, either type of innovation, the magnitude of innovation, and/or the referent. A small minority (9.58, n = 7) focused on all three elements of innovation (e.g., Ebert et al. 2019; Sinha and Noble 2008). A significant number of

Table 3 Categorization of the Innovation Dimensions used in articles (Types, Magnitude, and/or Reference)

Dimensions Articles	Types							Magnitude	Reference
Studies(n = 7) that used many dimensions	Product	Process	Technological	Marketing	Service	Organisational	Business Model	Radical/ incremental	New to where?
Srinivasan et al. (2004)	×		×					Magnitude as continuum	New to Market
Min et al. (2006)	×		×					Magnitude as continuum	New to Market
Sinha and Noble (2008)	×	×	×					Radical	New to industry
Buddelmeyer et al. (2010)	×		×	×				Radical, incremental	New to firm New to industry
Deng et al. (2014)	×							Radical, incremental	New to Market
Børing (2015)	×	×			×			Radical, incremental	New to Market
Ebert et al. (2019)	×							Radical	New to region New to nation New to world
Studies(n = 24) that used two dimensions	Product	Process	Technological	Marketing	Service	Organisational	Business Model	Radical/ incremental	New to where?
Banbury and Mitchell (1995)	×							Incremental	
Alderman (1996)	×	×	×						New to industry New to nation
Carroll and Teo (1996)	×	×	×					Significant (radical)	
Christensen et al. (1998)	×		×					Architectural (intermediary)	
Dowell and Swaminathan (2000)	×		×						New to industry
Cottrell and Nault (2004)	×		×						New to firm New to industry
Aspelund et al. (2005)			×					Magnitude as continuum	

Table 3 (continued)

Dimensions Articles	Types							Magnitude	Reference
Jensen et al. (2008)	×	×				×			New to firm New to world
Naidoo (2010)				×				Incremental	
Giovannetti et al. (2011)	×	×				×			New to firm New to Market
Cefis and Marsili (2012)	×	×						Radical, incremental	
Sharif and Huang (2012)	×								New to firm New to Market
Sui and Baum (2014)	×								New to Market
Talay et al. (2014)	×	×						Radical, incremental	
Fernandes and Paunov (2015)	×								New to firm New to Market New to world
Velu (2015)							×	High, low, and moderate degree	
Howell (2015)	×	×						Incremental	
Hyytinen et al. (2015)	×	×			×				New to Market
Ortiz-Villajos and Sotoca (2018)	×	×		×		×		Significant(radical), incremental	
Wojan et al. (2018)	×	×		×				Incremental, more far-ranging, radical	
Sandberg et al. (2019)	×								New to Market
Cefis and Marsili (2019)	×	×	×	×		×		Radical, incremental	
Chatzoudes et al. (2021)				×					New to firm
Zhang and Mohnen (2022)	×								New to Market
Studies(n=20) that used one-dimension	Product	Process	Technological	Marketing	Service	Organisational	Business Model		
Audretsch (1991)	×		×						

Table 3 (continued)

Dimensions Articles	Types							Magnitude	Reference
Audretsch and Mahmood (1995)	×		×						
Dom et al. (1995)	×	×	×						
Barnett and Freeman (2001)	×		×						
Colombo and Delmastro (2001)	×	×	×						
Cefis and Marsili (2005)	×	×	×						
Levitas et al. (2006)			×						
Cefis and Marsili (2006)	×	×	×						
Fontana and Nesta (2009)	×		×						
Cantner et al. (2008)	×	×	×						
Helmers and Rogers (2010)	×		×	×	×				
Wagner and Cockburn (2010)	×	×					×		
Cefis and Marsili (2011)	×	×							
Colombelli et al. (2013)	×	×	×						
Boyer and Blazy (2014)	×	×	×		×				
Löfsten (2016)	×								
Colombelli et al. (2016)	×	×							
Zhang et al. (2020)	×								
Cefis et al. (2020)	×	×	×	×		×			
Guerzoni et al. (2021)	×				×				
Agostino et al. (2022)	×								

studies (32.8%, n = 24) focused on only two dimensions of innovation (e.g., Naidoo 2010; Sui and Baum 2014), while 20 studies (27.3%) considered innovation types as the sole dimension. The remaining 22 studies (30.1%) did not use any specific innovation dimension; they either viewed innovation as a patenting activity (e.g., Helmers

and Rogers 2011; Lee et al. 2011) or evaluated innovation as R&D expenditure or intensity (Garcia Martinez et al. 2019).

Regarding the trends in the usage of innovation dimensions over time, Table 4 shows that technological product and process innovation were the most frequently adopted, despite a declining trend. While they remain the most common, non-technological innovations, such as marketing, service, organizational, and business model innovation, have emerged in recent years, showing an increasing pattern. This tendency aligns with the publication of influential articles on these new types of innovation (Birkinshaw et al. 2008; Volberda et al. 2014). As for the magnitude of innovation, radical and incremental innovations have been, and continue to be, the most studied. However, the number of studies on intermediate innovation has decreased sharply. Regarding novelty, there have been no significant changes; new-to-market/industry innovation remains the most studied, while other types continue to be underresearched.

Measures of Innovation. Most studies use objective measures as proxies for firms' innovation activities. Intellectual property, as an innovation output approach, was the most frequently used objective measure (e.g., Helmers and Rogers 2010) (see Table 5). Another common approach was measuring R&D expenditure or R&D intensity, which emphasizes the input-orientation (e.g., Lee et al. 2011) (n = 15, 20.5%). The remaining studies in this category evaluated innovation based on the number of various types of innovation from administrative records, accounting for 30% of the studies (e.g., Cottrell and Nault 2004; Buddelmeyer et al. 2010). In contrast, 26% of the studies employed subjective measures, such as questionnaires to gather self-reports and evaluations from managers(e.g., Naidoo 2010; Ebert et al. 2019; 2018), as well as secondary public data like the Community Innovation Survey (CIS) (e.g.,

Table 4 Innovation dimensions used in the reviewed studies in the last three decades

Years Dimensions	1990–1999 %	2000–2009 %	2010–2022 %	Total percentage %
Innovation types				
Product	100.0	76.4	57.1	65.7
Process	–	35.2	30.6	28.7
Marketing	–	–	16.3	10.9
Service	–	–	10.2	6.84
Organizational	–	5.88	8.16	6.84
Business model	–	–	4.08	2.73
Innovation magnitude				
Radical	14.2	5.88	20.4	16.4
Incremental	14.2	–	22.4	16.4
Intermediate innovation	14.2	–	4.08	4.10
Magnitude as continuum	–	17.6	–	4.10
Reference				
New to Market /Industry	14.2	29.4	20.4	21.9
New to Firm		11.7	10.2	9.59
New to region/ nation/ world	14.2	5.88	4.08	5.48
Total number of studies	7	17	49	

Table 5 Subjective and objective measures of innovation used in the reviewed studies

Operationalization and Measurement (In order of appearance)	(%)	Exemplary studies
Subjective measures		
Survey questionnaires: collecting self-evaluations/ declarations of managers and executives about organizational innovativeness	26.0	Doms et al. (1995); Cefis and Marsili (2005, 2006, 2011, 2012); Naidoo (2010); Hyytinen et al. (2015); Garcia Cabrera et al. (2021)
Expert ratings: innovations are selected and rated by experts in the related fields	8.21	Carroll and Teo (1996); Min et al. (2006); Talay et al. (2014); Velu (2015); Ortiz-Villajos and Sotoca (2018)
Objective measures		
Intellectual property: number of patents and patent citations	23.2	Wilbon (2002); Levitas et al. (2006); Helmers and Rogers (2010); Useche (2015); Zhang et al. (2018); Cotei and Farhat (2018)
R&D investment: Total amount of money spent for R&D activities (as an input)	20.5	Pérez et al. (2004); Lee et al. (2011); Ugur et al. (2016); Garcia Martinez et al. (2019); Wang and Zhou (2022),
Innovation new to market/ industry: number of various types of innovation offered by administrative records	16.4	Cottrell and Nault (2004); Buddelmeyer et al. (2010); Børing (2015); Hyytinen et al. (2015);
Innovation new to firms but not new to market or the vice versa	15.0	Sui and Baum (2014); Fernades and Paunov (2015); Sandberg et al. (2019); Chatzoudes et al. (2021)
Accounting-based approach: new product/process sale/ total sale	9.58	Sharif and Huang (2012); Deng et al. (2014); Howell (2015)
New product development: Number of new products introduced by firms or upgraded existing product line and product category	4.10	Dowell and Swaminathan (2000); Barnett and Freeman (2001); Cottrell and Nault (2004)
Other measures: distance of product from its technological frontier, Machine learning, etc	2.73	Fontana and Nesta (2009); Guerzoni et al. (2021)

Colombelli et al. 2016). Further, 8.21% of the studies employed expert ratings to select and assess relevant innovations in a specific context, relying on expert knowledge, primarily focusing on major product and process innovation (e.g., Carroll and Teo 1996; Min et al.2006).

4.3.2 Conceptualization and measurement of firm surviva

Development of the conceptualization of firm survival. The early conceptualization of firm survival (1990–1999) implicitly framed it as a desirable outcome that firms and managers want to pursue, while firm exit is inherently negative. This assumption equates firm exit to firm failure, without distinguishing other types of exit, and primarily reports a positive association between innovation and firm survival (Doms et al. 1995; Carroll and Teo 1996). Despite the continued dominance of this perspective in the subsequent period (2000–2010), growing interest has emerged in the more nuanced dimensions of firm survival, such as product market exit, M&A, and forced liquidation (Srinivasan et al. 2004; Fontana and Nesta 2009). Notably,as the conceptualization of firm survival becomes more refined, the relationship between innovation and firm survival becomes increasingly equivocal (Min et al. 2006; Fontana and Nesta 2009). In the most recent period (2010–2022), the application of the nuanced dimensions of firm survival has led to conceptual ambiguity. Some survival-related terms are used interchangeably, despite addressing distinct firm outcomes. For instance, firm closure often denotes voluntary liquidation initiated by owners, whereas liquidation may refer to either voluntary or forced liquidation (bankruptcy), which represents genuine firm failure (Cefis et al. 2021). Moreover, financial crises such as the 2008 crisis, the 1990 dot-com bubble crisis, and the COVID-19 crisis influence the conceptualization of firm survival. Studies examining these crises have prioritized continued solvency (or bankruptcy) and M&As over continued operations (Wagner and Cockburn 2010; Grazzi et al. 2021). Additionally, firm survival is framed as flexibility, emphasizing firms' adaptability, endurance, and resistance (Naidoo 2010; Chatzoudes et al. 2021). Table 6 presents a more detailed understanding of the firm survival dimension used in the pertinent literature.

Dimensional Issues of Firm Survival. Over 80% of the reviewed studies framed firm survival as continued operation.

In international business, export market persistence was commonly used as a dimension of firm survival, while in marketing (Deng et al. 2014), product market persistence served the same purpose (Srinivasan et al. 2004). However, it is often difficult to determine whether market exit from export or product markets is a strategic decision of firms or a genuine failure stemming from poor economic performance. Studies using continued solvency as a firm survival dimension regard insolvency as an indicator of firm failure (15%). Further, 13.6% of the studies used continued ownership as a firm survival dimension, with some efforts to differentiate acquisition or merger from failure and success (e.g., Esteve-Pérez et al. 2010; Børing 2015).

Measures of firm survival Most reviewed articles (92.5%) measured firm survival using firm death and mortality indicators, such as market exit, discontinued operations, or bankruptcy. This aligns with the findings of Josefy et al. (2017), who emphasized the disconnect between theory and empirics due to the widespread use of firm

Table 6 Various conceptualizations of firm survival in the reviewed articles

Percentage Firm exit	1990–1999 %	2000–2009 %	2010–2022 %	Total %
Homogeneous event (Firm exit = Firm failure)	85.7	64.7	40.8	50.6
Heterogeneous event (Firm exit = M&A, liquidation, or bankruptcy)	–	9.09	16.3	12.3
Negative exit (Genuine failure)	14.2	45.4	32.6	30.1
Percentage Dimensions of firm survival	1990–1999 %	2000–2009 %	2010–2022 %	Total %
Continued operation	100.0	100.0	79.5	86.3
Market persistence	–	–	8.16	5.47
Continued ownership	–	–	20.4	13.6
Continued solvency	–	–	22.4	15.0
Two or more dimensions	–	5.88	18.3	13.6
Total number of studies	7	17	49	

mortality/death measures as proxies for firm survival. In contrast, a small percentage of studies used genuine objective survival measures, assessing whether a firm survives for a specific duration (e.g., Wilbon 2002; Hyytinen et al. 2015). Other studies used subjective measures, asking respondents directly to assess the survival/failure status of the firm.

4.3.3 Modeling the relation of innovation and firm survival

This section clarifies how the relationship between innovation and firm survival is conceptualized and specified in the pertinent literature. First, we distilled the sources of effect size heterogeneity in two time periods (pre-2010 and post-2010) and then synthesized the variables used in the reviewed studies of the impact of firm survival in terms of independent, mediating, and moderating variables.

One conclusion that can be drawn from the pre-2010 studies is that the impact of innovation on firm survival varies in terms of magnitude and direction between and within studies. 73.3% of the studies reported a positive relationship between innovation and firm survival in this period (e.g., Doms et al. 1995; Colombo and Delmastro 2001; Cefis et al. 2006; Li et al. 2010). However, the remaining 26.6% of studies reported insignificant, mixed, or even negative relationships. In studies reporting mixed effects, heterogeneity reflects the variation between innovation inputs/outputs (Wilbon 2002), innovation types (e.g., product and process innovation)(Cefis and Marsili 2005), and the variation between flow and stock measures innovation output (Buddelmeyer et al. 2010). Moving on to post-2010 studies, the focal relationship appears even more heterogeneous than in pre-2010 studies. This trend was also captured in a prior review (Ugur and Vivarelli 2021), which provides an extensive review of the topic from a microeconomic perspective. Compared to 73.3% of the pre-2010 studies, only 53.4% of the post-2010 studies indicate a positive relationship between innovation and firm survival. The sources of heterogeneity include not only

innovation types and measures discussed in the pre-2010 studies, but also the focal relationship depending on the level of R&D intensity (Ugur et al. 2016), the magnitude of business model innovation (Velu 2015), risk factors (Hyytinen et al. 2015; Howell 2015), and technological regime (Kim and Lee 2016). Finally, evidence from both the pre-2010 and post-2010 studies indicates that the output measures of innovation (patent, trademark, and number of product innovations) are more likely to yield a positive effect on firm survival than input measures. This pattern aligns with Rosenbusch et al. (2011) meta-analysis of innovation and SME performance, which found that output measures of innovation, relative to input measures, are more likely to be associated with higher SME performance. It is also important to note that the impact of innovation is more likely to be positive when firms operate in low-tech industries.

Independent variables. Most studies (90.1%, n = 64) (see Table 7) investigated the direct or indirect effect of innovation on firm survival, treating innovation as an independent variable. This category also included studies examining the antecedents of innovation and its subsequent impact on firm survival. In addition to innovation, other variables were also explored, and categorized into four main classes. Among environmental factors, micro-environmental factors (13.6%) were commonly used as independent variables in combination with innovation compared to macro-environmental factors (5.47%). Firm-level factors (41%), such as firm resources, strategy, and firm capability also constituted a significant proportion of independent variables. The largest proportion of independent variables, however, was firm characteristics, including firm size, legal structure, and firm age.

Mediating variables. Only a few recent studies used innovation as a mediator (2.73%). For example, Naidoo (2010) suggested that marketing innovation mediates the relationship between marketing orientation and superior market performance, leading to long-term survival. Similarly, García-Cabrera et al. (2021) proposed innovation as a link between knowledge resources and firms' chances of survival.

Moderating variables: Compared to mediators, moderators are more frequently used in the relationship between innovation and firm survival. 31.5% of studies used various firm and industry-level variables as moderators. Researchers paid relatively greater attention to firm-level factors as moderators (21.9%), while environmental factors (9.58%) and inter-organizational relations (2.73%) received less attention. Further, only five studies (6.84%) consider innovation as a moderator of the link between any third variable and firm survival (e.g., Srinivasan et al. 2004).

4.4 Methodology (M)

4.4.1 Sample size

The sample sizes used in the reviewed articles ranged from 45 to 299,038 firms (see Table 8). Most studies (71.2%) used samples ranging from 101 to 10,000. Nearly 20% of the articles applied much larger sample sizes (> 10,000), particularly in more recent research. Only a few studies (5.47%) used samples fewer than 100 firms. This indicates a growing trend toward using larger sample sizes to enhance the generalizability of the findings.

Table 7 Independent, mediating, and moderating variables used in innovation-firm survival relationship

Variables	Number of studies	Relative frequency
Independent variables		
Environmental factors	**14**	**19.1**
Micro environmental factors	10	13.6
Macro environmental factors	4	5.47
Firm-level factors	**30**	**41.0**
Firm resources	8	10.9
Firm-level strategy	7	9.58
Firm capability	6	8.21
Firm performance	5	6.84
Firm experience	4	5.47
Firm characteristics	**33**	**45.2**
Firm size	8	10.9
Legal structure	6	8.21
Firm age	4	5.47
Exporting behavior	4	5.47
Foreign participated firms	3	4.10
Firm location	2	2.73
Firms' technological advancement	2	2.73
Other firm characteristics	4	5.47
Inter-organizational factors	**5**	**6.84**
Others	**11**	**15.0**
Mediating variables		
Innovation activity	2	2.73
Competitive advantage	2	2.73
Firm performance of under crisis	1	1.36
No mediator	70	95.8
Moderating variables		
Environmental factors	**7**	**9.58**
Micro-environmental factors	6	8.21
Macro-environmental factors	1	1.36
Firm-level factors	**16**	**21.9**
Innovation activity	5	6.84
Innovation risk	3	4.10
Firm-level strategy	3	4.10
Financial factors	3	4.10
Time	2	2.73
Firm characteristics	**4**	**5.47**
Inter-organizational factors	**2**	**2.73**
Others	**6**	**8.21**
No moderator	46	63.0

4.4.2 Data collection and time emphasis

Concerning data collection methods, the most popular approach was using administrative records (78%), likely due to the ease of accessing large sample sizes in one shot and the lower cost compared to primary data collection. Furthermore, the trend analysis shows fluctuations in the adoption of longitudinal and cross-sectional data

Table 8 Methods and Data Sources

Research design	1990–1999 %	2000–2009 %	2010–2022 %	Total percentage (N = 73) %
Sample size				
1–100	14.2	17.6	–	5.47
101–10,000	85.7	70.5	69.3	71.2
10,001–100,000	–	5.8	14.2	10.9
100,000 +	–	5.8	10.2	8.21
N/A	–	–	6.12	4.10
Data collection methods				
Administrative record	71.4	88.2	75.5	78.0
Survey	–	–	8.16	5.47
Both	28.5	11.7	16.3	16.4
Time emphasis				
Longitudinal	71.4	88.2	79.5	80.8
Cross-sectional	28.5	11.7	20.4	19.1
Unobserved heterogeneity (Frailty)				
Yes	–	23.5	30.6	26.0
No	100.0	76.4	69.3	73.9
Left truncation				
Yes	–	11.7	16.3	13.6
No	100.0	88.2	83.6	86.3
Total number of studies	7	17	49	

over time. Notably, there is a general inverse pattern in the use of longitudinal versus cross-sectional data.

4.4.3 Unobserved heterogeneity (frailty)

Unobserved heterogeneities (or frailty) are omitted variables that failed to be (either unobserved in available data or intrinsically unobservable) included in the model specification, which can be a potential source of bias (Ugur and Vivarelli 2021; Manjón-Antolín and Arauzo-Carod 2008). Econometric models that do not control for unobserved heterogeneity may yield upward-biased innovation effects on firm survival (Ugur and Vivarelli 2021). With an increasing trend over time, almost one-third of the studies (26%) controlled for unobserved heterogeneity in their model specification, while the rest of the empirical studies (73.9%) did not control for frailty, which is in line with the results reported by Ugur and Vivarelli (2021).

4.4.4 Left truncation

Left truncation bias occurs when a given study fails to take emerging firms that were initiated before a study began observing them (Yang and Aldrich 2012). Ignoring those firms that had already been exposed to the risk of failure for a certain period when they were involved in the study observation may have led to misrepresentation of the sample, thereby systematically biasing the effect of innovation on firm survival (Yang and Aldrich 2012; Shim and Davidsson 2018). Most of the reviewed studies

(86.3%) did not consider the left truncation. The remaining studies (13.6%) used several methods to reduce or control the left-truncation problem.

4.4.5 Analytical approach

The Cox proportional hazard model was the most frequently used (27.3%) statistical method to analyze the focal relationship, followed by logistic regression (23.2%), complementary log–log model(13.6%), and probit model (13.6%). Notably, 36.8% of the articles applied logistic regression and probit models for estimations. Among these, 10 out of 27 studies used cross-sectional logistic regression and probit models to estimate relevant parameters, instead of applying discrete-time logistic regression to handle both right-censoring and time-dependent variables.

5 Discussion and future research directions

Our systematic literature review (as shown in Fig. 2) reveals that most research on innovation and firm survival is grounded in economics-oriented theories, such as the Resource-Based View (RBV), Dynamic Capabilities, and Evolutionary Economics. These studies predominantly focus on technological product and process innovations, conceptualized in various ways—such as resources, technology adoption, learning, knowledge, capabilities, tendencies, orientations, and behaviors—and their impact on firm survival, which is often implicitly or explicitly treated as firms' ultimate goal. Empirically, these studies rely primarily on administrative records from manufacturing industries in developed economies to track innovation and firm survival prospects.

While previous research provides valuable insights into the relationship between innovation and firm survival, it tends to take a distant perspective on internal innovation processes and activities (Damanpour 2020). This narrow focus limits our understanding of how organizations innovate in practice and under what contextual conditions innovation contributes to firm survival. Moreover, the widely accepted view that innovation inherently benefits firm performance and survival overlooks the complexities it can introduce, highlighting the need for a more nuanced, multifaceted approach.

To advance the field, future research should explore both the internal and external complexities of innovation-related activities while expanding the scope to underexplored industries and emerging innovation types, such as patient innovation in the healthcare industry. Leveraging modern statistical techniques—such as configurational analysis and other advanced analytical methods—can help capture the intricate interplay of multiple factors shaping innovation and firm survival. By adopting these approaches, scholars can provide more timely and nuanced insights into the evolving innovation landscape. In the next section, we identify the unexplored aspects of this relationship and propose future research directions using the TCCM framework.

Considering various underresearched aspects of innovation-firm survival studies depicted in Table 9, we also suggest some future research directions by integrating theories, contexts, constructs, characteristics, and methods:

Table 9 Future research direction on innovation and firm survival

Suggestions	Research Questions
Theory: Alternative theories could be used independently (e.g. institutional theory, network theory); however, we recommend that future studies employ configurational reasoning to theorize the complex interplay of causal mechanisms that lead to firm survival in innovative firms.	1.What are the possible pathways to firm survival, and where do innovation resources fit within them? 2.How do firms at different stages of development (e.g., start-ups, diversified firms) adopt distinct or overlapping configurations of innovation resources to achieve survival? 3.Does the symbolic adoption of management innovation, alongside technological innovation, amplify or weaken the relationship between innovation and firm survival? 4.What are the institutional conditions under which the symbolic adoption of management innovation enhances or undermines firm survival? 5.How does bank lending (credit market) impact firm survival-related outcomes through technological innovation? 6.Under what conditions do financial market development (e.g., bank lending) acts as a catalyst or constraint for firm innovation activities? 7.How do implementing non-marketing strategies (e.g., political connection, informal network) affect the relations between innovation and firm survival in institutionally underdeveloped environments? 8.Which types of innovation collaboration (e.g., customers, users, suppliers, competitors, or public–private) enable firms to achieve long-term survival? 9.How do contextual or institutional factors moderate the link between innovation collaboration and firm survival? 10.How do characteristics of the network (e.g., size, density, stability, informal, or formal network) influence innovation and firm survival links? 11.How do network resources or capabilities shape firms' exploitative and exploratory innovation strategies, and how do they jointly affect firms' longevity?
New research settings: Healthcare industry, user innovation (e.g.patient innovation) as a new research setting Developed and developing countries of Asia as new research contexts	12.How do healthcare firms benefit from collaborating with or adopting patient innovation/innovators? 13.Under what conditions do firms adopt/collaborate with patient innovators rather than established producers? 14.How does the "opportunity cost" of choosing patient innovators over producer innovators influence a firm's decision-making process and subsequent survival? 15.How do AI-powered business assistants (e.g., ChatGPT 4.0) influence healthcare firms' strategic decision-making in searching for and adopting patient-driven innovations?

Table 9 (continued)

Suggestions	Research Questions
Characteristics and constructs: Conceptual research regarding the commonalities and differences in conceptualizing innovation to shed light on the common grounds and divergence of conceptualization across domains Conceptual work to delineate boundaries of different forms of exit (hostile M&A, harvesting, firm closure, liquidation) Using genuine firm survival measures (Josefy et al. 2017) or more flexible measures such as firm adaptability, market persistence, or resilience to proxy firm survival Considering non-economic indicators of firm failure (e.g., moral failure, loss of social responsibility, labor exploitation) to capture diverse societal stakeholders	16.How do different domains (e.g., economics, strategic management, and marketing) conceptualize innovation and firm survival constructs, and what are the commonalities and differences in conceptualizations across fields? 17.To what extent does stakeholder pressure (from customers, employees, or broader society) shape responsible innovation practice(or sustainable innovation), and, in turn, mitigate or increase the risk of moral failure of firms (e.g., loss of social responsibility, labour exploitation)?
New methods: Data triangulation through qualitative insights from case studies, interviews with industry experts, and survey data Conducting Landmark analysis to capture the dynamic nature of innovation (e.g., Cefis et al. 2023) Building the autoregressive model OR cross-lagged feedback loop model to capture dynamic nature of innovation fuzzy-set qualitative comparative analysis (fsQCA) can be utilized Meta-analysis on innovation and firm survival relationship MASEM for unexplored mechanism between innovation and firm survival	18.Under what conditions do firms retain or discontinue their innovation activities over time? 19.Does the firms' past innovation efforts lead them to sustain innovation in the subsequent period? 20.Is there any reinforcing (or negative) feedback loop where past innovation success increases the chances of survival, boosting future innovation efforts?

Drawing on ***resource orchestration theory***, future studies could explore the complex interplay of various innovation resources (e.g., human capital, R&D, and social capital) in determining firm survival in ***emerging economies.*** This research could treat innovation as a ***"time-variant covariate***" to assess how the configuration of innovation resources evolves over time.

Drawing on ***institutional theory***, researchers might examine under what conditions the financial market development (e.g. bank lending) acts as a catalyst or constraint for firms' innovation strategies. Future studies could employ a ***deductive fsQCA*** approach, allowing for the configuration of conditions (e.g., financial market development, firm size, and managerial capabilities) that facilitate or hinder innovation strategies in ***developed economies (e.g., Japan, Singapore, and Taiwan).***

Future research could adopt an ***inter-organizational perspective*** to explore underexplored industries, such as the service and ***healthcare sectors***, by addressing two key questions: 1) under what conditions do firms collaborate with patient innovators (user innovation) rather than established producers (producer innovation),

and 2) how do the "opportunity costs" of selecting one over the other influence a firm's decision-making process and long-term survival? This research could begin with ***qualitative case studies*** to gain insights into the industry, followed by the use of ***fuzzy-set qualitative comparative analysis (fsQCA)*** to identify the necessary and sufficient conditions that drive firms' collaboration choices.

This section presents future research directions on innovation and firm survival research based on theoretical underpinnings, new research settings, constructs, and methods. We also suggest relevant research questions that could be examined in future studies.

5.1 Theoretical underpinnings

5.1.1 Resource orchestration theory as an extension of RBV

Resource orchestration (RO) theory, as an extension of RBV, could help explain innovation success by orchestrating crucial resources to achieve innovation strategies (Carnes et al. 2021). While prior research has investigated the role of individual innovation resources (e.g., R&D resources, R&D human capital, technology resources, or patents) on firm survival (e.g., Lee et al. 2011; Yang et al. 2017), there remains limited understanding regarding how these resources interact to influence firm survival. At this point, future studies could benefit from the configurational approach to uncover the unique configurations of innovation resources leading to firm survival. Further, firms at different stages of development have distinct resource requirements, shaped by their different resource endowments, goals, and strategies. Investigating the most effective configuration of innovation resources at different stages of firm development (e.g., start-ups, established ordiversified firms) could offer further insights into multiple pathways to firm survival. To address the above issues, future studies could examine the following research questions: *1) What are the possible pathways to firm survival, and where do innovation resources fit within them? 2) How do firms at different stages of development (e.g., start-ups, diversified firms) adopt distinct or overlapping configurations of innovation resources to achieve survival?*

5.1.2 Institutional theory

From an institution-based perspective, the institutional environment significantly influences the outcomes of firms' strategic initiatives (Scott 2008). While technological innovation is essential for creating a firm's competitive advantage, firms must also ensure their practices align with the expectations of various stakeholders and audiences to enhance their legitimacy. This is particularly crucial for early-stage firms, as gaining legitimacy strengthens their resilience against survival threats (Achbah and Fréchet 2024). One way firms achieve legitimacy is through the symbolic adoption of management innovation (e.g., new management practice) (Sturdy 2004). Building on this, future research could ask *3) Does the symbolic adoption of management innovation, alongside technological innovation, amplify or weaken the relationship between innovation and firm survival? 4) What are the institutional conditions under which*

the symbolic adoption of management innovation enhances or undermines firm survival? Further, The development of a country's markets and financial systems directly impacts firms' ability to secure funding for innovative activities (He and Tian 2020). Prior research by Ugur et al. (2016) found moderate evidence for the complementarity between R&D intensity and market concentration. Yet, other financial market factors such as credit market and bank lending remained underexplored. Investigating the sequence of bank lending → technological innovation → firm survival could offer valuable insights into how financial institutions influence firms' innovation strategies. In addition, it is important to understand to what extent banks, traditionally viewed as passive investors, intervene with firms' innovation strategies, and therefore firm survival prospects. Gu et al. (2017) found that bank interventions harm innovation quantity, not quality. To properly address the following concern, future studies could ask *5) How does bank lending (credit market) impact firm survival-related outcomes through technological innovation? 6) Under what conditions does financial market development(e.g., bank lending) act as a catalyst or constraint for firm innovation activities?*

While prior studies have focused on the role of innovation on firm export and emerging market survival (e.g., Deng et al. 2014; Sui and Baum 2014; Tan and Sousa 2019), they have not explicitly theorized how firms adapt their innovation and survival strategies to the institutional environment in which they operate. Robust market-supporting institutions provide the essential framework for firms to prosper, whereas inadequate market-supporting institutions generate 'institutional voids' that hinder firms' success (Khanna and Palepu 1997). In response, firms operating in such environments may develop unique survival mechanisms, such as implementing non-marketing strategies (e.g., political connections, formal/informal networks, and collaboration) alongside innovation efforts. At this point. Future studies could ask 7) *How do the implementation of non-marketing strategies (e.g., political connection, informal network) affect the relationship between innovation and firm survival in institutionally underdeveloped environments?* Other institutional boundary conditions, such as institutional distance between parent firms and subsidiaries and the host country's appropriability regime, could also be used to examine how the institutional environment affects firms' innovation activities.

5.1.3 Inter-organisational relations

Building on the view that inter-organizational relations- particularly innovation collaborations- enhance the innovation performance of firms (Sharif and Huang 2012), more emphasis could be placed on understanding the different types of innovation collaboration and their role in firm viability. Existing literature has primarily focused on R&D collaboration between private firms (e.g., Lee et al. 2011; Velu 2015), however, this narrow focus opens future research avenues to explore other types of collaboration such as partnership with customers, users, suppliers, and competitors, as well as partnership between private–public sectors, and their impact on firm survival. This exploration is crucial due to the cooperation problems arising from incentive misalignments and value appropriation conflict between partners during innovation collaboration (Bruce et al. 2019). Furthermore, the insight into the innovation col-

laboration is enriched by considering the contextual and institutional factors, such as cross-national institutional settings, which shape the effectiveness of these partnerships. Therefore, future studies could ask: *8) Which types of innovation collaboration (e.g., customers, users, suppliers, competitors, or public–private) enable firms to achieve long-term survival? 9) How do contextual or institutional factors moderate the link between innovation collaboration and firm survival?* Further, Hillman et al. (2009) argue that different theoretical perspectives are necessary to explain inter-organizational linkages in innovation and business survival. At this point, future research may employ *Network theory* to look at how network structure such as size, density, and strength—and network ties—such as formal and/or informal ties—may support or undermine the relationship between innovation and firm longevity. Similarly, the direct impact of network resources or network capabilities on firms' exploitative and exploratory innovation strategies, which in turn affect firms' chances of surviving, also merits significant scholarly study. To properly address these network perspectives, the following questions could be asked*: 10) How do characteristics of the network (e.g., size, density, stability, informal, or formal network) influence innovation and firm survival link? 11) How do network resources or capabilities shape firms' exploitative and exploratory innovation strategies, and how they jointly affect firms' longevity?*

5.2 New research settings

With an increasing emphasis on innovation studies in other industries such as the service and creative industry, pioneering innovation research in an underexplored context could provide unique aspects of innovation and survival strategies. Patient innovation in the healthcare industry, for instance, as a user innovation can improve both patients' well-being and the long-term survival of the healthcare system and institutions (DeMonaco et al. 2019; Cennamo et al. 2022). Producer innovation rests on the assumption that industry evolves in a Schumpeterian sense in which the firm is the main driver of innovation activities (Schumpeter 1934), however, in the context of user innovation, patient innovation in particular, the primary driver is the patient, who develops novel solutions to meet their own medical needs, which firms may later adopt. Although "producer innovation" and "user innovation" differ in terms of subject, motivation, funding source, and innovation process, society benefits the most when 'patient innovation' (user innovation) and traditional 'producer innovation' are developed together (Gambardella et al. 2017). However, little is known about the complexities of adopting health-related products and service innovation, as well as the possible influence on the performance and survival of adopting firms. Therefore, future studies can investigate, *12) How do healthcare firms benefit from collaborating with or adopting patient innovation/innovators? 13) Under what conditions do firms adopt/collaborate with patient innovators rather than established producers? 14) How does the 'opportunity cost' of choosing patient innovators over producer innovators influence a firm's decision-making process and subsequent survival?* Further, in today's rapidly evolving landscape, the healthcare firm's ability to understand and integrate emerging technologies such as Artificial Intelligence or healthcare digital innovation, into firms' strategic decision-making generates a competitive advan-

tage (Mohamad et al. 2023). Generative AI (GenAI) is transforming the ways by which healthcare firms identify and collaborate with patient innovators by leveraging AI-driven data mining and predictive analytics. Such technologies enable firms to evaluate and integrate patient-driven novel solutions and reduce risks. To properly address the issues, future research could investigate *15) How do AI-powered business assistants (e.g., ChatGPT 4.0) influence healthcare firms' strategic decision-making in searching for and adopting patient-driven innovations?*

In terms of region and country, existing research has primarily focused on North American and European developed economies, limiting the findings' international generalizability (Anderson et al. 2004). Meanwhile, China and South Korea have recently acquired widespread recognition as Asia's leading research destinations. Other top Asian innovation economies, such as Japan, Singapore, and Taiwan, require further examination. Furthermore, the emerging markets of Turkey, India, and Iran are worth researching due to their rapid growth as emerging innovation powerhouses (WIPO 2023). Additionally, middle- and low-income economies require organizational-level survival research to establish resilient institutions that can combat poverty, hunger, and social injustice while also contributing to their long-term development (Ahen and Amankwah-Amoah 2021).

5.3 New constructs and characteristics

Innovation in the pertinent literature is defined in many ways, for example as firm resources, capability, capacity, persistence, R&D efforts, behavior, technology, tendency, or strategy (e.g., Lee et al. 2011; Sinha and Noble 2008; Tan and Sousa 2019; Li et al. 2010). This lack of conceptual clarity has led to concept proliferation. Beyond this, a lack of conceptual clarity leads to the operationalization and measurement issues of innovation. For instance, some measure innovation through R&D expenditure, R&D human capital, patents, or the number of new products firms introduced (Garcia Martinez et al. 2019; Helmers and Rogers 2010), while others measure it via expert rating of major innovation (Carroll and Teo 1996; Talay et al. 2014). Even though such "conceptual proliferation" was noted by various scholars from different domains as a source of heterogeneous findings in empirical studies and an impediment to conceptual progress (Damanpour 2020; Ugur and Vivarelli 2021; Garcia and Calantone 2002), scholars did not draw adequate concern to the reconciliation of conceptual definition of organizational innovation. To this end, more conceptual research is needed regarding the commonalities and differences in conceptualizing innovation to shed light on the common grounds and divergence of conceptualization across domains. This is promising, as it encourages interdisciplinary dialogue and surfaces the core and peripheral elements of innovation construct across domains. Therefore, future studies could investigate *16) How do different domains (e.g., economics, strategic management, and marketing) conceptualise innovation and firm survival constructs, and what are the commonalities and differences in conceptualizations across fields?*

Many scholars in the pertinent literature have focused on some aspects of the innovation dimension (Fig. 2). However, the literature disproportionately emphasized technological innovation. Albeit the improvements, these characteristics spot-

light that the pertinent literature needs to be further developed by exploring other types of innovation such as non-technological innovation, which is regarded as a factor with strong potential to contribute to firm performance (Volberda et al. 2014). Drawing on the complementary/compensatory perspective, for instance, future studies could explore the interaction of technological and organizational innovation and their impact on short-term survival (refer to RQ3 in Table 9). Similarly, as we stand on the brink of significant technological change, scholars can go one step further to explore the dynamics of the adoption of digital innovation, AI-based innovation in particular, and traditional industrial innovation (e.g. product and process innovation) and their interactive impact on firms' long-term survival prospects.

Regarding firm survival, we noticed that Firm failure (or firm exit) is implicitly assumed as a negative outcome, while firm survival is viewed as a goal of firms in the pertinent literature. Despite the increasing reluctance to equate firm survival with success (Cefis et al. 2021), this shift is not fully reflected in the innovation and firm survival research area. Scholars, irrespective of the field, primarily conceptualize firm survival as continued operation without considering the financial and market performance of firms, treating it as an essential precondition of other firm outcomes such as firm success and firm profitability. The implicit assumption leads to the inclusion of "zombie firms" – firms that managed to survive, but often due to government support, but would otherwise exit the market due to poor performance. This issue can be mitigated by increasing sample size and conducting long-term survival analysis to better identify and differentiate inherently persistent "zombie firms".

While the application of a finer-grained view of firm survival dimensions provides a more nuanced view of innovation and survival-related outcomes, the absence of clear conceptual boundaries of each dimension (e.g., firm closures VS firm liquidation) further complicates the picture. At this point, conceptual research is needed to delineate the boundaries of different exit modes such as firm closure, voluntary liquidation, forced liquidation, hostile M&A, and Harvesting.

Further, most empirical studies (95%) used organizational mortality and firm death measures such as market exit and bankruptcy to proxy firm survival, despite their initial attention to theorizing innovation and firm survival associations. At this point, Josefy et al. (2017) suggest using genuine firm survival measures such as the overall life span of a firm or the number of years a firm survived after a baseline (e.g., Wilbon 2002; Hyytinen et al. 2015), to mitigate the disconnection between theory and empirics. In line with this, we recommend adopting more flexible measures to proxy firm survival prospects such as firm adaptability, market persistence, or resilience, in comparison to the existing literature which primarily employed strict financial and market-based approaches to measure firm survival. This view is further intensified by considering other non-economic indicators of firm survival to incorporate a broad set of organizational activities and the interests of secondary stakeholders such as employees, NGOs, or society at large. At this point, the moral failure of firms, for instance, can be examined in the context of social innovation including responsible innovation, sustainable innovation, or patient innovation. In doing so, we can better comprehend the ethical dilemma arising from adopting innovation to boost productivity and efficiency, which in certain cases disregards the local culture or environment. To properly address the issues, the following research question could be asked,

17) To what extent does stakeholder pressure (from customers, employees, or broader society) shape responsible innovation practice(or sustainable innovation), and, in turn, mitigate or increase the risk of moral failure of firms (e.g. loss of social responsibility, labour exploitation)?

5.4 New methods and data sources

The systematic review reveals that most studies rely on administrative data or public records to track firm survival data. While cost-effective and comprehensive, it systematically favours better-performing firms, overlooking those with higher failure rates (Josefy et al. 2017), which biases the assessments of innovation's impact on survival. To mitigate this, we support Yang and Aldrich's (2012) approach of using event history data, incorporating a substantial number of new enterprises whose gestation period starts ten years before the observation window. Additionally, qualitative insights from case studies, interviews with industry experts, and survey data can enhance validity through data triangulation.

Moreover, capturing innovation data at a single point in time (e.g., at founding or before a crisis) fails to reflect the dynamic nature of firms' innovation activities. To this end, future studies should examine how firms' innovation efforts evolve and impact survival rates. Landmark analysis, for instance, is a promising technique to capture how time-varying innovation activities affect different exit routes of firms (e.g. Cefis et al. 2023). Beyond this, an autoregressive model could assess whether firms with high innovation efforts (or lower) in the past exhibit higher (or lower) innovation capabilities in the future. Furthermore, a cross-lagged feedback loop model could explore the reciprocal relationship between innovation and firm survival across multiple time points. To properly address the time-varying innovation variable and complex causal dynamics, future studies could ask *18) Under what conditions do firms retain or discontinue their innovation activities over time?19) Does the firms' past innovation efforts lead them to sustain innovation in the subsequent period? 20) Is there any reinforcing (or negative) feedback loop where past innovation success increases the chances of survival, boosting future innovation efforts?* These models provide a foundation for understanding the causal relationship between innovation and firm survival.

The third issue is related to the methodological choice and robustness analysis. We recommend considering unobserved heterogeneity (frailty) in model specification and employing statistical tests (e.g., Schoenfeld residuals test) to decide between accelerated failure time models (AFT) and proportional hazard model (Manjón-Antolín and Arauzo-Carod 2008; Ugur and Vivarelli 2021).

Finally, most prior studies employ standard econometric techniques (e.g., Cox regression, complementary log–log models) to analyze innovation's effect on firm survival. However, few have utilized advanced methods such as fuzzy-set qualitative comparative analysis (fsQCA), which accommodates asymmetric relationships and examines complex combinations of independent variables leading to similar outcomes(refer to RQ1 and RQ2 in Table 9). Moreover, future research should also incorporate meta-analysis to quantitatively synthesize empirical findings, enhance accuracy, and offer evidence-based recommendations for practitioners and policy-

makers (Aguinis et al. 2011). Meta-analytic structural equation modelling (MASEM) could further uncover unexplored mechanisms linking innovation and firm survival, such as mediation effects. MASEM can also compare different innovation types and sequences to determine which configurations most strongly enhance or hinder firm survival.

6 Conclusion

This study conducted a systematic literature review to provide a comprehensive overview of innovation and its impact on firm survival. Our review synthesizes existing research, integrates key findings into a general framework, and outlines future research directions to advance the field. Our analysis reveals that most studies on innovation and firm survival are grounded in economic-oriented theories (e.g., Resource-Based View, Dynamic Capabilities, Evolutionary Economics, and Active Learning Theory), focus predominantly on manufacturing industries in developed economies, and rely heavily on administrative records to examine the effects of technological product innovations. However, the conceptualization and measurement of innovation vary widely across studies, often lacking clear theoretical justification. Moreover, firm survival is primarily conceptualized as continued operations, often without accounting for firms' financial and market performance.

Building on these insights, we propose several promising avenues for future research. We encourage the exploration of alternative theoretical perspectives (e.g., Resource Orchestration Theory, Institutional Theory, and Configurational theory), the expansion of research settings to underexamined contexts (e.g., the healthcare industry, emerging economies, and low-income countries), and the investigation of underexplored constructs (e.g., patient innovation and the moral failure of firms). Additionally, we advocate for adopting advanced methodological approaches (e.g., fuzzy-set Qualitative Comparative Analysis fsQCA) and a more nuanced consideration of intertemporal variability in model specifications to better capture the dynamic and multifaceted nature of innovation and firm survival.

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