ISTANBUL TECHNICAL UNIVERSITY ★ GRADUATE SCHOOL

INNOVATION AND FIRM SURVIVAL: A SYSTEMATIC LITERATURE REVIEW AND META-ANALYSIS

Ph.D. THESIS

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Department of Management

Management Programme

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YENİLİK VE FİRMANIN HAYATTA KALMASI: SİSTEMATİK LİTERATÜR İNCELEMESİ VE META-ANALİZİ

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Her zaman yanımda olan anneme ve eşime,

FOREWORD

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TABLE OF CONTENTS

Page

FOREWORD ..... **ix**
TABLE OF CONTENTS ..... **xi**
ABBREVIATIONS ..... **xiii**
LIST OF TABLES ..... **xv**
LIST OF FIGURES ..... **xvii**
SUMMARY ..... **xix**
ÖZET ..... **xxi**
1. INTRODUCTION **1**
1.1 General Background and Aim of the Dissertation 1
1.2 Research Gap 3
1.3 Research Methodology 4
1.4 Research Questions 4
1.5 Contributions to the Literature 5
1.6 Organization of the Thesis 7
2. SYSTEMATIC LITERATURE REVIEW **9**
2.1 Review Procedure 9
2.2 Coding Process 11
2.3 Findings Based on the TCCM Framework 12
2.3.1 Theory (T) 12
2.3.2 Context (C) 16
2.3.3 Characteristics and constructs (C) 17
2.3.4 Methodology (M) 30
2.4 General Overview of Past Research 34
2.5 Discussions and Implications 35
2.5.1 Theoretical underpinnings 39
2.5.2 New research settings 42
2.5.3 New constructs and characteristics 43
2.5.4 New methods and data sources 46
3. BIBLIOMETRIC ANALYSIS AND A FIELD-BASED CONTENT ANALYSIS **49**
3.1 Review Procedure 50
3.2 Bibliometric Analysis 51
3.2.1 Publication trends over the years 51
3.2.2 Most cited articles, authors, and journals 52
3.2.3 Intellectual structure of the research area 55
3.2.4 Conceptual structure of the research area 58
3.2.5 Thematic evolution of the research area 59
3.3 Findings Based on Field-Based Content Analysis 62
3.3.1 Across-field variations 68

3.3.2 Within field variations 68
3.3.3 Cross-field borrowing 69
3.3.4 Measurement consequences of firm survival 71
3.4 Discussions and Implications 73
3.4.1 Discussions 73
3.5.2 Implications 76
4. A QUANTITATIVE META-ANALYTICAL REVIEW 81
4.1 Conceptual Model and Hypothesis Development 82
4.1.1 Innovation and firm survival 83
4.1.2 Innovation and dimensions of firm survival 85
4.1.3 Innovation and firm survival contingencies 88
4.2 Methodology 96
4.2.1 Search strategy and inclusion criteria 96
4.2.2 Extracting effect size 97
4.2.3. Coding variables 99
4.3 Meta-analytic methods 99
4.4 Results 100
4.4.1 The hypothesized relationship between innovation and firm survival 100
4.4.3 Moderator analysis 106
4.5 Sensitivity and Robustness Checks 109
4.6 Discussions 113
4.6.1 Theoretical implications 113
4.6.2 Practical implications 119
4.7 Limitations of the Meta-Analysis 121
5. CONCLUSION AND RECOMMENDATIONS 123
5.1 General Discussion 123
5.2 Theoretical implications 127
5.3 Practical implications 131
5.4 Concluding Remarks 132
REFERENCES 133
APPENDICES 153
APPENDIX A 155
APPENDIX B 157
APPENDIX C 159
APPENDIX D 163
CURRICULUM VITAE 165

ABBREVIATIONS

SLR : Systematic Literature Review
ABS : Chartered Association of Business Schools
OECD : Organization for Economic Co-operation and Development
CIS : Community Innovation Survey
M&A : Mergers and Acquisitions
TTE : Time-to-Event
Cox PH : Cox Proportional Hazard
AFT : Accelerated Failure Time
KM : Kaplan-Meier
HR : Hazard Ratio
SE : Standard Error
V : Variance
fsQCA : Fuzzy-set qualitative comparative analysis
MASEM : Meta-analytic structural equation modeling
WIPO : World Intellectual Property Organization
NGO : Non-governmental organization
IPO : Initial Public Offering
ESG : Environmental, Social, and Governance
CSR : Corporate Social Responsibility
BMI : Business Model Innovation
HRM : Human Resource Management
IDV : Individualism
UAI : Uncertainty Avoidance Index

LIST OF TABLES

Page

Table 2.1: Theories used to explain the impact of innovation on firm survival..... **15**
Table 2.2: Research settings used in studies on innovation-firm survival **17**
Table 2.3: Categorization of the Innovation Dimensions used in articles **20**
Table 2.4: Innovation dimensions used in the reviewed studies **23**
Table 2.5: Subjective and objective measures of innovation used in the review **24**
Table 2.6: Various conceptualizations of firm survival in the review **27**
Table 2.7: Independent, mediating, and moderating variables in the review **29**
Table 2.8: Methods and Data Sources **31**
Table 2.9: The analytical approach used in the literature **33**
Table 2.10: Future research directions on innovation and firm survival **37**
Table 3.1: The most influential articles on the impact of innovation on the firm Survival **53**
Table 3.2: The top 10 contributing authors **54**
Table 3.3: Top publication outlets **54**
Table 3.4: Cluster distribution of co-citation analysis **57**
Table 3.5: Reconciliation matrix of field-based assumptions and conceptualization of İnnovation and firm survival **64**
Table 3.6: Primary research questions of each field **67**
Table 3.7: Firm survival operationalization and its impact on the overall effect **72**
Table 4.1: Extracting effect sizes approaches **98**
Table 4.2: The meta-analysis results of the association between innovation and firm survival **102**
Table 4.3: Results of moderator analysis of the impact of innovation on overall firm survival **108**
Table 4.4: Robustness checks: Results of the overall analysis without outlier **111**
Table 4.5: Robustness checks: Results of the subgroup analysis without outlier **112**
Table 4.6: Meta-analytical evidence across firm performance and firm survival studies **116**

LIST OF FIGURES

Page

Figure 2.1: PRISMA Framework **11**
Figure 2.2: Overview of research on the impact of innovation on firm survival **34**
Figure 3.1: PRISMA flow chart **51**
Figure 3.2: Annual publication trend **52**
Figure 3.3: Co-citation network of authors, citation cut-off point=20 ..... **55**
Figure 3.4: Thematic map of innovation-firm survival link between 1990-2023 ..... **59**
Figure 3.5: Thematic evolution of innovation and firm survival 1995-2008 ..... **59**
Figure 3.6: Thematic evolution of innovation and firm survival 2009-2015 ..... **60**
Figure 3.7: Thematic evolution of innovation and firm survival 2016-2019 ..... **61**
Figure 3.8: Thematic evolution of innovation and firm survival 2020-2023 ..... **61**
Figure 3.9: Across-field/within-field variations and cross-field borrowing map **71**
Figure 3.10: Multi-channel framework **76**
Figure 4.1: Conceptual model **95**
Figure 4.2: PRISMA diagram for study inclusion in the meta-analysis **97**
Figure 4.3: Impact of innovation on overall firm survival (N=39) **103**
Figure 4.4: Funnel plot: innovation and overall firm survival **104**
Figure 4.5: Funnel plot left: innovation and firm failure. Right: innovation and pooled exit **104**
Figure 4.6: Leave-one-out analysis **110**
Figure 4.7: Top 5 most influential studies in LOO analysis **110**

INNOVATION AND FIRM SURVIVAL: A SYSTEMATIC LITERATURE REVIEW AND META-ANALYSIS

SUMMARY

As a unique dimension of firm performance, firm survival and its relationship with innovation have long traditions in both academia and practice. In the same vein, the last three decades have witnessed numerous studies investigating the fate of innovative firms. However, there is no systematic discussion on whether innovative firms are more likely to survive than their non-innovative counterparts. Therefore, this study aims to systematically review the extant literature on the impact of innovation on firm survival to answer whether innovation truly helps a firm's survival prospects.

In this dissertation, the author employed four systematic review approaches to provide a comprehensive understanding of the relationship between innovation and firm survival. Firstly, the author conducted a framework-based review under four different themes: theory, context, characteristics, and methodology, to provide an answer to what is already known in the extant literature. Based on the identified gap from the review, the author outlined detailed future research directions to enrich the existing body of knowledge.

Secondly, the author combined bibliometric analysis with a field-based content analysis to further analyze and visualize the extant literature. In the bibliometric analysis, citation, co-citation, and thematic analysis were performed to identify the intellectual and conceptual structure of the research area. The bibliometric mapping highlights the exchange of ideas between economics and management/organizational research, as well as the dominance of economics-oriented theories explaining the innovation and firm survival link. This pattern aligns with the findings from the framework-based review. To further examine the pattern of how ideas, theoretical perspectives, and assumptions about innovation and firm survival are transferred, adapted, or reinterpreted across domains, the author conducted field-based content analysis. The results of the content analysis indicate that diverse theoretical perspectives rooted in different domains entail distinct underlying assumptions about innovation and firm survival, leading to the proliferation of concepts and the fragmentation of the field. Finally, the author builds a theoretically grounded and testable multi-channel framework to unify the fragmented body of knowledge on innovation and firm survival research.

Thirdly, the author conducted a meta-analysis on the impact of innovation on overall firm survival using data from 39 independent samples, encompassing over 950,000 firms. The results show that innovative firms have an 18% lower hazard rate than non-innovative ones, suggesting that, on average, innovation has a protective effect on overall firm survival. More specifically, innovative firms are more likely to survive in

the export market and are less likely to experience negative or pooled exits. Results provide no significant effect on innovation and mergers and acquisitions (M&As). Furthermore, subgroup analysis was performed to examine how innovation's effect varies across different settings. That is, firms operating in a low-uncertainty avoidance context and operating in a high-technological environment exhibit a more substantial protective effect of innovation on firm survival. In addition, the innovation output approach is a weak but statistically significant moderator between innovation and the firm survival link. Taken together, corroborating evidence from both meta-analysis and robustness tests indicates that the impact of innovation on firm survival is highly heterogeneous and context-sensitive, depending on factors such as national culture, industry type, and innovation measurement. This provides empirical support for the multi-channel framework developed in the previous chapter, which accounts for the importance of societal norms, environmental factors, and innovation outputs for the focal link.

All in all, by using methodological triangulation, this dissertation contributes to the literature by systematically analyzing the impact of innovation on firm survival research conceptually, structurally, and empirically. It is believed that this dissertation provides valid explanations of whether innovation enhances firm survival and opens a new avenue for considering interaction-based and complex models in the innovation and firm survival research area.

YENİLİK VE FİRMANIN HAYATTA KALMASI: SİSTEMATİK LİTERATÜR İNCELEMESİ VE META-ANALİZİ

ÖZET

Innovasyon ve firmaların performansı ile olan ilişkisi, özellikle firmaların hayatta kalma olasılığı ile olan ilişkisi stratejik yönetim ve mikroekonomi literatüründe uzun süredir ilgi çeken araştırma konusu olarak önemini korumaktadır. Benzer biçimde, son otuz yıl yenilikçi firmaların kaderini inceleyen çok sayıda çalışmaya tanıklık etmiştir. Ancak, yenilikçi firmaların yenilikçi olmayanlara kıyasla hayatta kalma olasılığının daha yüksek olup olmadığına ilişkin sistematik bir tartışma henüz bulunmamaktadır. Bu nedenle bu çalışma yeniliğin şirketlerin hayatta kalması üzerindeki etkisine dair tüm literatürü sistematik biçimde analiz ederek yeniliğin firmaların hayatta kalma olasılığını gerçekten artırıp artırmadığını ortaya koymayı amaçlamaktadır.

Yazar bu amaç doğrultusunda firmaların hayatta kalması üzerindeki etkisine ilişkin literatürü kavramsal, yapısal, ve ampirik açıdan incelemiştir. Mevcut tez çalışması bu doğrultusunda dört farklı inceleme yaklaşımı kullanmıştır (çerçeveye dayalı sistematik inceleme, bibliyometrik analizi, içerik analizi, ve meta-analizi).

İlk olarak, yazar 1990 ile 2022 yılları arasındaki yeniliğin firmaların hayatta kalma olasılığına olan etkisini inceleyen tüm çalışmaları taramıştır. Bu anlamda, toplam 73 çalışmaya teori, bağlam, kavram ve metod olmak üzere dört tema altında çerçeveye dayalı bir inceleme gerçekleştirmiştir. Bu ilişkiye kuramsal açıdan bakıldığında, evrimsel ekonomi kuramı ve aktif öğrenme kuramı gibi yaklaşımların sıkça kullanıldığı görülmektedir ve bu durum ekonomi odaklı görüşlerin ilgili literatürde baskınlığını ortaya koymaktadır. Bağlamsal olarak ise, ilgili çalışmaların büyük çoğunluğu ABD ve Birleşik Krallık gibi gelişmiş ülkelerin üretim sektörüne odaklanmaktadır. Aynı zamanda çalışmaların önemli bir kısmı küçük veya girişimci firmaların hayatta kalmasını incelemektedir. Konuya kavramsal açıdan bakıldığında, araştırmaların çoğu teknolojik yeniliğe odaklanmakta ve firmaların genel çıkışını başarısızlıkla eşitlemektedir. Bununla birlikte, firmaların hayatta kalma göstergesi çoğunlukla ekonomik performansa dayanarak ele alınmıştır: bu bakış açısıyla çalışanlar ve toplum gibi ikincil hissedarların çıkarları göz ardı edilmektedir. Metod olarak firmanın hayatta kalması "zamana bağlı sonuç" niteliği taşıdığı için, çoğu çalışma Cox orantılı tehlike modeli (Cox modeli) olmak üzere hayatta kalma analizi yöntemleri kullanmaktadır. Bu incelemden elde edilen araştırma boşluklarına dayanarak, yazar mevcut bilgi birikimini zenginleştirmek amacıyla dört tema altında ayrıntılı gelecekteki araştırma yönelimleri önermektedir. Kuramsal açıdan, gelecekteki araştırmaların kurumsal teori gibi yönetim teorilerinden yararlanarak, teknolojik

olmayan inovasyonun (örneğin yeni yönetim uygulaması) sembolik benimsenmesi ve bunun firmaların hayatta kalmasına etkisi gibi yeterince incelenmemiş alanları ele alması gerekmektedir. Bağlamsal açıdan, gelecekteki çalışmalar sağlık sektöründe hasta inovasyonu ve savunma sanayide teknolojik inovasyon gibi yeterince araştırılmamış sektörleri ve yeni ortaya çıkan inovasyon türlerini kapsayacak şekilde araştırma alanını genişletebilir. Ayrıca Türkiye, Japonya ve Singapur gibi diğer inovasyon güç merkezleri de araştırma bağlamı olarak kullanılabilir. Kavramsal olarak, teknolojik olmayan inovasyonun yanı sıra, firma ahlaki varlığının sürdürülmesi, meşruiyetin sürdürülmesi veya firmanın sosyal itibarı gibi firma hayatta kalmasının ekonomik olmayan göstergeleri; çalışanlar, sivil toplum kuruluşları ve toplum gibi ikincil paydaşların çıkarlarını kapsayarak özgün bir bakış açısı sunabilir. Yöntemsel açıdan ise, konfigürasyonel analiz ve diğer ileri analitik yöntemler (örneğin fsQCA) gibi modern istatistiksel tekniklerin kullanımı, inovasyonu ve firma hayatta kalmasını şekillendiren çoklu faktörler arasındaki karmaşık etkileşimleri yakalamaya yardımcı olabilir. Bu yaklaşımların benimsenmesiyle araştırmacılar, inovasyonun dönüşen yapısına ilişkin daha güncel ve daha incelikli içgörüler üretebilirler.

İkinci olarak, yazar mevcut literatürü daha derinlemesine analiz etmek ve görselleştirmek için bibliyometrik analiz ile içerik analizini birleştirmiştir. Bibliyometrik analizde, araştırma alanının entelektüel ve kavramsal yapılarını belirlemek amacıyla, atıf, ortak atıf ve tematik analiz gerçekleştirilmiştir. Bibliyometrik haritalama, ekonomi ve yönetim/organizasyon alanları arasında fikir alışverişi ve yenilik ile firmanın hayatta kalma ilişkisini açıklamada ekonomi odaklı kavram ve kuramların daha baskın olduğunu ileri sürmektedir. Bu örüntü, çerçeveye dayalı incelemeden elde edilen bulgularla uyumludur. Yenilik ve firmaların hayatta kalmasıyla ilgili fikirlerin, kuramların ve varsayımların farklı alanlar arasında nasıl aktarıldığını, uyarlandığını ve yeniden yorumlandığını daha ayrıntılı incelemek için, yazar içerik analizi gerçekleştirmiştir. İçerik analizi sonuçları, farklı alanlara kök salmış çeşitli kuramsal bakış açılarının yenilik ve firmaların hayatta kalmasıyla ilişkili farklı varsayımlar içerdiğini, bunun da yenilik ve hayatta kalma kavramlarının çoğalmasına ve alanın parçalanmasına yol açtığını göstermektedir. Son olarak, yazar yenilik ve firmaların hayatta kalmasına ilişkin araştırmalardaki parçalı bilgi birikimini birleştirmek amacıyla kuramsal temeli sağlam, test edilebilir çok kanallı çerçeve geliştirmiştir. Bu çerçeve, yeniliğin firmaların hayatta kalmasına olan etkisinin mevcut literatürde öne sürüldüğü gibi tek bir yoldan değil, birden fazla katmanlı kanal aracılığıyla etkilediğini ileri sürmektedir. Bu kanallar ilgili mekanizmalar tetiklendiğinde devreye girmekte. Örneğin, şirket kaynak ve yeteneklerinin yeniden yapılandırılması yoluyla (yetenek kanalı), çevreye uyum sağlamak için üretkenlik ve verimliliğin artırılması yoluyla (seçme/seçilme kanalı) ya da meşruiyet ve paydaş desteğini güçlendirmek yoluyla (meşruiyet kanalı) etkide bulunmaktadır. Yenilik ve firmaların hayatta kalması arasındaki ilişkiyi çok kanallı ve bağlama duyarlı bir süreç olarak ele almak, parçalı literatürü birleştirerek konuya daha bütüncül bakmamızı sağlamaktadır.

Üçüncü olarak, yazar yeniliğin firmaların hayatta kalmasına olan etkisine ilişkin meta-analizi gerçekleştirmiştir. Meta-analizi, 39 bağımsız örnekten toplamda 950.000'den fazla firmadan elde edilen verileri kapsamaktadır. Sonuçlar, yenilikçi firmaların yenilikçi olmayan firmalara kıyasla %18 daha düşük tehlike oranına sahip olduğunu göstermektedir: bu da ortalama olarak yeniliğin firma yaşamı üzerinde koruyucu bir etki yarattığını düşündürmektedir. Daha spesifik olarak, yenilikçi firmaların ihracat pazarında hayatta kalma olasılıkları daha yüksek olup, firmaların başarısızlığa ya da

genel çıkışlarla karşılaşma olasılıkları daha düşüktür. Ancak, çalışma yenilik ile birleşme ve satın almalar (M&A) arasında anlamlı bir etki olmadığını göstermektedir. Ayrıca, yazar yeniliğin etkisinin farklı koşullara göre nasıl değiştiğini incelemek için alt grup analizleri gerçekleştirmiştir. Buna göre, düşük belirsizlikten kaçınma kültüründe sahip veya yüksek teknolojik ortamlarda bulunan firmalar, yeniliğin firma yaşamı üzerindeki koruyucu etkisini daha güçlü biçimde göstermektedir. Buna ek olarak, yeniliği çıktı olarak ölçmek, mevcut ilişkide zayıf fakat istatistiksel olarak anlamlı bir etki sergilemektedir. Meta-analiz ve sağlamlık testlerinden elde edilen bulgular, yeniliğin firmaların hayatta kalması üzerindeki etkisinin oldukça heterojen ve bağlama duyarlı olduğunu; ulusal kültür, sektör ve yeniliğin ölçüm biçimi gibi birçok faktöre bağlı olarak değiştiğini göstermektedir. Bu sonuç, önceki bölümde geliştirilen çok kanallı çerçeveye toplumsal normların, çevresel unsurların ve yenilik çıktılarının önemini ön plana koyarak ampirik destek sunmaktadır.

Sonuç olarak, bu doktora tezi yöntemsel üçleme yaklaşımını kullanarak, inovasyonun firmaların hayatta kalması üzerindeki etkisini kavramsal, yapısal ve ampirik açılardan kapsamlı bir inceleme yaparak literatüre katkı sunmaktadır. Bu doğrultuda, çerçeve temelli incelemeler, bibliyometrik analizler, içerik analizleri ve meta-analizler olmak üzere dört inceleme yöntemi bütünleştirilmektedir. Bu yöntemsel üçleme, inovasyon–firma hayatta kalma ilişkisine dair örtüşen ve ayrışan çıkarımlar yapılmasına olanak tanımakta ve böylece daha sağlam ve genellenebilir bir bulgu seti ortaya koymaktadır. Bulgular, inovasyonun genel firma hayatta kalması üzerinde koruyucu bir etkiye sahip olduğunu göstermektedir. Ancak bu etki sonuca özgü ve bağlama bağımlıdır. Buna göre, düşük belirsizlikten kaçınma kültüründe sahip veya yüksek teknolojik ortamlarda bulunan firmalar, yeniliğin firma yaşamı üzerindeki koruyucu etkisini daha güçlü biçimde göstermektedir. Buna ek olarak, yeniliği çıktı olarak ölçmek, mevcut ilişkide zayıf fakat istatistiksel olarak anlamlı bir etki sergilemektedir. Yazar inovasyonun firmaların hayatta kalmasını nasıl etkilediğine ilişkin parçalı bir araştırma literatürünü çok kanallı bir çerçeve geliştirerek alanı sağlam bir kuramsal ve ampirik temelde birleştirmektedir. Bu tezin, yeniliğin firmaların hayatta kalmasını artırıp artırmadığına ilişkin geçerli açıklamalar sunduğu ve yenilik ile firma yaşamı araştırmalarında etkileşim temelli ve karmaşık modellerin ele alınmasına yönelik yeni bir açılım yarattığı düşünülmektedir.

1. INTRODUCTION

Since Schumpeter introduced the concepts of "innovation" and "creative destruction," innovation has been widely recognized as an essential driver of productivity growth and economic development. From the early 1990s, research has begun to explore how organizational variables influence innovation and has started examining firm-level innovation and its relationship to firm outcomes (e.g., Damanpour, 1991). Among these outcomes, scholarly interest in innovation as a key strategy for enhancing organizational resilience and ensuring long-term viability has increased (e.g., Destefanis et al., 2023; Özsuca et al., 2023; Kato et al., 2022). This dissertation examines the impact of firm-level innovation on firms' survival prospects. The introductory chapter covers the general background, research gap, and aim of the dissertation. It also discusses the methodology employed, research questions addressed, and potential areas of contribution. Finally, this chapter outlines the organization of the dissertation.

1.1 General Background and Aim of the Dissertation

The last three decades have witnessed a substantial increase in studies examining the impact of innovation on firm performance in general (Rosenbusch et al., 2011; Singhal et al., 2020) and firm survival in particular (Ugur and Vivarelli, 2021). Nevertheless, existing studies on the link between innovation and firm survival remain inconclusive, offering positive (e.g., Sharif and Huang, 2012; Wojan et al., 2018), nonsignificant (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). Several reasons may explain these inconsistencies. Theoretically, views on the effect of innovation on firm survival are becoming less aligned (Ugur and Vivarelli, 2021). The evolutionary model suggests that firms operating in an un-routinized technological regime are more likely to innovate, reach the technological frontier, and achieve the minimum efficient scale (MES); therefore, innovation is positively associated with firm survival (Audretsch and Mahmood, 1995). Conversely, active learning theory predicts that the relationship between R&D investment and firm survival is uncertain

due to the stochastic nature of R&D investment and industry-level competitive pressures (Ericson and Pakes, 1995). Schumpeterian competition models also predict an inverted-U relationship between innovation and firm survival: initially, innovation boosts firm survival, but beyond a certain point, diminishing returns and rising costs reduce the likelihood of survival (Ugur et al., 2016). Moreover, variations in research methodologies, such as research design (e.g., longitudinal vs. cross-sectional), sampling, innovation measurement (e.g., Rosenbusch et al., 2011; Ugur and Vivarelli, 2021), as well as operational definitions of firm survival and contextual settings (e.g., high-tech vs. low-tech), also contribute to inconsistent results. Furthermore, research on both innovation and firm survival is inherently multidisciplinary (Crossan and Apaydin, 2010; Damanpour, 2020; Josefy et al., 2017). As a result, conflicting findings may arise from different assumptions that researchers across domains hold about the concepts of innovation and firm survival. Despite this fragmented body of knowledge and the inconclusive relationship between innovation and firm survival, little effort has been made to systematically address this relationship.

Furthermore, firm survival is important because it reflects a firm's ability to continue operations, stay solvent, and continue ownership, thereby distinguishing it from the broader concept of firm performance (Josefy et al., 2017). Although firm performance and firm survival are often regarded as related concepts, they differ both conceptually and empirically. While firm performance generally refers to maximizing profit or return on assets (Rumelt, 1991), firm survival pertains to the continuation of operations, ownership, or solvency (Josefy et al., 2017). Empirically, unlike continuous indicators of firm performance, firm survival is often treated as time-to-event (TTE) data and modelled using survival analysis. Despite its uniqueness, firm survival is often viewed as a part of overall firm performance and is rarely studied in detail. This is evident in the growing number of systematic reviews and meta-analysis on innovation and firm performance published in leading management and innovation journals (e.g., Rosenbusch et al., 2016; Rousseau et al., 2016; Singhal et al., 2020), yet there is limited systematic discussion on innovation and firm survival. Additionally, existing research suggests that the link between performance and survival is complex, and the factors influencing both can vary significantly (Gimeno et al., 1997; 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, also enable firms to remain viable. This background knowledge underscores the need to critically

examine whether innovation enhances a firm's survival prospects. Therefore, this dissertation aims to systematically review the extant literature on the impact of innovation on firm survival prospects.

1.2 Research Gap

Several prior meta-analysis have sought to consolidate the relationship between innovation and firm performance, and these studies have found a weak to moderate relationship between the two (e.g., Rubera and Kirca, 2012; Rosenbusch et al., 2011; Rousseau et al., 2016; Singhal et al., 2020). That is, on average, innovative firms tend to perform better in the marketplace. Although it provides insightful knowledge, the correlation coefficient, as an effect size, reflects only the short-term co-movement between innovation activities and firm growth or financial returns, providing limited insight into whether innovation enhances or impairs firm survival in the long run. In the domain of firm survival, in particular, a few attempts have sought to document the link between innovation and firm survival. For example, the earliest review by Dalglish and Newton (2002) focused on a narrow subsection of the topic, examining empirical studies of the relationship between innovation and firm survival. Ugur and Vivarelli (2021) systematically reviewed how innovation affects two key firm-level outcomes: productivity and survival. They reviewed theoretical perspectives grounded in economics, such as evolutionary economics and active and passive learning theory, to assess whether these diverse perspectives contribute to the heterogeneous effects of innovation on firm survival. Furthermore, they also draw attention to the recent advances in modelling techniques that reveal nonlinearity and other forms of heterogeneity in innovation's effects. Despite their breadth, the reviews are primarily microeconomically oriented and do not systematically address other management theories, innovation constructs, or contexts. Furthermore, their approach to firm survival is relatively narrow, focusing on productivity rather than treating firm survival as a distinct, multifaceted concept. Finally, the review does not provide a formal synthesis of empirical findings or quantify the effect size and variability of innovation's impacts across different contexts. Therefore, a systematic literature review is needed to critically assess the current state of knowledge on the impact of innovation on the firm survival conceptually, intellectually, and empirically.

1.3 Research Methodology

To systematically review the extant body of knowledge from a conceptual, intellectual, and empirical perspective, this thesis employs a hybrid review integrating framework-based review, bibliometric analysis, field-based content analysis, and meta-analysis. Each review approach aims to capture the various aspects of the relationship between innovation and firm survival research. For example, the framework-based review discussed in the second chapter seeks to provide a clear and comprehensive understanding of the four structured themes: Theory (T), Context (C), Characteristics (C), and Methodology (M), which serve as the cornerstone of the extant literature. The bibliometric analysis discussed in the third chapter aims to analyze and visualize the structure and connections of collective knowledge on the topic. Then, the findings of the bibliometric analysis were integrated and reinforced by a field-based content analysis, which allowed examination of the intellectual structure identified in the bibliometric analysis. Finally, the fourth chapter's meta-analysis seeks to provide quantitative evidence on innovation and firm survival-related outcomes. This methodological triangulation complements the inherent limitations of any single method and enables the drawing of a more robust and generalizable conclusion (Morse et al., 2014).

1.4 Research Questions

Following the foundational tenet of triangulation, different research questions are asked about the same phenomenon (Jack and Ratura, 2006). In this thesis, the author seeks to address the following research questions:

RQ1: Which theories, contexts, constructs, and methodologies are incorporated into the literature of innovation and firm survival? (Chapter 2)

RQ2: What are the probable future research directions for innovation and firm survival under these four themes? (Chapter 2)

RQ3: What is the intellectual foundation of research on innovation and firm survival? (Chapter 3)

RQ4: How do assumptions from different disciplines about innovation and firm survival shape the conceptualization, and how might integrating these perspectives reconcile differences and advance the field? (Chapter 3)

RQ5: Does innovation enhance firm survival prospects? (Chapter 4)

RQ6: Does the association between innovation and firm survival get affected by environmental, firm-level, and methodological factors? (Chapter 4)
RQ7: What are the theoretical and practical implications of innovation for firm survival? (Chapter 4)

1.5 Contributions to the Literature

This dissertation makes several theoretical and methodological contributions to the existing body of knowledge. First, this PhD study employs a hybrid review to develop a multi-channel framework that explains the relationship between innovation and firm survival. This framework proposes that innovation influences firm survival not via a single pathway, as suggested by existing literature, but through multiple layered channels. These channels activate when the relevant one is triggered: reconfiguring resources and capabilities (Capability channel), improving productivity and efficiency to adapt to the environment (Selection channel), or increasing legitimacy and stakeholder support (Legitimacy channel). Viewing the link between innovation and firm survival as a multi-channel, context-dependent process explains why previous bivariate models often yielded inconsistent results. Consequently, this study offers a unified, theoretically grounded, and testable framework to integrate the fragmented literature. Second, through meta-analysis, the author provides empirical support for the multi-channel framework introduced in Chapter 3. This framework suggests that innovation impacts firm survival via multiple channels, whose activation depends on specific environmental and organizational factors. Consistent with this, the moderator analysis indicates that output-based innovations, such as product innovation and patenting, tend to yield stronger survival benefits, consistent with the capability channel, in which a firm's ability to translate knowledge into tangible outcomes enhances resilience. Additionally, firms in high-technology environments are more likely to survive, emphasizing the selection channel, where innovation increases productivity, efficiency, and environmental fit, reducing the risk of outright failure (Nelson and Winter, 1982). Furthermore, national cultural factors, particularly uncertainty avoidance, influence the innovation-survival relationship through the legitimacy channel, indicating that informal institutions and societal norms shape stakeholders' perceptions of innovation and overall firm survival. Overall, the meta-analysis highlights a nuanced, context-dependent understanding of innovation's role in

firm survival and advocates a configurational approach to better capture its complexities. Third, multiple reviews indicate that research on the impact of innovation on firm survival requires new theoretical perspectives distinct from the broader innovation and firm performance discourse. In this regard, the threshold theory of firm survival (Gimeno et al., 1997) is a proper lens to understand not only the relationship between two sibling concepts: performance and survival, but also to propose a theoretical reconciliation of conflicting findings in prior research. The theory suggests that firm survival depends not only on overall firm performance but also on whether firms are above or below certain performance thresholds (Gimeno et al., 1997). Considering firm survival as a function of both firm performance and relative performance thresholds allows us to examine how innovation affects firms' performance thresholds. Accordingly, the author proposes that the dual effect of innovation on performance thresholds may contribute to the substantial heterogeneity of focal relationships. The positive impact of innovation on performance thresholds supports the widely held view that innovation is inherently risky and costly. In contrast, the adverse effect of innovation on performance thresholds may suggest that innovation is configured to other firm and environmental factors, such as social capital and resource mobilization, so that it helps firms surpass the thresholds. Approaching the innovation and firm survival relationship from a threshold theory perspective explains why empirical findings on innovation's influence on survival are highly heterogeneous and context-dependent, and why a bivariate direct relationship is insufficient to capture this complex phenomenon. Therefore, the author argues that the relationship between innovation and firm survival cannot be fully understood through performance-based theories alone; instead, survival requires a distinct theoretical approach grounded in interactive, complex models. Finally, this dissertation employs methodological triangulation by using two complementary review approaches, including qualitative and quantitative reviews, to examine the same phenomena: the relationship between innovation and firm survival. The purpose of methodological triangulation is to confirm findings through the convergence of different perspectives; therefore, triangulation is useful for observing similarities across different review approaches, thereby enabling the generation of convergent inference (Jack and Raturi, 2006). The combined insights from the review highlight that innovation generally enhances overall firm survival; however, this relationship is highly heterogeneous and context-sensitive, and the proliferation of conceptualizations of innovation and firm

survival is identified as the primary source of the fragmented body of knowledge. Building on this joint inference, the author reflects on the general findings from the review and develops a comprehensive framework that unifies the fragmented body of knowledge.

1.6 Organization of the Thesis

This dissertation consists of five chapters. The introductory chapter provides an overview of the topic and states the thesis's objectives. It highlights the research gap and outlines the potential contributions to the existing body of knowledge. The chapter also covers the research methodology and formulates the research questions. The remaining chapters of the PhD thesis are organized as follows.

Chapter 2 provides a structured review of how innovation influences firm survival, organized around theory, context, characteristics, and methodology. It lays the groundwork by discussing the theoretical perspectives that explain this relationship. The chapter also covers the contextual factors such as country of origin, industry, region, and the firm's development stage. Additionally, it traces the conceptual evolution of innovation and firm survival and elaborates how both constructs are conceptualized and operationalized. Furthermore, it offers insights into the methodological approaches used to study the focal relationship. Overall, this chapter clarifies what is already known about theory, context, characteristics, and methods, and suggests avenues for future research to advance existing knowledge.

Chapter 3 offers further analysis and visualization of scientific knowledge by combining bibliometric analysis with field-based content analysis. It examines the intellectual and conceptual structure of research on how innovation affects firm survival, highlighting underlying assumptions about innovation and firm survival across domains and how these assumptions lead to conceptual proliferation and field fragmentation. Additionally, this chapter discusses the mukti-channel framework.

Chapter 4 outlines the conceptual framework and hypotheses developed from the extensive literature review in earlier chapters. It employs a meta-analytic approach to present empirical evidence on how innovation influences outcomes related to firm survival, including export market persistence, negative exit (firm failure), mergers and acquisitions (M&A), and pooled exit (undifferentiated exit). The chapter also presents subgroup analysis to examine how the effects of innovation differ across national

cultures, industry contexts, firm ages, and innovation measures. It concludes with robustness and sensitivity checks, highlighting both theoretical insights and practical implications.

Chapter 5 provides the general discussion, explores theoretical and managerial implications, and concludes with final remarks.

2. SYSTEMATIC LITERATURE REVIEW

In this chapter, the author adopts a systematic literature review (SLR) approach—a framework-based review—to provide a comprehensive overview of the impact of innovation on firm survival research. This chapter employs the TCCM framework developed by Paul and Rosado-Serrano (2019), in which T denotes theory, C denotes context, C denotes characteristics, and M denotes methodology to present the state of knowledge on innovation and firm survival research. The TCCM framework is widely adopted by scholars across various fields (e.g., Mandler et al., 2021; Kittur and Agarwal, 2024). As mentioned in the introduction, the author aims to address the following research questions:

RQ1: What theories, contexts, constructs, and methodologies are incorporated in the literature of innovation and firm survival?

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

This chapter begins by outlining the systematic literature review process, which follows the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) (Moher et al., 2009). This protocol provides detailed guidance on selecting eligible studies for the review. It is then followed by a comprehensive introduction to coding guidelines and the coding process. Subsequently, the research findings based on the TCCM framework are presented in terms of theory, context, constructs, and methodology, followed by the identified research gaps and future directions to advance the existing body of knowledge.

2.1 Review Procedure

To identify eligible studies for the review, the research adopts the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) diagram to provide a structured, transparent review process (Moher et al., 2009). In the identification stage, the author 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: 1) The selected time frame for the SLR was between 1990 and 2022, as this period marks the beginning of the upward trend in academic research on innovation and its impact on organizational outcomes (Damanpour, 1991); 2) Subjects of area were limited to Management, Business, Economics and Econometrics, and Social Science, allowing for disciplinary diversity in the included studies. Studies from the financial management and accounting literature were excluded, as these areas are primarily application-driven, focusing on building statistical models to predict firm failure/survival without delving into the theoretical foundations of the assumed relationship. This is also in line with the prior review on firm failure literature (e.g., Kücher and Feldbauer-Durstmüller, 2019; Amankwah-Amoah, 2016); 3) The document type was restricted to “journal articles” to ensure peer-reviewed content and the language was limited to “English”, since it is the working language of the review. This initial search returned 3592 articles. After removing duplicates, 2892 articles remained.

During the screening phase, the identified articles (N=2892) were screened based on titles and abstracts, and the introduction was reviewed as necessary. At this stage, articles focusing on the impact of innovation on any aspect of firm survival were included. It is worth noting that, at this point, the author aimed to be inclusive and flexible in the selection criteria to gain a comprehensive understanding of the research topic. After the screening process, 93 articles remained for full-text review.

In the final eligibility check, the author further refined the inclusion criteria, particularly with respect to empirical and conceptual boundaries. To achieve this, studies focusing on macro-level innovation, such as industry or regional-level innovation, that investigated the impact of innovation on firm performance, explored the drivers or antecedents of innovation, or used the term “survival” in a way that did not align with the review's aim, were excluded. Furthermore, conceptual papers, qualitative studies, and case studies were excluded because the SLR in this chapter included studies that reported on innovation and firm survival constructs, measures, and relationships (e.g., Mandler et al., 2021). Additionally, articles published in journals not listed in the Association of Business Schools (ABS) Academic Journal Guide were excluded. This stage of the search process yielded 66 articles, excluding

retracted and inaccessible articles.

Finally, a manual reference check of the 66 articles identified an additional 7 studies. Overall, 73 articles were selected for the SLR. The article selection steps (PRISMA flow diagram) for the literature review are shown in Figure 2.1.

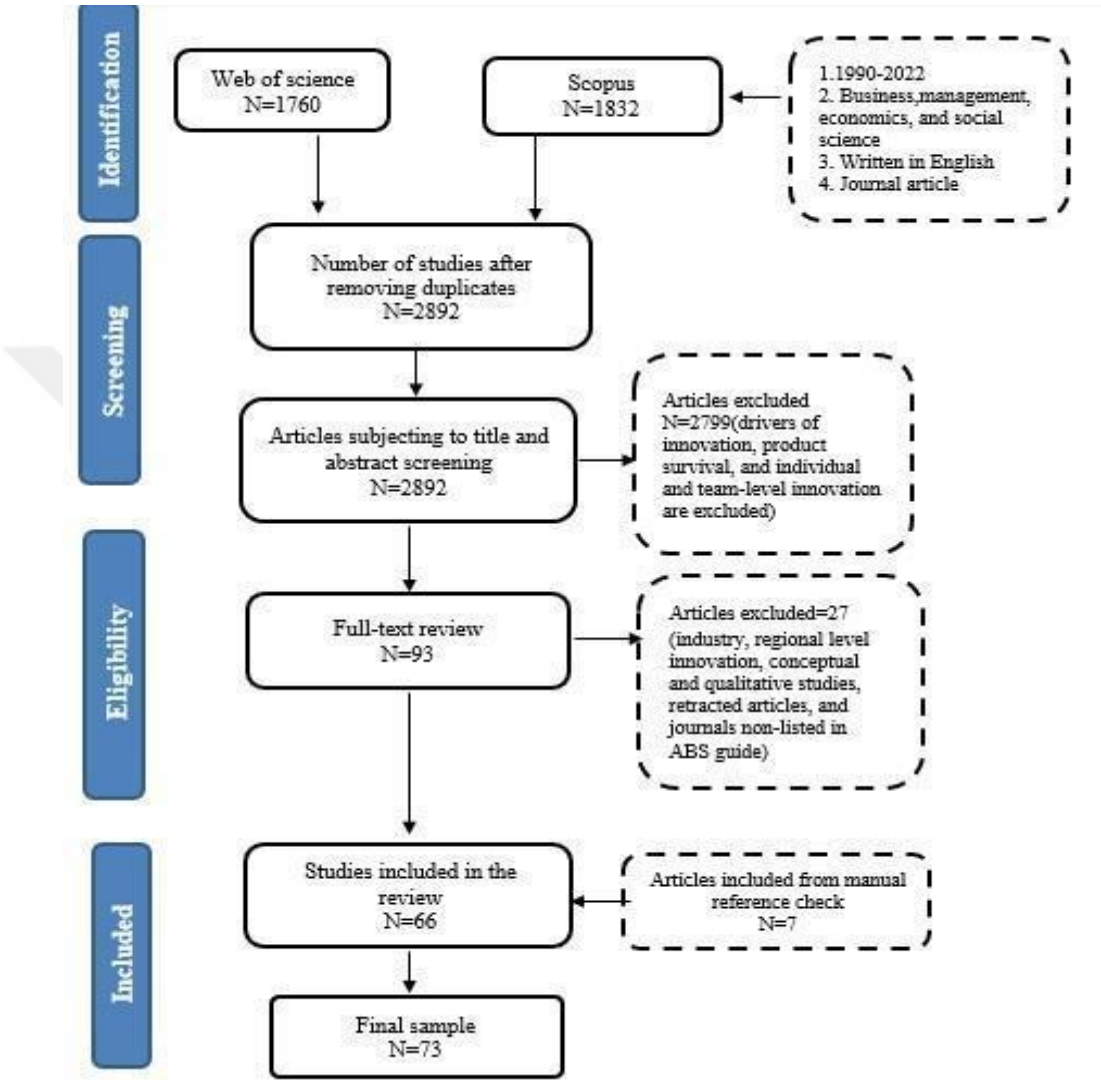


Figure 2.1: PRISMA framework.

2.2 Coding Process

To consolidate the research findings, a qualitative approach was adopted, with all eligible studies subjected to content analysis using a coding process in an Excel spreadsheet. Consistent with the aim of the thesis, a coding scheme was developed (Lipsey and Wilson, 2001) and designed across four main sections: 1) methodological

underpinnings of reviewed studies, including sample size, data collection, time emphasis, and statistical analytical approach 2) contexts, including country of origin, industry, region, and firm stage of development, 3) conceptual approaches toward innovation and firm survival constructs, moderators, and mediators in the relationship, and 4) theoretical perspectives of reviewed studies. The author and the thesis advisors resolved the disagreement over how to code studies using a predeveloped coding scheme.

2.3 Findings Based on the TCCM Framework

2.3.1 Theory (T)

The most used theoretical perspectives or frameworks to explain the relationship between innovation and firm survival in the reviewed articles were mainly determined based on the "authors' statements" within the articles. If not explicitly stated, the author inferred which theory was employed to explain the focal relationship. The results indicate 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 strategic management, organization studies, and entrepreneurship, highlighting the multidisciplinary nature of the topic. Regarding the overall evolution of theoretical approaches, contingency theory and resource-based view have gained prominence in recent decades, while active learning theory and organizational change theory have shown some decline.

2.3.1.1 Contingency theory and strategic alignment

According to the contingency theory, no single strategy suits all firms without considering their environmental context and relevant organizational structure (Venkatraman, 1989). Therefore, the behaviour and performance of organizations depend on certain internal and external contingencies (Mintzberg et al., 2020). In this review, contingency theory—the most frequently used perspective with an increasing trend over time (Table 2.1)—focuses on the moderating role of external environmental factors (e.g., Levitas et al., 2006; Kim and Lee, 2016; Ugur et al., 2016) and firm characteristics (e.g., Carroll and Teo, 1996; Lee et al., 2012; Sandberg et al., 2019; Zhang et al., 2020). Another application of this theory was to examine the contingent effect of risk on the existing relationship (e.g., Fernandes and Paunov, 2015; Howell,

2015; Hyytinen et al., 2015). Other boundary conditions were also considered concerning inter-firm relations, international experience, and internationalization strategy (e.g., Lee et al., 2012; Velu, 2015). Additionally, the concept of strategic alignment, which has a theoretical foundation in contingency perspectives, is closely related to contingency theory (Zajac et al., 2000). Studies based on strategic alignment theory were relatively fewer in number (2.73%), mainly examining the complementary effect of firm capabilities and innovation-related competitive actions on firm survival (Li et al., 2010) and exploring the fit between firms' degree of business model innovation and third-party alliances with complementary assets on firm survival (Velu, 2015).

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

According to RBV, firms must possess valuable, rare, imperfectly imitable, and non-substitutable resources to attain a sustainable competitive advantage (Wernerfelt, 1984; Barney, 1991). The RBV focuses on a firm's internal capacity to understand how resources and capabilities enable superior performance in the marketplace (Barney, 1991). The DC approach, which concerns a firm's ability to deploy resources effectively, has also emerged as an extension of the RBV (Eisenhardt and Martin, 2000; Teece et al., 1997). 21.9% of the empirical studies within the sample articles applied both theories, with an increasing trend over time, by viewing innovation as an organizational resource (e.g., Perez et al., 2004; Esteve-Pérez and Mañez-Castillejo, 2008; Cefis and Marsili, 2019). A further common application of these theories involves examining the complementary effect of a firm's R&D capability and innovation-related competitive actions on firm survival (Li et al., 2010), as well as investigating the compensatory effect of firm innovation on the relationship between market experience and exit from emerging markets (Sandberg et al., 2019). Additionally, the interrelations between marketing innovation, competitive advantage, and a firm's survival prospects (e.g., Chatzoudes et al., 2021; Naidoo, 2010) and the moderating role of the technological regime on firms' post-entry innovation efforts and survival prospects (e.g., Kim and Lee, 2016), were also examined through the lenses of RBV and DC.

2.3.1.3 Active learning theory

Active learning theory was proposed by Ericson and Pakes (1995) as an alternative to the passive learning model or the theory of "noisy selection,"(Jovanovic, 1982), in which firms gradually learn their efficiency levels through experience operating in the industry; those that are more efficient grow and survive, while the inefficient ones eventually exit the market (Cefis and Marsili, 2006; Jovanovic, 1982). In contrast, the active learning model highlights that firms deliberately seek new knowledge by engaging in research and development (R&D) to boost their competitiveness and performance (Ericson and Pakes, 1995), although the impact of R&D on firm survival remains indeterminate. In this review, this theory with a declining trend over time, has been either explicitly or implicitly applied to investigate the relationship between firms' R&D activities and their subsequent survival likelihood (e.g., Esteve-Pérez et al., 2010; Fernandes and Paunov, 2015). Furthermore, instead of focusing solely on the direct relationship between R&D activities and survival, Kim and Lee (2016) examined whether different technological regimes influence the link between firms' post-entry active learning and their survival prospects.

2.3.1.4 Evolutionary economic theory

Rooted in the Schumpeterian tradition, the evolutionary economic theory of Nelson and Winter (1982) attributes firms' exit behaviour to the process of learning and market selection, whereby the selection mechanism of the market penalizes firms that exhibit a low level of productivity and profitability, or low levels of environmental fit by weeding them out of the industry. In the evolutionary framework, innovation is understood in terms of profitability or productivity, whereby firms with higher profits or positioned in the upper part of the productivity distribution increase their market share and survival rates (Ugur and Vivarelli, 2020; Fontana and Nesta, 2009). In response, firms undertake innovation activities to improve efficiency and their relative position in the distribution of productivity levels and "environmental fit" (Howell, 2015). Empirical research grounded in evolutionary economic theory accounts for about 6.84% of the reviewed publications, with a slight increase after the 2000s. Most studies used evolutionary economic theory as a mere background (e.g., Cefis and Marsili, 2006, 2011). A few explicitly draw on evolutionary economic theory to develop hypotheses, examining how firms' innovation activities affect firm survival during crisis and testing the role of selection mechanisms in shaping existing

relationships within the evolutionary landscape (e.g., Cefis and Marsili, 2019; Guerzoni et al., 2021).

Other theoretical perspectives and frameworks that receive relatively little attention include organizational change and adaptation theory, the knowledge-based view, and first-mover advantage theory. Firstly, organizational change theory in the existing literature was used to shed light on the impact of innovation, as organizational change itself can be detrimental to firm survival due to the process effect of organizational change through technical innovation (e.g., Dowell and Swaminathan, 2000; Carroll and Teo, 1996). The knowledge-based view was employed either to examine the role of knowledge, proxied by innovation activities of firms, on firm survival (Cantner et al., 2009) or to investigate how firms leverage various knowledge resources, such as human capital and external knowledge, to foster firm-level innovation, which in turn affects firm survival prospects (García-Cabrera et al., 2021). According to the first-mover advantage theory, firms adopting a first-mover strategy become dominant in a product class or market and achieve superior performance relative to rivals (Lieberman and Montgomery, 1988). This theoretical perspective was used in two subfields of innovation research: strategic management and marketing. As for the former, Banbury and Mitchell (1995) examined how industry incumbents were among the first to introduce important incremental innovations that enabled them to achieve significant market share, thereby indirectly improving their survival rates. In the marketing domain, Min et al. (2006) addressed whether first-mover advantages protect new entrants with truly new products from outright failure.

Table 2.1: Theories used to explain the impact of innovation on firm survival.

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

2.3.2 Context (C)

2.3.2.1 Industry

Regarding the industrial context of the reviewed studies, almost three in four (76.7%) used a single-industry sample, with a decreasing trend since the 2010s, whereas 21.9% covered multiple industries (Table 2.2). Notably, studies across multiple industries appear to have increased since the 2010s. Meanwhile, the manufacturing industry remains the most common industrial context in this body of research, accounting for 53.4% of studies.

2.3.2.2 Country and region

The results show that the USA (26%) is the most frequently examined country as a research setting, despite a decreasing trend over time. This is followed by China (13.6%), the UK (8.21%), the Netherlands (6.84%), and Italy (6.84%). Notably, there were significant changes over time, including a sharp decline in studies conducted in the USA and a sudden increase in China (20.4%) and South Korea (6.12%) after 2010. In terms of continental distribution, Europe hosts most of the studies (45.2%), followed by North America (28.7%) and Asia (19.1%). Additionally, 6.84% of the reviewed studies adopted a multi-country perspective; however, none of them included cross-cultural comparisons.

2.3.2.3 Firm stage of development

The author classified the firms in the reviewed studies according to Miller and Friesen's (1984) typology: new ventures and diversified firms. More than one-third of the studies (34.2%) explicitly use samples of new ventures and startups. Unfortunately, 60.2% of the studies do not explicitly mention the firms' stage of development in their samples; instead, they describe their sample using firm size and firm age. Only four studies (4.10%) included samples of diversified firms. At the firm stage of development, there is a growing trend since the 2010s toward focusing on start-ups.

Table 2.2: Research settings used in studies on innovation-firm survival.

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	

2.3.3 Characteristics and constructs (C)

In this section, the characteristics of innovation and firm survival are examined, with a focus on their conceptualization and measurement. The author also explains how scholars model the relationship between innovation and firm survival by summarizing the variables used (e.g., dependent, independent, mediating, and moderating variables).

2.3.3.1 Definitional issues of innovation

To evaluate the concept of innovation, the author begins by addressing the definitional issues of the innovation terms used in the reviewed studies. Most studies (74.6%, n=53) did not provide a specific conceptual definition of innovation and instead only defined innovation operationally. The remaining studies relied on definitions provided by reputable institutions, such as the OECD Oslo Manual (2005) (Cefis and Marsili, 2019), the National Bureau of Statistics of China (Deng et al., 2014), or the commonly cited definitions of Schumpeter (1942) and Henderson and Clark (1990) within the innovation literature. The definition of innovation in these studies typically involves launching new products and/or processes (e.g., Banbury and Mitchell, 1995; Boyer and Blazy, 2014; Carroll and Teo, 1996; Cefis and Marsili, 2012), improving the marketing mix (Naidoo, 2010), developing new business models (Velu, 2015), adopting radical manufacturing technologies (Sinha and Noble, 2008), a firm's ability to generate innovation (Tan and Sousa, 2019), and a firm's tendency to engage in innovative activities (Ali, 2021).

2.3.3.2 Development of the conceptualization of innovation

The early conceptualization of innovation (1990–2000) in the focal domain mainly 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 examined technology adoption as a means of 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 an important role in shaping the conceptualization of innovation. In the following 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 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 behaviour (Wojan et al., 2018), and intellectual property (Kato et al., 2022). This lack of conceptual clarity and the proliferation of innovation-related variables have contributed to heterogeneous findings and hindered the development of a unified understanding of organizational innovation (Garcia and Calantone, 2002; Ugur and Vivarelli, 2021; Damanpour, 2020). The concept of innovation has evolved, leading to diverse definitions and perspectives. However, a more detailed understanding requires an examination of the innovation dimension.

2.3.3.3 Dimensional issues of innovation

The author categorized innovation dimensions used in the reviewed studies based on the following criteria: innovation types (product, service, process, marketing, management, organisation, business model innovation, technological, organisational innovation), innovation reference (new to the world, country, industry, and firm), and innovation magnitude (radical, incremental) (Gopalakrishnan and Damanpour, 1997; Crossan and Ayaydin, 2010). Most studies (Table 2.3) addressed certain aspects of innovation dimensions, such as the type of innovation, the magnitude of innovation, and/or the reference. Among these, a small minority (9.58%, n=7) investigated all three elements of innovation (e.g., Ebert et al., 2019; Sinha and Noble, 2008). A significant number of studies (32.8%, n=24) focused solely on two dimensions of innovation (e.g., Naidoo, 2010; Sui and Baum, 2014), while 20 studies (27.3%) considered innovation types as the only dimension. The remaining 22 studies (30.1%) did not utse any specific innovation dimension; they either viewed innovation as a patenting activity (e.g., Helmers and Rogers, 2011; Lee et al., 2012) or evaluated innovation in terms of R&D expenditure or intensity (Garcia Martinez et al., 2019).

Table 2.3: 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**	**Techno-logical**	**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., 2009)	×		×	×				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									
(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	
(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

Table 2.3(continued): Categorization of the Innovation Dimensions used in articles (Types, Magnitude, and/or Reference).

Dimensions / **Articles**	**Types**						**Magnitude**	**Reference**
(Sui and Baum, 2014)	×							New to Market
(Talay et al., 2014)	×	×					Radical, incremental	
(Fernandes and Paunov, 2015)	×							New to firm New to Market
(Velu, 2015)						×	High, low, and moderate degree	New to world
(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								
(Audretsch, 1991)	×		×					
(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)	×	×	×					

Table 2.3(continued): Categorization of the Innovation Dimensions used in articles (Types, Magnitude, and/or Reference).

Studies(n=20) that used one-dimension	**Types**						
(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)	×						

Regarding trends in the use of innovation dimensions over the past three decades, Table 2.4 indicates that technological product and process innovation were the most commonly adopted types in the relevant literature, although their use declined over time. They remain the most prevalent, but non-technological innovations such as marketing, service, organizational, and business model innovation have gained prominence in recent years, showing an increasing pattern. This trend aligns with the publication of influential articles on these newer types of innovation (e.g., Birkinshaw et al., 2008; Volberda et al., 2014). Concerning the magnitude of innovation, radical and incremental innovations have been, and continue to be, the most widely studied. However, research focusing on intermediate innovation has shown a marked decline. In terms of innovation reference, there are no significant shifts; new-to-market/industry innovation remains the most extensively studied, while other types remain underresearched.

Table 2.4: 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	

2.3.3.4 Measures of innovation

Most studies employ objective measures to proxy for firms' innovation activities. Intellectual property as an innovation output approach is the most frequently used objective measure in the existing literature (Table 2.5). Another popular method for measuring innovation is R&D expenditure (R&D intensity), which reflects an input-oriented approach (n=15, 20.5%). The remaining studies in this category evaluate innovation based on the number of various types of innovation recorded in official administrative data, accounting for about 30% of the reviewed research (e.g., Cottrell and Nault, 2004; Buddelmeyer et al., 2009). Conversely, 26% of studies used subjective measures, such as questionnaires where business managers self-declare and assess their firms' innovation activities (e.g., Naidoo, 2010; Ebert et al., 2019), as well as secondary public data sources like the Community Innovation Survey (CIS) (e.g., Colombelli et al., 2016). Additionally, 8.21% of studies employed expert ratings to identify and evaluate relevant innovations within specific contexts. This approach largely depends on experts' industry knowledge and mainly focuses on major or significant product and process innovations (e.g., Carroll and Teo, 1996; Min et al., 2006).

Table 2.5: 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. (2012); 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);

2.3.3.5 Conceptualization and measurement of firm survival

The early conceptualization of firm survival (1990-1999) implicitly regarded it as a desirable outcome that firms and managers sought, while firm exit was considered inherently negative. This assumption equates firm exit with firm failure without distinguishing other types of exit and mainly reports a positive link between innovation and firm survival (Doms et al., 1995). Despite the continued dominance of this view in the subsequent period (2000-2010), there has been growing interest in more nuanced aspects of firm survival, such as product market exit, M&A, and forced liquidation (e.g., Srinivasan et al., 2004; Fontana and Nesta, 2009). Notably, as the conceptualization of firm survival becomes more sophisticated, the relationship between innovation and firm survival becomes increasingly uncertain. In the most recent period (2010-2022), applying these nuanced dimensions has introduced conceptual ambiguity. Some survival-related terms are used interchangeably in the existing literature, even though they denote different firm outcomes. For example, firm closure often refers to voluntary liquidation initiated by owners, whereas liquidation can mean either voluntary or forced liquidation (bankruptcy), which indicates genuine firm failure (Cefis et al., 2021). Furthermore, financial crises such as the 2008 crisis, the 1990 dot-com bubble, and the COVID-19 pandemic influence the understanding of firm survival. Studies examining these crises tend to focus more on continued solvency (or bankruptcy) and M&As rather than ongoing operations (Wagner and Cockburn, 2010; Grazzi et al., 2021). Additionally, firm survival is framed as a matter of flexibility, highlighting firms' adaptability, endurance, and resistance (Naidoo, 2010; Chatzoudes et al., 2021). Table 2.6 offers a more detailed overview of the dimension of firm survival as used in the relevant literature.

2.3.3.6 Views on firm exit

Drawing on previous reviews of firm survival and failure (e.g., Josefy et al., 2017; Soto-Simeone et al., 2020) and firm exit (Cefis et al., 2021), about half of the reviewed studies (50.6%) adopt a homogeneous view of firm exit, without distinguishing among different modes such as firm closure, M&A, or bankruptcy (Cefis et al., 2021). However, this homogeneous perspective has steadily declined, from over 85% in the 1990s to nearly 40% in the 2010s (Table 2.6). Only 12.3% of studies considered firm exit as a heterogeneous event, accounting for various combinations of exit modes. This viewpoint emerged after the 2000s and has shown a slight increase over time (e.g.,

Fontana and Nesta, 2009; Cefis and Marsili, 2011). Furthermore, 30.1% of the reviewed studies examined negative exit by focusing solely on firms that go bankrupt or experience apparent failure, often excluding other exit types such as M&A from the sample (e.g., Colombo and Delmastro, 2001; Boyer and Blazy, 2014; Howell, 2015; Ugur et al., 2016), treating all M&A as firm survival if infrequent in the population (e.g., Helmers and Rogers, 2010), or simply ignoring M&A because it is rare within that specific industry or country (Lee et al., 2012).

2.3.3.7 Dimensional issues of firm survival

Drawing on the multidimensional conceptualization of firm survival (Josefy et al., 2017), the author categorized the reviewed studies according to the dimensions used. Over 80% of the reviewed studies used firm continued operation to conceptualize firm survival (Table 2.6). Export or product market persistence as a firm survival dimension is mostly used in international business and marketing domains (e.g., Deng et al., 2014; Sui and Baum, 2014; Srinivasan et al., 2004), where it is difficult to determine whether a market exit from foreign or product markets is a strategic decision of firms or a genuine market failure resulting from the poor economic firm performance. Studies that used continued solvency as a firm survival dimension regard insolvency as an indicator of firm failure (15%). Furthermore, 13.6% of the reviewed studies employed continued ownership as a dimension of firm survival, with some studies attempting to differentiate between acquisition or merger and failure or success (e.g., Esteve-Pérez et al., 2010; Børing, 2015).

2.3.3.8 Measures of firm survival

Most reviewed articles (92.5%) assessed firm survival by indicators of firm death and mortality, such as market exit, discontinued operations, or bankruptcy. This aligns with Josefy et al. (2017), who highlighted the gap between theory and empirical findings caused by the common use of firm mortality/death measures as proxies for firm survival. In contrast, only a small fraction of studies used true, objective measures of survival, such as whether a firm survives a particular year (e.g., Wilbon, 2002; Hyytinen et al., 2015), while others relied on subjective measures based on respondents' opinions of the firm's survival or failure status (Naidoo, 2010).

Table 2.6: 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
Dimensions of firm survival				
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	

2.3.3.9 Modelling the relation of innovation to firm survival

Beyond treating innovation and firm survival as separate, this section explains how their relationship is understood and defined in the relevant literature. Table 2.7 summarizes the variables used in the reviewed studies, categorized as independent, mediating, or moderating variables.

One conclusion from pre-2010 studies is that the impact of innovation on firm survival varies in magnitude and direction between and within studies. 73.3% of these studies found a positive relationship between innovation and firm survival (e.g., Doms et al., 1995; Colombo and Delmastro, 2001; Li et al., 2010). However, the remaining 26.6% reported insignificant, mixed, or even negative relationships. In studies showing mixed effects, heterogeneity reflects differences in innovation inputs and outputs (Wilbon, 2002), innovation types (e.g., product and process innovation) (Cefis and Marsili, 2005), and variations between flow and stock measures of innovation output (Buddelmeyer et al., 2010). Moving to post-2010 studies, the relationship appears even more heterogeneous than in earlier research. This trend was also noted in a previous review (Ugur and Vivarelli, 2021), which provides an extensive overview of the topic

from a microeconomic perspective. Compared to 73.3% of pre-2010 studies, only 53.4% of post-2010 studies indicate a positive link between innovation and firm survival. Sources of heterogeneity now include not only innovation types and measures but also the level of R&D intensity (Ugur et al., 2016), the extent of business model innovation (Velu, 2015), risk factors (Hyytinen et al., 2015; Howell, 2015), and technological regimes (Kim and Lee, 2016). Finally, evidence from both periods suggests that output measures of innovation (such as patents, trademarks, and the number of product innovations) are more likely to positively influence 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, relative to input measures, are more often associated with higher SME performance. It is also noteworthy that the impact of innovation tends to be more positive in high-tech industries.

Independent variables. Most studies in the reviewed articles (90.1%, n=64) (Table 2.7) examined the direct or indirect impact of innovation on firm survival chances, considering innovation as an independent variable. In this category, the author also included studies that explored the antecedents of innovation and its subsequent effects on firm survival. Other variables were also used as independent variables alongside innovation. These other independent variables were categorized into four main groups. Within the scope of environmental factors, micro-environmental factors (13.6%) were more frequently used as independent variables alongside innovation than macro-environmental factors (5.47%). A significant proportion was also attributed to firm-level factors (41%), including firm resources, firm strategy, and firm capabilities. Beyond firm-level factors, the largest proportion was assigned to firm characteristics as independent variables, 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) suggests that marketing innovation mediates the relationship between marketing orientation and superior market performance, leading to long-term survival. García-Cabrera et al. (2021) define innovation as a link between knowledge resources and firms' survival prospects.

Moderating variables. Compared to mediators, moderators are more frequently used to examine the link between innovation and firm survival. 31.5% of the studies employed various firm and industry-level variables as moderators of the key

relationships. Researchers paid comparatively greater attention to firm-level factors as moderators (21.9%), while environmental factors (9.58%) and inter-organizational relations (2.73%) attracted less interest in the existing link. Furthermore, only five studies (6.84%) considered innovation as a moderator of the connection between any third variable and firm survival (e.g., Srinivasan et al., 2004).

Table 2.7: Independent, mediating, and moderating variables used in the 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

2.3.4 Methodology (M)

This section presents methodological observations on innovation and firm survival, focusing on sample size, data collection methods, temporal perspectives, and statistical methods. Furthermore, the author summarizes information regarding left truncation and unobserved heterogeneity.

2.3.4.1 Sample size

The sample size in the reviewed articles ranged from 45 to 299,038 firms (Table 2.8). Most studies (71.2%) used samples between 101 and 10.000. Nearly 20% of the articles employed much larger sample sizes (above 10,000), particularly in more recent studies. Only a few of the earliest studies (5.47%) used samples of fewer than 100 firms. This reflects a recent trend towards using larger sample sizes to improve the generalizability of the findings.

2.3.4.2 Data collection and time emphasis

Regarding data collection methods, the most common approach was the use of administrative records (78%), likely due to the ease of accessing a large number of samples at once and the lower cost of primary data collection. Furthermore, trend analysis reveals fluctuations in the adoption of longitudinal and cross-sectional data over time. Interestingly, the trend analysis also shows a generally opposite pattern in the use of longitudinal and cross-sectional data.

2.3.4.3 Unobserved heterogeneity

Unobserved heterogeneities (or frailty) are some omitted variables that are either unobserved in the available data or intrinsically unobservable and are not included in the model specification. These 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 produce upward-biased estimates of the effect of innovation on firm survival (Ugur and Vivarelli, 2021). Over time, nearly one-third of studies (26%) reported controlling for unobserved heterogeneity in their models, whereas the remaining studies (73.9%) did not account for frailty, consistent with the findings of Ugur and Vivarelli (2021).

2.3.4.4 Left truncation

Left truncation bias occurs when a study fails to consider emerging firms that existed before the observation period began (Yang and Aldrich, 2012). Ignoring firms that had already faced the risk of failure prior to being included in the study may lead to a misrepresentation of the sample, systematically biasing the estimated effect of innovation on firm survival (Yang and Aldrich, 2012; Shim and Davidsson, 2018). Most of the reviewed studies (86.3%) did not account for left truncation, whereas the remaining studies (13.6%) employed various methods to mitigate this issue.

Table 2.8: 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	

2.3.4.5 Analytical approach

The Cox proportional hazards model (Cox model) is the most frequently used statistical analysis in the pertinent relationship (26.7%), followed by logistic regression (22.5%), the complementary log-log model (14.0%), and the probit model (14.0%)

(Table 2.9). It is worth noting that 36.8% of the articles used logistic regression and probit models for estimation. Among these, 10 of 27 studies used cross-sectional logistic regression and probit models to estimate relevant parameters, rather than applying discrete-time logistic regression to account for both right censoring and time-dependent variables.

The study's primary outcome is firm survival, a time-to-event (TTE) measure. These data types are unique in that they address two key questions: whether the event (firm failure) occurs and when it happens. They are widely used in medicine and are increasingly employed in engineering, economics, and the social sciences (Hosmer and Lemeshow, 1989).

There are nonparametric, parametric, and semiparametric methods for analysing and comparing survival times across groups (e.g., innovators versus non-innovators/control group). The Cox proportional hazards model (Cox PH) (Cox, 1972), a semiparametric method, is one of the most widely used statistical approaches for modelling firm survival data in the relevant literature. It is considered the most robust and general regression model and does not assume any specific form for the underlying baseline hazard function. In other words, the model assumes that, regardless of the overall shape of the hazard function, it is the same for all firms (Cleves et al., 2008), so the effect of a one-unit change in the explanatory covariate results in a constant, parallel shift of the baseline function (proportional hazard assumption). The Cox model is expressed as (2.1):

$$h(t) = h_0(t)exp^{(x\beta)} \tag{2.1}$$

where $h(t)$ represents the risk of failure at time *t,* given that the firms still existed at t - 1, and $h_0(t)$ is the risk of reference when all the independent variables are zero (having no specified parametric form), x is the independent variable (e.g., innovation activity of firms). In general, a hazard ratio (HR) can be computed by the hazard rate of one firm divided by the hazard rate of another firm. The two firms being compared can be distinguished by their values for the set of predictors, that is, the x, so the hazard ratio is the estimate of $h(t,\ x^a)$ divided by the estimate of $h(t,\ x)$, where x^a denotes a vector of predictors for one firm (e.g., innovators) and x for the other (e.g., non-innovators/control group):

$$HR = \frac{h(t,x^a)}{h(t,x)} \tag{2.2}$$

When the above result equals 1 ($HR = 1$), both groups (innovators vs non-innovators) experience the same number of events in a given period. When the above result is greater than 1 ($HR > 1$), the treatment group (innovative firms) experiences a higher event probability (exit or failure) than the control group (non-innovative firms) within any given period. When the result is less than $1(HR < 1)$, the treatment group experiences a lower event probability than the control group within any given period.

Table 2.9: The analytical approach used on the link between innovation and firm survival.

Analytical approach	**Number of studies**	**%**	**Exemplary studies**
Cox proportional hazard model	19	26.7	Pérez et al. (2004); Wagner and Cockburn (2010); Li et al. (2010); Giovannetti et al. (2011); Deng et al. (2014); Jung et al. (2018)
Logistic regression	16	22.5	Banbury and Mitchell (1995); Wilbon (2002); Lee et al. (2012); Löfsten (2016);
Clog log	10	14.0	Fontana and Nesta (2009); Cefis and Marsili (2012); Zhang et al. (2020)
Probit	10	14.0	Doms et al. (1995); Colombo and Delmastro (2001); Helmers and Rogers (2010); Hyytinen et al. (2015); Kato et al. (2022)
Log-normal	5	7.04	Cefis and Marsili (2005); Colombelli et al. (2013); Colombelli et al. (2016); Ortiz-Villajos and Sotoca (2018)
Weibull	5	7.04	Esteve-Pérez and Mañez-Castillejo (2008); Howell (2015); Fernandes and Paunov (2015); García Martínez et al. (2019)
Generalized Gamma	4	5.63	Sinha and Noble, 2008); Talay et al. (2014); Ortiz-Villajos and Sotoca (2018)
Exponential	3	4.22	Barnett and Freeman (2001); Esteve-Pérez and Mañez-Castillejo (2008); Velu (2015);
Gompertz model	3	4.22	Carroll and Teo (1996); Dowell and Swaminathan (2000); Kim and Lee (2016)
Piecewise constant exponential model	3	4.22	Buddelmeyer et al. (2010); Cefis and Marsili (2019); Jensen et al. (2008)
Structural equation modeling	2	2.81	Naidoo (2010); Chatzoudes et al. (2021)
Log-logistic	1	1.40	Howell (2015)
Others	3	4.22	Cefis and Marsili (2006); Helmers and Rogers (2011);
Total	84		

2.4 General Overview of Past Research

Figure 2.2 offers a simplified overview of the literature on how innovation affects firm survival. Studies typically examine the impact of either a single aspect of innovation (e.g., technological product and/or process innovation) or a combination of two innovation dimensions (e.g., product-process innovation with radical-incremental innovation) on firm survival, which is mainly understood as the ongoing operation or market persistence of firms. This key relationship is further clarified by considering several boundary conditions, as well as mechanisms that may influence the link between innovation and firm survival. Boundary conditions such as macro and micro environmental factors can shape firms' innovation activities, which, in turn, enhance firms' profitability and productivity within an evolutionary landscape (evolutionary economics theory; Nelson and Winter, 1982); alternatively, these boundary conditions act as contingent factors with which firms' innovation strategies must align to secure survival prospects (contingency theory and strategic alignment theory; Venkatraman, 1989). Additionally, firms actively engage in activities such as research and development, despite the uncertain potential to improve firm survival (active learning theory; Ericson and Pakes, 1995).

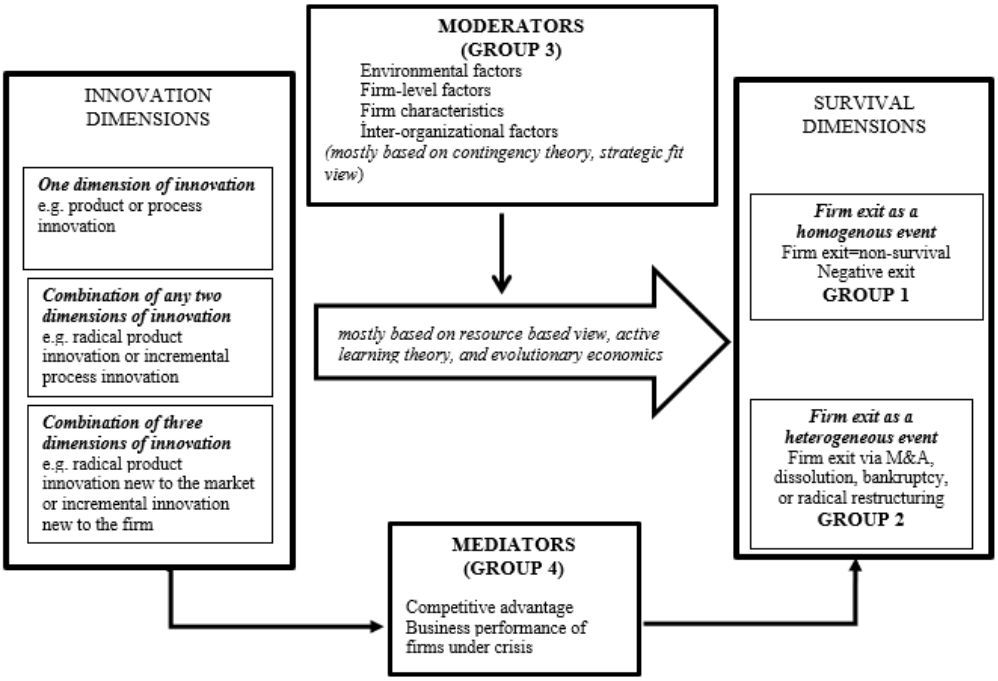


Figure 2.2: Overview of research on the impact of innovation on firm survival.

Reviewed studies used different models to examine the link between innovation and firm survival. As shown in Figure 2.2, the author observed four groups of models. The first group of studies (Group 1) focused primarily on the types of innovation activities or the magnitudes of innovation and highlighted the differential effects of various innovation types/magnitudes on firm survival, treating firm survival as a complementary status to firm exit (firm exit as a homogeneous event). For example, Ortiz-Villajos and Sotoca (2018) disaggregated innovation types and examined 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 the influence of innovation capabilities on firm exit decisions, including business closures, M&As, and radical restructuring. Alternatively, considering various firm- and environmental-moderating variables, a significant number of studies (Group 3) investigated the conditions under which innovation might enhance or impair a firm's survival prospects. Howell (2015) investigated the moderating role of various firm and environmental factors on innovation and firm survival. Finally, very few studies (Group 4) have focused on the mechanisms underlying the link between innovation and firm survival. For instance, Naidoo (2010) developed a conceptual model linking market orientation, marketing innovation, competitive advantage, and firm survival.

2.5 Discussions and Implications

The systematic literature review (as shown in Figure 2.2) indicates that most research on innovation and firm survival is grounded in economically oriented theories, such as the Resource-Based View (RBV), Dynamic Capabilities, and Evolutionary Economics. These studies mainly focus on technological product and process innovations, conceptualized in various ways—including resources, technology adoption, learning, knowledge, capabilities, tendencies, orientations, and behaviours—and their influence on firm survival, which is often implicitly or explicitly regarded as the ultimate goal of firms. Empirically, these studies primarily use administrative records from manufacturing industries in developed economies to model innovation and firm survival prospects.

While previous research offers valuable insights into the relationship between innovation and firm survival, it often adopts a distant view of internal innovation

processes and activities (Damanpour, 2020). This limited perspective restricts our understanding of how organizations innovate in practice and the specific contextual conditions under which innovation aids firm survival. Furthermore, the widely accepted view that innovation naturally benefits firm performance and survival overlooks the complexities it can create, emphasizing the need for a more detailed and nuanced approach.

To advance the field, future research should investigate both the internal and external complexities of innovation-related activities while broadening the scope to include underexplored industries and emerging forms of innovation, such as patient innovation in healthcare. Using modern statistical techniques—such as configurational analysis and other advanced analytical methods—can help capture the complex interactions among multiple factors shaping innovation and a firm's survival. By adopting these approaches, scholars can generate more timely and nuanced insights into the evolving landscape of innovation. In the next section, the author identifies the unexplored aspects of this relationship and suggests future research directions using the TCCM framework. Table 2.10 summarizes the future research directions.

Table 2.10: Future research directions on innovation and firm survival.

Components	Research Questions
Theory Alternative theories could be used independently (e.g. institutional theory, network theory); however, the author recommends 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) act as a catalyst or constraint for firm innovation activities? 7) How do implementing non-marketing strategies (e.g. political connection, informal network) affect the relationship 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. Japan, Singapore, Taiwan, Turkey, India, and Iran as new 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 2.10 (Continued): Future research directions on innovation and firm survival.

Components	Research Questions
Characteristics and constructs	
Conceptual research is needed regarding the commonalities and differences in conceptualizing innovation to shed light on the common grounds and divergence of conceptualisation across domains.	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?
Conceptual work is needed to delineate boundaries of different forms of exit (hostile M&A, harvesting, firm closure, liquidation)	
Using genuine firm survival measures (Josefy et al., 2017) Using more flexible measures, such as firm adaptability, market persistence, or resilience to proxy firm survival	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)?
Considering non-economic indicators of firm survival, such as the moral failure (e.g. loss of social responsibility, labour exploitation) of firms to capture diverse stakeholders and society at large.	
New methods	
Including firms whose gestation period starts ten years before the observation window to mitigate the selection bias (Young and Aldrich 2012)	
Data triangulation through qualitative insights from case studies, interviews with industry experts, and survey data	18) Under what conditions do firms retain or discontinue their innovation activities over time? 19) Do 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?
Conducting Landmark analysis to capture the dynamic nature of innovation (e.g. Cefis et al., 2023)	
Build the autoregressive model OR cross-lagged feedback loop model	
fuzzy-set qualitative comparative analysis (fsQCA) can be used.	
Meta-analysis on innovation and firm survival relationship.	
MASEM for unexplored mechanism between innovation and firm survival.	

Considering various underresearched aspects of innovation-firm survival studies depicted in Table 2.10, the author suggests some future research directions by integrating theories, contexts, constructs, characteristics, and methods:

- 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 to identify configurations 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 fuzzy-set qualitative comparative analysis (fsQCA) to identify the necessary and sufficient conditions that drive firms' collaboration choices.

2.5.1 Theoretical underpinnings

2.5.1.1 Resource orchestration theory as an extension of RBV

Resource orchestration (RO) theory, as an extension of the RBV, can help explain the success of innovation by managing essential resources to implement innovation strategies (Carnes et al., 2021). While previous research has explored the role of individual innovation resources (e.g., R&D resources, R&D human capital, technology, or patents) in firm survival (e.g., Lee et al., 2012; Yang et al., 2017), there remains a limited understanding of how these resources interact to influence survival.

Future studies could benefit from a configurational approach to identify the unique combinations of innovation resources that lead to firm survival. Additionally, firms at different stages of development have specific resource needs, shaped by their resource endowments, goals, and strategies. Examining the most effective configuration of innovation resources at various stages of a firm's life cycle (e.g., start-ups, established or diversified firms) could provide further insights into multiple pathways to survival. To address these issues, future research could consider the following 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 (e.g., start-ups, diversified firms) adopt distinct or overlapping configurations of innovation resources to achieve survival?

2.5.1.2 Institutional theory

From an institution-based perspective, the institutional environment profoundly influences the outcomes of firms' strategic initiatives (Scott, 2013). While technological innovation is vital for developing a firm's competitive advantage, firms must also ensure their practices align with the expectations of diverse stakeholders and audiences to bolster their legitimacy. This is especially important for early-stage firms, as gaining legitimacy increases 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 practices) (Sturdy, 2004). Building on this, future research could explore 3) whether the symbolic adoption of management innovation, alongside technological innovation, strengthens or weakens the link between innovation and firm survival. 4) What institutional conditions favour or hinder the symbolic adoption of management innovation in enhancing firm survival? Furthermore, the development of a country's markets and financial systems directly affects firms' capacity 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. However, other financial market factors, such as credit markets and bank lending, remain underexplored. Investigating the sequence of bank lending → technological innovation → firm survival could provide valuable insights into how financial institutions influence firms' innovation strategies. Additionally, it is important to understand the extent to which banks, traditionally seen as passive investors, intervene in firms' innovation strategies and,

consequently, their survival prospects. Gu et al. (2017) found that bank interventions harm the quantity of innovation but not its quality. To adequately address this issue, future studies could examine 5) how bank lending (credit market) impacts firm survival outcomes through technological innovation, and 6) under what conditions financial market development (e.g., bank lending) acts as a catalyst or constraint on firms' innovation activities.

While previous studies have examined the impact of innovation on firm exports and the survival of firms in emerging markets (e.g., Deng et al., 2014; Sui and Baum, 2014; Tan and Sousa, 2019), they have not explicitly developed theories on how firms adapt their innovation and survival strategies to the institutional environment in which they operate. Robust market-supporting institutions offer the essential framework for firms to succeed, whereas inadequate institutions create 'institutional voids' that obstruct their success (Khanna and Palepu, 1997). In response, firms operating in such environments may develop unique survival mechanisms, such as adopting non-marketing strategies (e.g., political connections, formal/informal networks, and collaboration) alongside their innovation efforts. Future research could explore how the implementation of non-marketing strategies (e.g., political connections, informal networks) influences the relationship between innovation and firm survival in environments with underdeveloped institutions. Additionally, other institutional boundary conditions, such as the institutional distance between parent companies and their subsidiaries and the host country's appropriability regime, could be examined to understand how the institutional environment impacts firms' innovation activities.

2.5.1.3 Inter-organizational relations

Building on the view that inter-organizational relations—particularly innovation collaborations—enhance firms' innovation performance (Sharif and Huang, 2012), greater attention could be given to understanding the different types of innovation collaborations and their roles in firm viability. Existing literature has mainly concentrated on R&D collaboration between private firms (e.g. Lee et al., 2012; Velu, 2015); however, this narrow focus opens future research avenues to explore other forms of collaboration such as partnerships with customers, users, suppliers, and competitors, as well as collaborations between the private and public sectors, and their impact on firm survival. This exploration is vital because cooperation issues arise from incentive misalignments and value appropriation conflicts between partners in

innovation collaboration (Bruce et al., 2019). Moreover, insights into innovation collaboration are enriched by considering contextual and institutional factors, such as cross-national institutional settings, which influence the effectiveness of these partnerships. Therefore, future studies could ask: 8) Which types of innovation collaboration (e.g. with customers, users, suppliers, competitors, or in public-private partnerships) enable firms to achieve long-term survival? 9) How do contextual or institutional factors moderate the relationship between innovation collaboration and firm survival? Additionally, Hillman et al. (2009) suggest that different theoretical perspectives are needed to explain inter-organizational linkages in innovation and business survival. Future research might employ Network theory to examine how network structure—such as size, density, and strength—and network ties—such as formal and/or informal relationships—may support or undermine the link between innovation and firm longevity. Similarly, the direct impact of network resources or capabilities on firms' exploitative and exploratory innovation strategies, which, in turn, influence the likelihood of survival, warrants significant scholarly attention. To explore these network perspectives comprehensively, the following questions could be posed: 10) How do characteristics of the network (e.g., size, density, stability, informal or formal ties) influence the link between innovation and firm survival? 11) How do network resources or capabilities shape firms' exploitative and exploratory innovation strategies, and in what ways do they collectively affect firms' longevity?

2.5.2 New research settings

With an increasing focus on innovation studies in other sectors such as the service and creative industries, pioneering research into innovation in underexplored contexts could reveal unique insights into innovation and survival strategies. Patient innovation in the healthcare industry, for example, as a form of user innovation, can enhance both patient well-being and the long-term viability of healthcare systems and institutions (DeMonaco et al., 2019; Cennamo et al., 2022). Producer innovation assumes that industry evolves in a Schumpeterian manner, in which the firm is the main driver of innovation (Schumpeter, 1934). However, in the context of user innovation- particularly patient innovation- 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 subject, motivation, funding sources, and innovation processes, society benefits most when 'patient innovation'

(user innovation) and traditional ‘producer innovation’ are developed together (Gambardella et al., 2017). Nonetheless, little is known about the complexities of adopting health-related product and service innovations, or how such adoption influences firms' performance and survival. Future research could explore, for example: 12) How do healthcare firms benefit from collaborating with or adopting patient innovators? 13) Under what conditions do firms choose to adopt or collaborate with patient innovators rather than established producers? 14) How does the ‘opportunity cost’ of selecting patient innovators over producer innovators affect a firm's decision-making and subsequent survival? Additionally, in today's rapidly changing landscape, a healthcare firm's ability to understand and incorporate emerging technologies, such as Artificial Intelligence and digital healthcare innovations, into strategic decision-making offers a competitive advantage (Mohamad et al., 2023). Generative AI (GenAI) is transforming how healthcare firms identify and collaborate with patient innovators by leveraging AI-driven data mining and predictive analytics. These technologies enable firms to evaluate and incorporate patient-driven solutions while minimising the risks. To address these issues thoroughly, 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 developed economies in North America and Europe, thereby limiting the international relevance of the findings (Anderson et al., 2004). Meanwhile, China and South Korea have recently gained widespread recognition as Asia's leading research hubs. Other top Asian innovation economies, such as Japan, Singapore, and Taiwan, require further investigation. Furthermore, the emerging markets of Turkey, India, and Iran are significant owing to their rapid growth into innovation powerhouses (WIPO, 2022). Additionally, middle- and low-income economies need organizational-level survival research to build resilient institutions that can combat poverty, hunger, and social injustice, while also supporting their long-term development (Ahen and Amankwah-Amoah, 2021).

2.5.3 New constructs and characteristics

Innovation in relevant literature is understood in many ways, such as firm resources, capability, capacity, persistence, R&D efforts, behaviour, technology, tendency, or

strategy (e.g., Lee et al., 2012; Sinha and Noble, 2008; Tan and Sousa, 2017; Li et al., 2010). This lack of conceptual clarity has led to conceptual proliferation. Moreover, this ambiguity also causes difficulties in operationalizing and measuring innovation. For example, some measure innovation through R&D expenditure, R&D human capital, patents, or the number of new products introduced by firms (Garcia Martinez et al., 2019; Helmers and Rogers, 2010), while others assess it via expert ratings of major innovation (Carroll and Teo, 1996; Talay et al., 2014). Although this "conceptual proliferation" has been recognized by various scholars from different fields as a source of varied findings in empirical research and as an obstacle to developing a clear conceptual framework (Damanpour, 2020; Ugur and Vivarelli, 2021), there has been insufficient focus on reconciling the diverse definitions of organizational innovation. Therefore, more conceptual research is needed to explore the commonalities and differences in how innovation is conceptualized, clarifying the shared ground and divergence across disciplines. This is valuable because it fosters interdisciplinary dialogue and highlights both the core and peripheral elements of the innovation construct across fields. Accordingly, future studies could examine how different domains (e.g., economics, strategic management, and marketing) conceptualize innovation and firm survival, and identify the similarities and differences in these conceptualizations across disciplines.

Many scholars in the pertinent literature have focused on the certain aspects of the innovation dimension. However, the literature has disproportionately emphasized technological innovation. Albeit the improvements, these characteristics spotlight 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 (Damanpour, 2014; 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 2.10). 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, the author observed that firm failure (or firm exit) is

implicitly regarded as a negative outcome, whereas firm survival is considered a goal within the relevant literature. Despite the growing reluctance to equate firm survival with success (Cefis et al., 2021), this shift is not fully reflected in research on innovation and firm survival. Scholars across various fields generally conceptualize firm survival as continuous operation, without examining firms' financial and market performance, and often treat it as a prerequisite for other outcomes, such as firm success and profitability. This implicit assumption leads to the inclusion of "zombie firms" – firms that have managed to survive, often supported by government aid, but would otherwise exit the market due to poor performance. This issue can be addressed by increasing sample sizes and conducting long-term survival analyses to better identify and differentiate inherently persistent "zombie firms".

While applying a more detailed perspective on firm survival dimensions offers a more nuanced understanding of innovation and survival-related outcomes, the lack of clear conceptual boundaries for each dimension (e.g., firm closures versus firm liquidation) further complicates the picture. At this stage, conceptual research is necessary to clearly define the boundaries of different exit modes such as firm closure, voluntary liquidation, forced liquidation, hostile M&A, and harvesting.

Furthermore, most empirical studies (95%) used organizational mortality and firm closure measures, such as market exit and bankruptcy, to proxy firm survival, despite their initial focus on theorizing the links between innovation and firm survival. At this stage, Josefy et al. (2017) recommend using genuine firm-survival measures, such as the overall lifespan of a firm or the number of years a firm persists after a baseline (e.g., Wilbon, 2002; Hyytinen et al., 2015), to reduce the gap between theory and empirical findings. In line with this, the author suggests adopting more flexible measures of firm survival potential, such as adaptability, market persistence, or resilience, rather than the primarily strict financial and market-based approaches employed in the existing literature. This perspective is further strengthened by considering non-economic indicators of firm survival to encompass a broader range of organizational activities and the interests of secondary stakeholders, such as employees, NGOs, and society at large. For instance, the moral failure of firms can be examined within the context of social innovation, including responsible innovation, sustainable innovation, or patient innovation. This approach enables a deeper understanding of the ethical dilemmas involved in adopting innovation to enhance

productivity and efficiency, which in some cases may neglect local culture or the environment. To address these issues, the following research question could be asked: 17) To what extent does stakeholder pressure (from customers, employees, or broader society) influence responsible innovation practice (or sustainable innovation), and consequently, does it mitigate or heighten the risk of moral failure in firms (e.g., loss of social responsibility, labour exploitation)?

2.5.4 New methods and data sources

The systematic review shows that most studies depend on administrative data or public records to track firm survival data. While cost-effective and comprehensive, it tends to favour better-performing firms, overlooking those with higher failure rates (Josefy et al., 2017), which introduces bias in assessing the real impact of innovation on survival. To address this, the author endorses Yang and Aldrich's (2012) method of using event history data, including a significant number of new enterprizes whose gestation period begins ten years before the observation window. Moreover, qualitative insights from case studies, interviews with industry experts, and survey data can strengthen validity through data triangulation.

Furthermore, capturing innovation data at a single point in time (for example, at founding or before a crisis) does not reflect the dynamic nature of firms' innovation activities. Therefore, future research should explore how firms' innovation efforts evolve and influence survival rates. Landmark analysis, for instance, is a promising method for understanding how time-varying innovation activities impact different exit routes of firms (e.g., Cefis et al., 2023). Additionally, an autoregressive model could assess whether firms with high (or low) past innovation efforts exhibit higher (or lower) future innovation capabilities. Moreover, a cross-lagged feedback loop model could examine the reciprocal relationship between innovation and firm survival across multiple time points. To effectively address the time-varying nature of innovation and the complex causal dynamics, future research could investigate: 18) Under what conditions do firms maintain or cease their innovation activities over time?19) Does a firm's past innovation effort influence its likelihood to sustain innovation in subsequent periods? 20) Is there a reinforcing or negative feedback loop where past innovation success enhances survival chances, thereby encouraging future innovation efforts? These models serve as a foundation for understanding the causal relationship between innovation and firm survival.

The third issue relates to methodological choice and robustness analysis. The author suggests considering unobserved heterogeneity (frailty) in model specification and using statistical tests (e.g., Schoenfeld residuals test) to determine whether to employ accelerated failure time models (AFT) or proportional hazard models (Manjón-Antolín and Arauzo-Carod, 2008; Ugur and Vivarelli, 2021).

Finally, most previous studies employ standard econometric techniques (e.g., Cox regression, complementary log-log models) to analyze innovation's effect on firm survival. However, few have used 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). Furthermore, future research should also incorporate meta-analysis to quantitatively synthesize empirical findings, improve accuracy, and provide evidence-based recommendations for practitioners and policymakers (Aguinis et al., 2011). Meta-analytic structural equation modelling (MASEM) could additionally uncover unexplored mechanisms linking innovation and firm survival, such as mediation effects. MASEM can also compare different innovation types and sequences to identify which configurations most effectively enhance or hinder firm survival.

3. BIBLIOMETRIC ANALYSIS AND A FIELD-BASED CONTENT ANALYSIS

In this chapter, the author combined bibliometric analysis with field-based content analysis to further unearth the knowledge structure of the innovation and firm survival research area.

As early as 1965, Price developed a bibliometric method to examine the relationships between articles and authors that shape the field through citation analysis. Bibliometric analysis is a set of techniques used to evaluate a body of research quantitatively (Donthu et al., 2021). In other words, bibliometric analysis is helpful for analyzing and visualising the collective scientific knowledge of emerging and well-established fields by systematically organizing extensive unstructured data (Block and Fisch, 2020; Donthu et al., 2021). Content analysis is an accepted methodology in the social sciences for systematically reviewing and confirming the validity of knowledge in a specific research area (Potter and LevineDonnerstein, 1999). The reason for employing a hybrid review is to generate integrated perspectives that can not be achieved by either method in isolation. In this chapter, the author aims to address the following research questions:

RQ1: What is the intellectual and conceptual foundation of research on innovation and firm survival?

RQ2: How do assumptions from different disciplines about innovation and firm survival shape the conceptualization, and how might integrating these perspectives reconcile differences and advance the field?

This chapter begins with the PRISMA review process, followed by the hybrid review. It then provides a brief overview of the coding process. Next, the findings from bibliometric analysis are presented, emphasizing the most cited articles, authors, publication outlets, and the intellectual and conceptual structure of the research area. This is then followed by content analysis, which examines how underlying assumptions about innovation and firm survival vary across domains and how these

differences lead to concept proliferation in both innovation and firm survival. Finally. discussions and future research directions are outlined to offer new insights into the innovation and firm survival research area.

3.1 Review Procedure

The author followed the PRISMA guidelines to identify eligible studies for the hybrid review, ensuring that each step of the process was transparent and well documented (Figure 3.1). Relevant studies were retrieved from the Web of Science and Scopus databases. Following previous reviews (e.g., Josefy et al., 2017; Rousseau et al., 2016), the following keywords were used in Title/Abstract/Keywords: ("innovation" OR"innovative") AND ("survival" OR"survivor" OR "failure" OR "death" OR “exit"). Furthermore, several inclusion criteria were employed: 1) topics limited to Management, Business, and Economics, 2) publication years from 1990 to 2023, 3) document types limited to journal articles, and 4) language restricted to “English”. The final search was conducted on January 15, 2024, which served as the cutoff date for inclusion. This initial search yielded 8738 records across both databases.

After removing duplicates (n = 3756), the author independently screened the titles and abstracts of the remaining 4982 records. During the screening process, several exclusion criteria were applied. Studies focusing on the drivers or antecedents of innovation (e.g., Beshr and Hossan, 2018), innovation failure, project failure, or market failure (e.g., Ball and Kittler, 2019), macro-level innovation activities such as innovation ecosystems, metropolitan innovation, or industry-level innovation and their impact on firm survival prospects (e.g., Tsvtkova et al., 2014), and studies that used keywords in a way not relevant to the current study, such as cancer mortality, cancer survival, or premature mortality (e.g., Lichtenberg, 2015), were excluded. After screening, 111 records remained.

During the eligibility stage, 111 studies underwent a full-text review. Of these, seven papers are conceptual, and two papers are inaccessible. Since this is a hybrid review, all 111 studies were analyzed bibliometrically to examine the intellectual structure of the relationship between innovation and firm survival. Meanwhile, 102 empirical studies were analyzed through field-based content analysis to explore disciplinary differences in how innovation and firm survival are conceptualized.

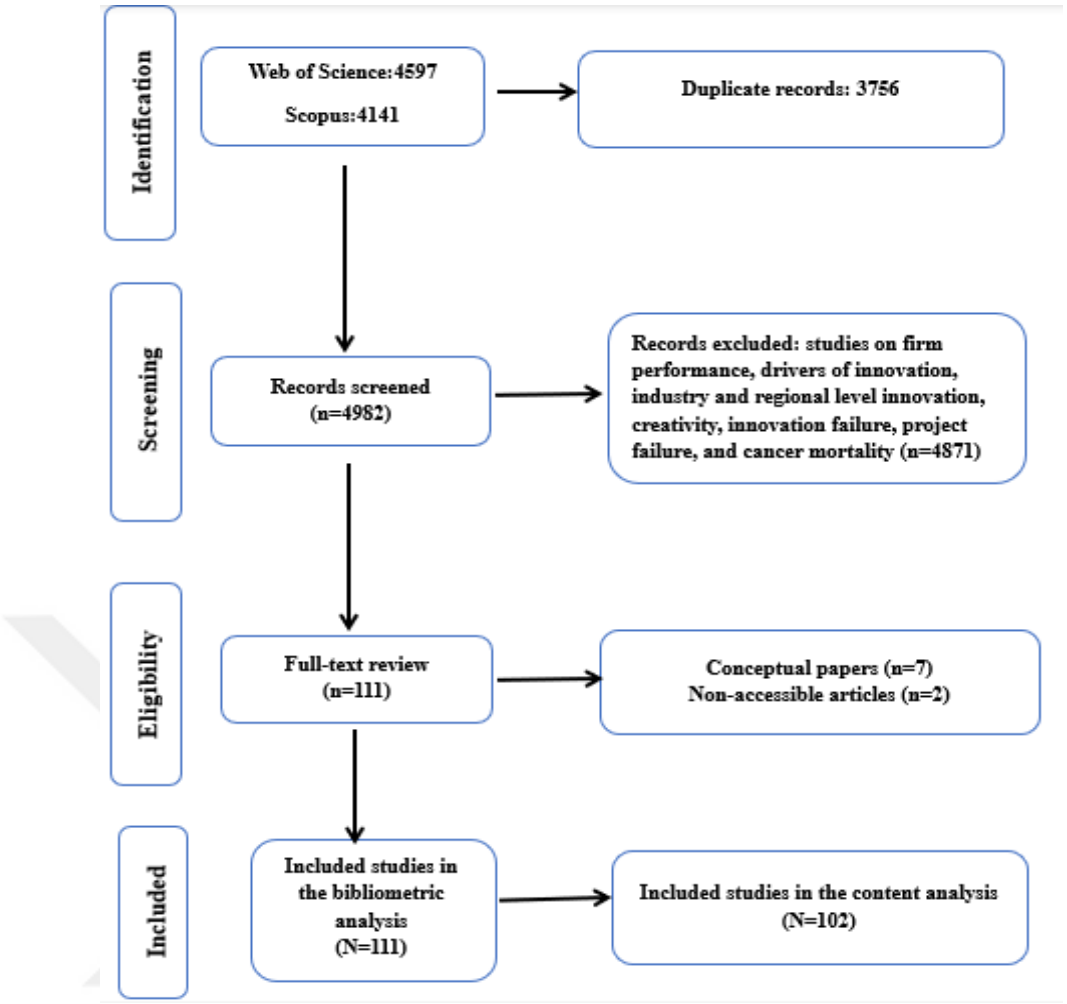


Figure 3.1: PRISMA flow chart.

3.2 Bibliometric Analysis

In this section, the findings of the bibliometric analysis are discussed in detail. The bibliometric analysis identified the most influential studies, authors, and publication outlets, as well as the intellectual and conceptual structure of the innovation and firm survival research area.

3.2.1 Publication trends over the years

Before discussing the findings of the bibliometric analysis, the publication trends for innovation-firm survival relationships from 1990 to 2023 are illustrated (Figure 3.2). The chronological distribution of publications over 30 years reflects a growing scholarly interest in this relationship. The first fifteen years (1990-2004) saw very slow growth in the field. Notably, the subsequent years were the most productive, with over 70 publications. In 2015, interest in innovation and firm survival surged. The upward

trend after 2015 may be due to several structural developments. For instance, the continued expansion of the digital economy and technological disruptions have shaped a new research agenda around innovation and firm survival. Likewise, policy changes that encourage innovation-driven competitiveness in both developed and emerging economies have stimulated academic inquiry. In addition, the aftermath of the global financial crisis renewed interest in research on firm survival and resilience. However, investment in innovation and scholarly attention slightly declined during the pandemic (WIPO, 2022). Subsequently, they resumed their rise.

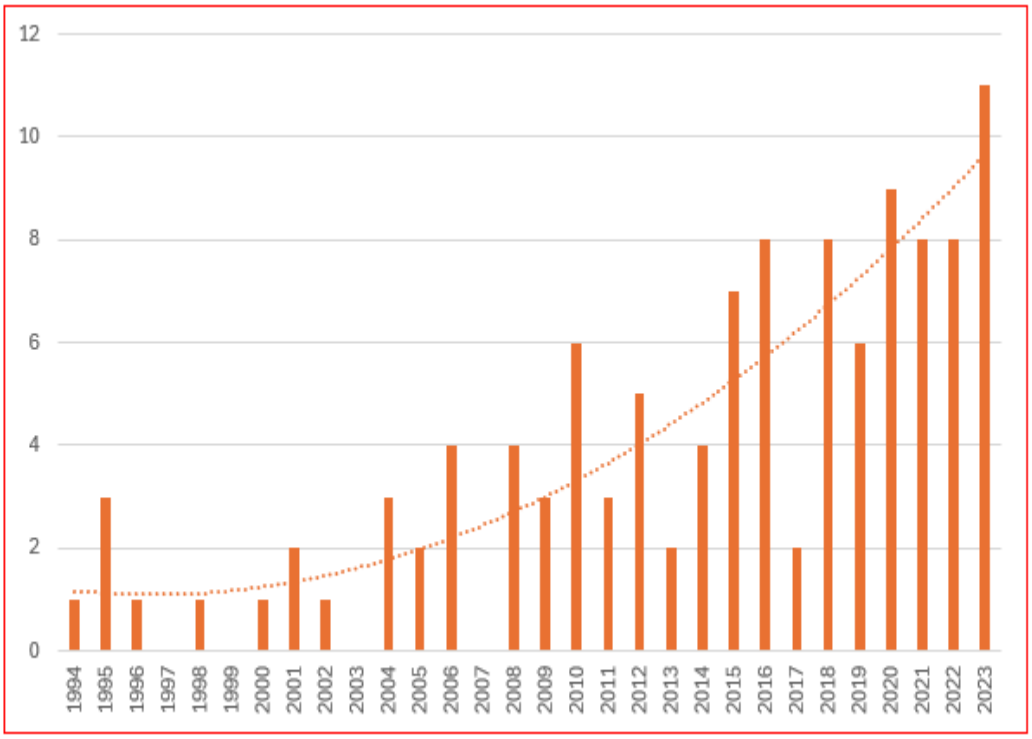


Figure 3.2: Annual publication trend.

3.2.2 Most cited articles, authors, and journals

To identify the most cited authors, articles, and journals influencing the field's development, a citation analysis was conducted. Table 3.1 highlights the articles with the highest citations in the subject area. These articles had the greatest impact based on total global citations (TLC) and total global citations per year (TLC/t). The most-cited articles were Audretsch and Mahmood (1995), Christensen et al. (1998), and Cefis and Marsili (2006). Generally, newer articles tend to receive fewer citations than older ones because they need more time to accumulate citations. However, the gap between older articles and those that have not had sufficient time to be cited was not

considerable. For instance, a more recent article by Naidoo (2010) has been cited 324 times, whereas Christensen et al. (1998) has been cited 389 times. Furthermore, the most cited publications cover a range of topics, including economics, strategic management, marketing, and entrepreneurship studies, indicating an interdisciplinary scholarly interest in the relationship between innovation and firm survival.

Table 3.1: The most influential articles on the impact of innovation on firm survival (sorted by TGC).

Authors	Journal Name	TGC	TGC/t
Audretsch and Mahmood (1995)	Review of Economics and Statistics	570	19.00
Christensen et al. (1998)	Management Science	389	14.41
Cefis and Marsili (2006)	Research Policy	340	17.89
Banbury and Mitchell (1995)	Strategic Management Journal	329	10.97
Naidoo (2010)	Industrial Marketing Management	324	21.60
Cefis and Marsili (2005)	Industrial and Corporate Change	306	15.30
Esteve-Pérez and Mañez-Castillejo (2008)	Small Business Economics	206	12.18
Sui and Baum (2014)	Journal of International Business Studies	199	18.09
Hyytinen et al. (2015)	Journal of Business venturing	192	19.20
Lee et al. (2012)	Journal of Small Business Management	192	14.77

Note: TGC=Total global citations received; TGC/t=Average global citations per year.

To analyze the author's profile in the research field, the top contributing authors and the number of publications they have authored or co-authored are presented in Table 3.2. To include collaborative work on the topic, the author set a cutoff point of 2; as a result, 16 authors met the threshold. The most prolific authors in the field were Cefis (7 articles), Marsili (5 articles), and Esteve-Pérez (3 articles).

Table 3.2: The top 10 contributing authors.

Authors	Affiliation	Country	No. of articles
Cefis E	Università degli Studi di Bergamo,	Italy	7
Marsili O	University of Bath	United Kingdom	5
Esteve-Pérez S	Universitat de València,	Spain	3
Baum M	Rechts-undWirtschaftswissenschaftliche Fakultät	Germany	2
Buddelmeyer H	Melbourne Institute: Applied Economic & Social Research	Australia	2
Colombelli A	Politecnico di Torino	Italy	2
Helmers C	Santa Clara University	United States	2
Ugur M	University of Greenwich	United Kingdom	2
Mazotta F	Università degli Studi di Salerno	Italy	2
Zhang D	Capital University of Economics and Business	China	2

Table 3.3 displays the impact of innovation and firm survival relationships, which have been published across a wide range of journals, including those in business research (e.g., Journal of Business Research), strategic management (e.g., Strategic Management Journal), marketing (e.g., Journal of Marketing), innovation and technology management (e.g., Research Policy, Technological Forecasting and Social Change, Technovation), entrepreneurship and small business management (e.g., Small Business Economics), economics (e.g., Economics of Innovation and New Technology, Empirical Economics, Review of Industrial Organization), and social science (e.g., Industrial and Corporate Change). Interestingly, despite the dominance of the economic perspective on innovation and firm survival relationships, the total citations in economics-based journals are notably fewer than those in business and management journals.

Table 3.3: Top journals according to the number of articles on innovation and firm survival relationship (sorted by publication).

Journal	Publications	h_index	Total citations
Research Policy	12	11	887
Small Business Economics	9	7	537
Industrial and Corporate Change	4	4	405
Economics of Innovation and New Technology	3	2	37
Journal of Business Research	3	3	268
Review of Industrial Organization	3	3	328
Strategic Management Journal	3	3	511
Technological Forecasting and Social Change	3	2	126
Empirical Economics	2	2	60
Journal of Marketing	2	2	317
Technovation	2	2	282

3.2.3 Intellectual structure of the research area

To understand the field's intellectual structure, a co-citation analysis was conducted at the author level to identify the most-cited authors and their connections to others who have influenced the field's development. Co-citation analysis measures how often two articles are cited together in a third article (Aria and Cuccurullo, 2017). The underlying assumption of co-citation analysis is that authors cite other works due to similarity, relevance, or relatedness (Donthu et al., 2021). Figure 3.3 illustrates the authors' co-citation network. The size of each node indicates how frequently it is co-cited; larger nodes are more frequently co-cited. Different colours and node adjacency indicate distinct thematic clusters. The field's intellectual structure (Figure 3.3) was generated using VOSviewer, employing fractional counting with association-strength normalization. Clustering was performed with a resolution parameter $\gamma = 1.0$ (default). To assess the sensitivity of the cluster structure to parameter choices, citation cutoffs were set at 20 and 50 citations, reducing the likelihood of clusters being artefacts of the parameters. The overall cluster architecture remained consistent across thresholds, with minor variations at the margins. Figure 3.3 and Table 3.4 display the most-cited scholars and three key thematic clusters that have shaped the field of innovation-firm survival. Each cluster represents a distinct theme or area of study within the focal relationship, often citing each other.

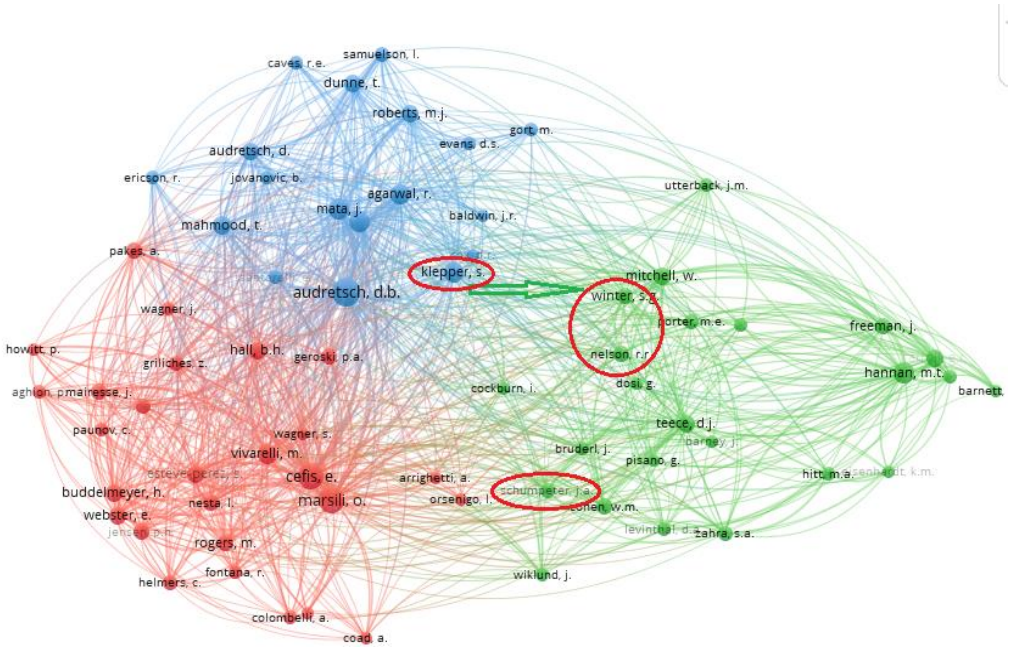


Figure 3.3: Co-citation network of authors, citation cut-off point=20.

The Green Cluster is the largest thematic group. It includes two theoretical bases that influence research on innovation and firm survival: “economics of innovation” and “organizing innovation” (Fagerberg et al., 2012). Scholars in the former, with backgrounds in economics and social sciences, mainly examine the economic aspects of innovation, technology, and R&D (Schumpeter, 1934; Nelson and Winter, 1982), while those in the latter focus on management and organization, exploring organizational change and inertia (Hannan and Freeman, 1984), absorptive capacity (Cohen and Levinthal, 1990), dynamic capability (Teece et al., 1997), and an expanded view of absorptive capacity (Zahra and George, 2002). Notably, foundational economists Joseph Schumpeter, Richard Nelson, and Sydney G. Winter form a cluster with strategic management and organizational ecology scholars such as SA Zahra, D Teece, and MT Hannan within the green cluster, rather than clustering with contemporary economists like DB Audretsch and S Klepper in the blue cluster. This illustrates the lasting influence of their ideas on shaping organizational and management research related to innovation and firm survival. Their position at the intersection of the blue and green clusters highlights the cross-disciplinary exchange of ideas, demonstrating how their fundamental concepts on innovation and evolutionary dynamics have influenced and been reinterpreted in management and organizational scholarship (or vice versa). This pattern becomes even clearer when considering citation thresholds. For instance, at lower thresholds (20–40 citations), Steven Klepper was grouped with economists such as David Audretsch, reflecting Klepper’s significant contributions to the evolution of industries and firm dynamics (entry and exit). At a higher threshold (50 citations), Klepper moved into the green clusters aligned with management and organizational scholars like Will Mitchell and MT Hannan. This shift indicates that while Klepper’s work is rooted in economics, his most impactful contributions resonate strongly within strategic management and organizational ecology, bridging economic models of industry evolution with the organizational and strategic perspectives on firm survival.

The blue cluster encompasses both the theoretical and empirical debates on the determinants of firm exits. A key part of this cluster is Jovanovic’s “noisy selection” model (1982), which claims that firms learn their efficiency levels by operating in the industry: efficient firms grow and survive, while inefficient ones eventually exit.

Ericson and Pakes's (1995) active learning model suggests that firms actively engage in R&D to enhance efficiency, profitability, and long-term survival. Building on this, scholars in this cluster have empirically examined how R&D activity influences the firm's survival. At the firm level, survival chances are associated with size and age (e.g., Evans, 1987; Dunne et al., 1989; Mata and Portugal, 1994; Audretsch and Mahmood, 1995). At the industry level, factors such as technological characteristics (Audretsch, 1991) and industry lifecycle stages (e.g., Agarwal and Gort, 1996; Klepper, 1996) are considered relevant. However, relatively few researchers have explicitly explored how firm-level innovation impacts the probability of firm survival.

Unlike the broader blue cluster, the scholars in the red cluster see innovation more directly as a key factor for firm survival, expressed through R&D investment (Esteve Perez et al., 2008; 2010), product and process innovation (Cefis and Marsili, 2005), or patenting behaviour (Wagner and Cockburn, 2010). In this way, the red cluster complements the blue one by shifting the focus from general survival factors to the specific and detailed role of innovation.

Table 3.4 Cluster distribution of co-citation analysis.

Themes of Clusters	Key Concepts	Highly cited author(s)
Green Cluster: Theoretical foundations of innovation and firm survival linkage	Schumpeterian innovation. Evolutionary economics. Organizational change/inertia; Absorptive capacity. Dynamic capability.	**"Economics of innovation"** Schumpeter (1934); Nelson and Winter (1982); **"Organizing innovation"** Hannan and Freeman (1984); Cohen and Levinthal (1990); Teece et al. (1997); Zahra and George (2002)
Red Cluster: Empirical and conceptual research on innovation, R&D, productivity, and firm survival	"innovation premium"; Innovation risk; R&D and firm productivity, patenting, product innovation	Cefis and Marsili (2005, 2006, 2012); Buddelmeyer et al. (2010); Ugur and Vivarelli (2021);
Blue Cluster: Empirical studies on new firms' post-entry performance, Patterns of firm entry and exit	New firm survival, firm dynamics, technological regime, Passive learning model, active learning theory	Audretsch (1991); Mata and Portugal (1994); Audretsch and Mahmood (1995); Dunne et al. (1988), Jovanovic (1982), Ericson and Pakes (1995).

3.2.4 Conceptual structure of the research area

To identify and visualize the groupings of research themes in the field, the conceptual thematic map was created using Biblioshiny, highlighting the most prominent themes from 1990 to 2023. The two-dimensional matrix has two axes: centrality and density. Centrality indicates a theme's importance within a discipline, while density shows its internal development (Callon et al., 1991). In the upper-left quadrant (Figure 3.4), niche themes like "organizational ecology" and "technological change" appear alongside borderline themes such as "creative destruction" and "technological opportunity." The former reflects strong conceptual models but is loosely connected to mainstream firm-level innovation and survival, focusing on population levels. By contrast, the latter themes serve as a bridge, connecting ecological perspectives with firm-level strategic concerns via technological opportunity and Schumpeterian dynamics. The core theme in the lower-right is "COVID-19," which, despite its central role in discussions of innovation and firm survival research, remains underexplored. This indicates that research on firm survival under uncertainty still needs further research. Motor themes cover a wide range of topics, such as "R&D," "industrial performance," "manufacturing," "innovation," and "financial crisis," which are important to the field's core structure. In the lower-left quadrant, emerging or declining themes such as "entrepreneurial exit" exhibit low centrality and density, suggesting they are underdeveloped or possibly declining research avenues within the innovation and firm survival domain. Conversely, themes such as "technological adoption," "absorptive capacity," and "firm dynamics" are situated in more peripheral positions, suggesting they are likely in early stages and yet fully integrated into the wider academic discourse.

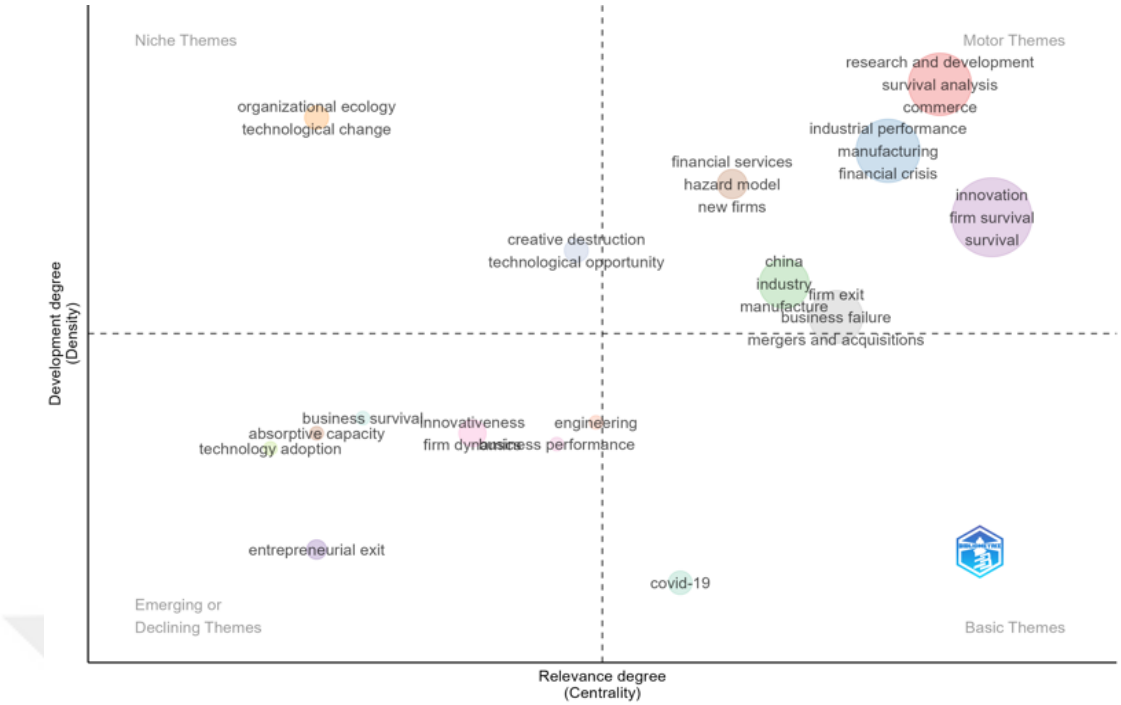


Figure 3.4: Thematic map of innovation-firm survival link between 1990 and 2023.

3.2.5 Thematic evolution of the research area

To trace the evolution of themes in the innovation-firm survival domain, the timeline was divided into four periods: 1995-2008 (Figure 3.5), 2009-2015 (Figure 3.6), 2016-2019 (Figure 3.7), and 2020-2023 (Figure 3.8).

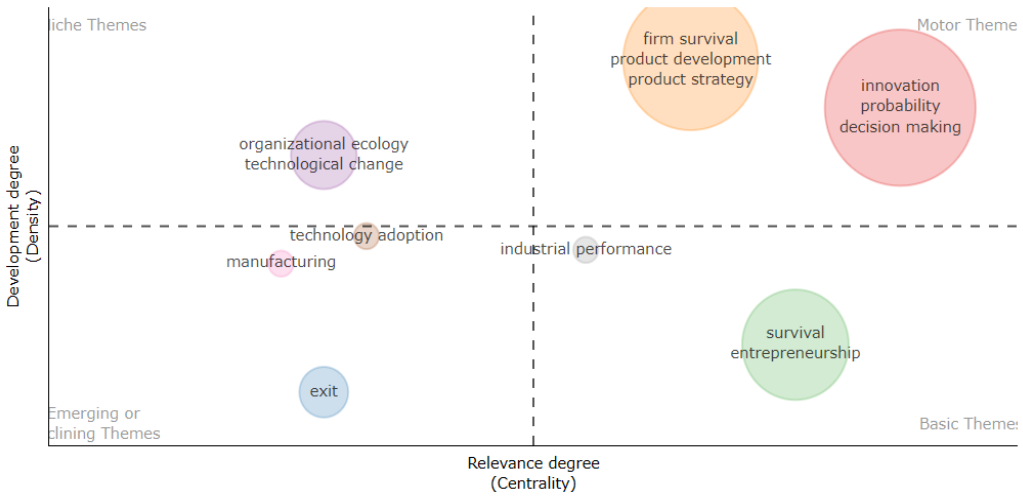


Figure 3.5: Thematic evolution of innovation and firm survival between 1995 and 2008.

1995-2008: The themes of "product development" and "product strategy" emerged as core themes (Figure 3.5), as reflected in publications such as Banbury and Mitchell (1995) and Cottrell and Nault (2004). These studies highlight the importance of

product variety management in influencing firms' survival outcomes. However, their decline in the following period suggests that the focus of the literature shifted away from product-specific considerations towards a more dynamic perspective. Additionally, "survival" and "entrepreneurship" emerged as fundamental themes, indicating that despite increasing recognition of entrepreneurial studies related to firm survival, the literature remained underdeveloped during this period.

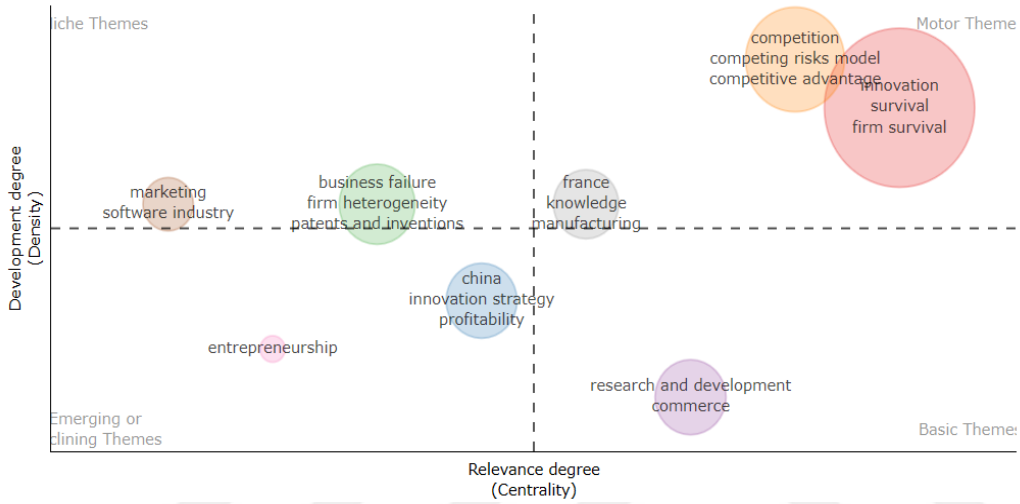


Figure 3.6: Thematic evolution of innovation and firm survival between 2009 and 2015.

2009-2015: The themes of "competition", "competing risk model" and "competitive advantage" became well-established, with an increasing number of studies highlighting how different exit modes, such as mergers and acquisitions, bankruptcy, or firm closure, are influenced by firms' innovation capabilities (e.g., Cefis and Marsili, 2012; Useche, 2015) (Figure 3.6). This thematic development indicates a broadening of the research area from product-specific strategies to the consideration of environmental and strategic factors that affect firm survival in competitive environments (e.g., Li et al., 2010; Howell, 2015). Meanwhile, innovation research in China emerged as distinct themes, reflecting the country's growing economic importance and drawing scholarly attention to how innovation activities evolve in this rapidly changing context (e.g., Sharif and Huang, 2012; Howell, 2015).

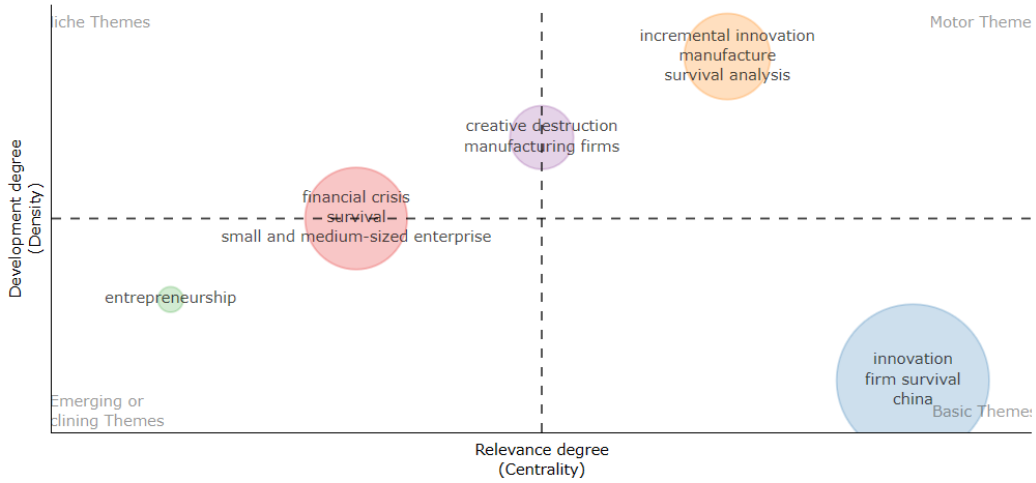


Figure 3.7: Thematic evolution of innovation and firm survival between 2016 and 2019.

2016-2019: The theme of "incremental innovation" emerged as the motor theme, reflecting a growing scholarly interest in more intermediate innovation types, such as incremental or "far-ranging innovation" (e.g., Wojan et al., 2018) (Figure 3.7). Innovation in China has become a fundamental theme, supported by numerous studies, yet remains underdeveloped in both theoretical and empirical depth. The theme "financial crisis" emerged as a niche area of research, although studies in this field predominantly focused on the aftermath of the 2008 crisis (e.g., Cefis and Marsili, 2019; Garcia Martinez et al., 2019).

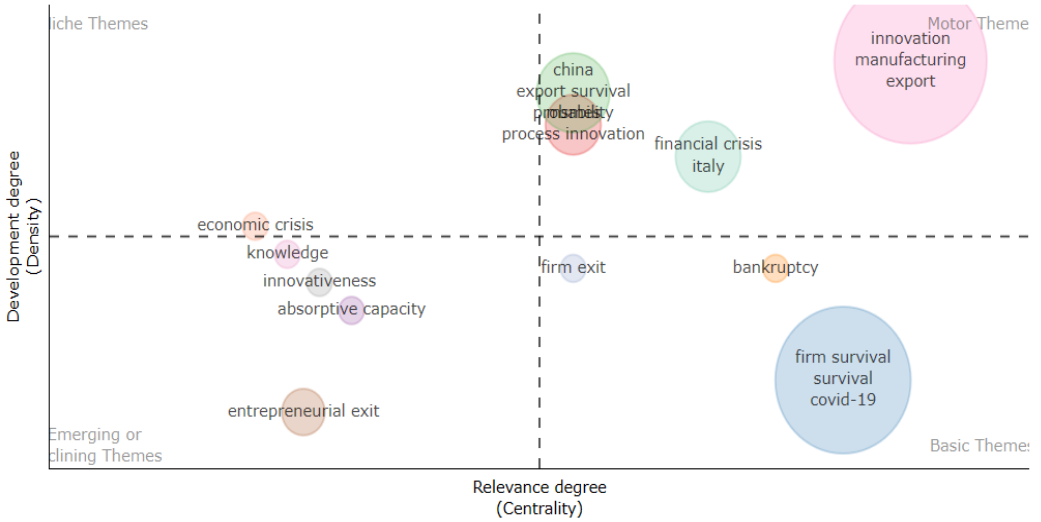


Figure 3.8: Thematic evolution of innovation and firm survival between 2020 and 2023.

2020-2023: The theme of "Innovation", "export", and "China" became a well-established motor theme, supported by the growing number of studies on the role of innovation on international market survival (e.g., Dai et al., 2020; Reddy and Sasidharan, 2023) (Figure 3.8). Furthermore, the scope of the COVID-19 pandemic's economic impact and consequences has motivated scholars to investigate its effects on firm resilience and survival. Although this area is expanding rapidly, the number of studies remains relatively limited (e.g., Muzi et al., 2023; Özşuca, 2023; Ali, 2021).

Taken together, the results of the bibliometric analysis highlight the exchange of ideas between economics and management/organizational research, as well as the development of themes in innovation and firm survival relationships. However, bibliometric mapping alone does not reveal which specific theoretical perspectives and assumptions about innovation and firm survival have been transferred, adapted, or reinterpreted across disciplines. Nor does it clarify how these adaptations have led to both conceptual enrichment and contested debates between fields. To address this gap, the following section complements the bibliometric mapping with a field-based content analysis.

3.3 Findings Based on Field-Based Content Analysis

In addition to the bibliometric analysis, qualitative content analysis was conducted to identify (1) the assumptions underlying innovation and firm survival. within each field, (2) the variations and contested debates existing both within and across domains, and (3) the instances of cross-field borrowing that further contribute to conceptual variation.

Regarding content analysis, the author included only studies that explicitly defined both innovation and firm survival constructs. Consequently, the conceptual and qualitative studies were excluded, leading to a final sample of 102 articles. All studies were classified into the following fields based on their potential contributions: Economics (50), Strategic Management (35), Marketing (4), Organization Studies (4), and International Business (9). If the potential contribution was not explicitly stated, the author assumed that the journal's field was the same as that of the study.

The author conducted a content analysis of the 102 selected studies using a pre-designed coding protocol (Table 3.5). The reconciliation matrix serves as a structured codebook, ensuring transparency and traceability between coded categories and textual

evidence. The reconciliation matrix synthesizes studies from the fields of economics, strategic management, marketing, organizational studies, and international business studies. It maps the major theoretical perspectives, underlying assumptions on innovation and firm survival, innovation types, mechanisms (if any), conditions, and empirical results. Furthermore, the content analysis was extended to address the primary research questions in each field on the impact of innovation on firm survival (Table 3.6) and to demonstrate how the choice of firm survival measure influences the contradictory findings in the extant literature (Table 3.7).

Table 3.5: Reconciliation matrix of field-based assumptions and conceptualization of innovation and firm survival.

Field	Theoretical lense(s)	Innovation type/construct	Assumptions about innovation	Mediators (Channel)	Moderators (Conditions)	Effect on survival	Assumptions about exit/survival
Organizational Studies	Organizational ecology, structural inertia	Technical innovation	Innovation is disruptive, destabilizing organizational structure		Firm size, firm age, innovation extensiveness, population learning	Often negative	Exit=organizational mortality(not necessarily efficiency-based, even efficient firms can die if innovation disrupts inertia
Economics	Evolutionary economics, active and passive learning theory	Product and process innovation	Innovation improves efficiency, competitiveness, and market power Innovation is inherently risky.		Technological regime, market concentration, import and export activities, risk, and financial constraints	Mixed	Exit = efficiency-based market selection
	Sunk cost logic	Technology adoption	Innovation is viewed as capital-intensive and it creates irreversible sunk costs				Firm survival is due to the inertia of irreversible sunk costs
International business studies	RBV	Product innovation, innovation capability	Innovation as a firm-specific resource and capability		Financial constraint, export mode, international experience, foreign ownership, profitability, provision of trade credit	Positive or negative to export market survival	Export market exit =loss of competitiveness in export market
	Sunk cost logic	R&D investment, R&D intensity	Innovation as product differentiation and sunk cost				Firm export survival is due to the inertia to irreversible sunk costs
	Evolutionary economic	Technological innovation	Innovation improves efficiency, profitability, and market power	Firm productivity			Export market Exit=efficiency based failure

Table 3.5(continued): Reconciliation matrix of field-based assumptions and conceptualization of innovation and firm survival.

Field	Theoretical lense(s)	Innovation type/construct	Assumptions about innovation	Mediators (Channel)	Moderators (Conditions)	Effect on survival	Assumptions about exit/survival
Strategic Management	RBV, DC	Innovation resource, intangible assets, innovation capability	Innovation as a firm resource and capability				Firm survival is the firms'adaptability to the changing environment (e.g. crisis)
	Organizational Ecology	Technology management	Innovation reinforces structural inertia as a stabilizer	Competitive strategy, competitive advantage	External support, financial constraints, financial crisis, competitive strategy, adoption timing, industry turbulence,	Mixed or inverted U-shaped relationships to firm survival	Firm survive through inertia-enhancing innovation
	Economies of Scope	New product introduction,	Innovation is viewed as product variety management; scope economies matter more in consumption than production				Firm failure is a strategic misalignment between product variety and scope
	Ambidexterity perspective	Exploratory innovation	The value of innovation relies on balancing				Firm survival depends on the balance between exploration and exploitation
	First-mover advantage theory	Entry timing, innovation adoption timing	Innovation value depends on managerial choice (e.g. innovation timing or entry timing)				Firm survival hinges on innovation timing
	Evolutionary Economics	Global engagement strategy	Innovation enhances firms' adapative capability				Firm survival partly depends on the firm's productivity and efficiency

Table 3.5(continued): Reconciliation matrix of field-based assumptions and conceptualization of innovation and firm survival.

Field	Theoretical lense(s)	Innovation type/construct	Assumptions about innovation	Mediators (Channel)	Moderators (Conditions)	Effect on survival	Assumptions about exit/survival
Marketing	Knowledge-based logic/contingency theory (CT)	External knowledge search	Innovation acts as both stabilizer and destabilizer	Competitive advantage, marketing innovation		U-shaped to firm failure	
	Demand/consumer-centric perspective	Marketing innovation, incremental innovation, really new product innovation, product radicalness	Innovation shifts demand, market structure, and/or consumer behaviour		Patent, trademark, absorptive capacity, industry embeddedness, firm size, technological intensity,	Positive for firm survival	Firm survival is contingent, not universal.
	RBV	Patent and trademark	Intangible marketing assets				

Table 3.6 Primary research questions of each field on the impact of innovation on firm survival prospects.

Fields	Primary research questions	Exemplary studies
Economics	What is the impact of technological innovation on firm survival? How does the degree of uncertainty shape the relationship between innovation and firm survival? How does the complementary effect of R&D intensity and market concentration influence a firm's survival aspect? How do aspects of a firm or its environment (firm size or technological regime) foster innovation within firms or industries and impact innovation and firm survival likelihood? How do firms' innovation capabilities shape different exit modes among business closure, M&A, and/or radical restructuring?	Cefis and Marsili (2005) Buddelmeyer et al. (2010); Ugur et al. (2016); Audretsch and Mahmood (1995); Kim and Lee (2016); Cefis et al. (2023)
Strategic Management	What is the impact of R&D investment as a strategic decision of firms on firm survival? How does the relationship between innovation, and firm financial resources impact on firm survival in a recent economic crisis? What is the nature of innovation development and firm survival aspect? How do the internal and external sources of innovation impact on firm survival?	Esteve-Pe´rez and Man˜ez-Castillejo (2008); Özsuca (2023); Li et al. (2010); Ali (2021); Destefanis et al.(2023)
Marketing	How do market orientation, marketing innovation, and competitive advantages impact firm survival? What is the contingent effect of product radicalness on the relationship between network externalities and market pioneer survival rate?	Naidoo (2010); Chatzoudes et al. (2021); Srinivasan et al. (2004)
Organization studies	How does organizational change through technological innovation or new product introduction affect the firm survival likelihood?	Carroll and Teo (1996); Barnett and Freeman (2001)
International Business	How do innovation activities of firms affect firms' export survival? What is the joint effect of firm innovation resources and internationalization strategies on firm survival?	Dai et al. (2020); Lee et al. (2012); Sui and Baum (2014)

3.3.1 Across-field variations

As shown in Table 3.5, different domains used different assumptions about innovation and firm survival which leads to the fragmentation of the field and contested debates. For example, while economics conceptualize innovation as an efficiency and productivity-enhancing mechanism that lowers the firms' hazard rate (Cefis and Marsili, 2005, 2006), organizational studies, mainly drawing on organizaitonal ecology and structural inertia perspective, frame innovation as disruptive and destablizer that heightens the organizaitonal mortality risk (Barnett and Freeman, 2001). According to organizational scholars, firm failure is not necessarily efficiency-based; efficient firms can die if the process effect of organizational change through technical innovation disrupts the structural inertia (Dowell and Swaminathan, 2000). Meanwhile, the field of strategic management, employing an organizational ecology perspective, frames innovation as an inertia-enhancing tool that facilitates the survival chances of initial public offering (IPO) firms (Wilbon, 2002). These divergent assumptions lead to contested debate about whether innovation stabilizes or destabilized firms' viability. Although organizaitonal ecology perspective sits at one end of the contested debate, the conceptual mapping from the bibliometric analysis shows (Figure 3.4) that it represents a niche theme rather than a dominant paradigm in the field.

3.3.2 Within field variations

Within fields, competing theoretical perspectives generate inconsistent assumptions and conceptualization of either construct. For instance, as shown in Table 3.5, the field of strategic management demonstrates particularly divergent views on innovation. Within this field, innovation is conceptualized as innovation resources and capabilities (RBV and DC views) (Landini et al., 2020; Ali, 2022), exploratory innovation (ambidexterity perspective) (Kim and Huh, 2015), innovation timing or innovation adoption timing (first-mover advantage/disadvantage theory) (Banbury and Mitchell, 1995; Christensen et al., 1998), product variety (economies of scope) (Cottrell and Nault, 2004), and global engagement strategy (evolutionary theory) (Bartoloni et al., 2021). Within this field, different theoretical perspectives hold different assumptions about innovation and firm survival. The RBV and dynamic capability views treat innovation as an enabler, framing firm survival in terms of

adaptability during crises and underscoring the protective effect of innovation on firm survival (e.g., Landini et al., 2020; Ali, 2022). In contrast, the ambidexterity perspective views innovation as a balancing act between exploration and exploitation, emphasizing the contingency view (Kim and Huh, 2015). According to the first-mover advantage theory, managerial decisions about innovation and adoption timing determine firm survival (Christensen et al., 1998; Banbury and Mitchell, 1995). In marketing, scholars have conceptualized innovation in various ways: as patents and trademarks (RBV and DC views), as marketing innovation, as incremental innovation, as product radicalness (demand/consumer centric perspective), and as external knowledge search. Even within the same field, different assumptions about innovation, as well as conflicting views regarding its impact on firm survival, highlight internal fragmentation, theoretical incoherence, and inconsistent conceptualization of innovation.

3.3.3 Cross-field borrowing

Importantly, these variations (across and within fields) facilitate cross-field borrowing. For example, both strategic management and international business studies have drawn on evolutionary economic theory. In this framework, innovation is regarded as a tool to improve efficiency and productivity, while firm exit is seen as market selection-based failure. However, the nature of the "borrowing" is not uniform. International business scholars largely adopt the theory directly, examining the impact of technological innovation on export market survival through firm productivity (Jitsutthiphakorn, 2021). Strategic management scholars, however, adapt the perspective to their own viewpoint, considering innovation as an adaptive capability and emphasizing that firm survival depends not only on efficiency and productivity but also on skills and firms' ability to cope with environmental complexity (Bartoloni et al., 2021). A similar pattern appears in the adaptation of "economies of scope" within strategic management. Although the concept is borrowed from economics, strategic management scholars focus on the consumption side rather than the production side, viewing innovation as a means of managing product variety and perceiving firm failure as the result of misalignment between product variety and scope (Cottrell and Nault, 2004). In contrast, international business scholars directly incorporate the sunk cost logic from economics, assuming firm exit results from inertia

due to irreversible sunk costs and implying that firm survival may sometimes be a matter of artificial persistence (Inui et al., 2017).

The reconciliation matrix shows that existing research has mainly focused on the direct relationship between innovation and firm survival, overlooking the underlying mechanisms through which innovation impacts firm survival. Future research should go beyond the direct link to examine how and under what conditions innovation affects survival, including through resource configurations and market adaptation. Regarding boundary conditions, existing studies have identified several firm-level moderators, including financial constraints, absorptive capacity, and competitive strategy, as well as macro-level moderators such as the technological regime, market concentration, and financial crises.

Figure 3.9 illustrates how contested debates, cross-field borrowing, and within-field variations function. The box size indicates the degree of variation within the field, while the grey background signifies internal heterogeneity and the white background indicates its absence. As shown in Figure 3.9, the field of strategic management and international business shows greater internal variation, encompassing competing theoretical perspectives, underlying assumptions, and divergent conceptualizations of innovation. In contrast, organizational studies hold a consistent view on innovation and its impact on firm survival; although not the dominant perspective, organizational studies contribute most to the contested debates.

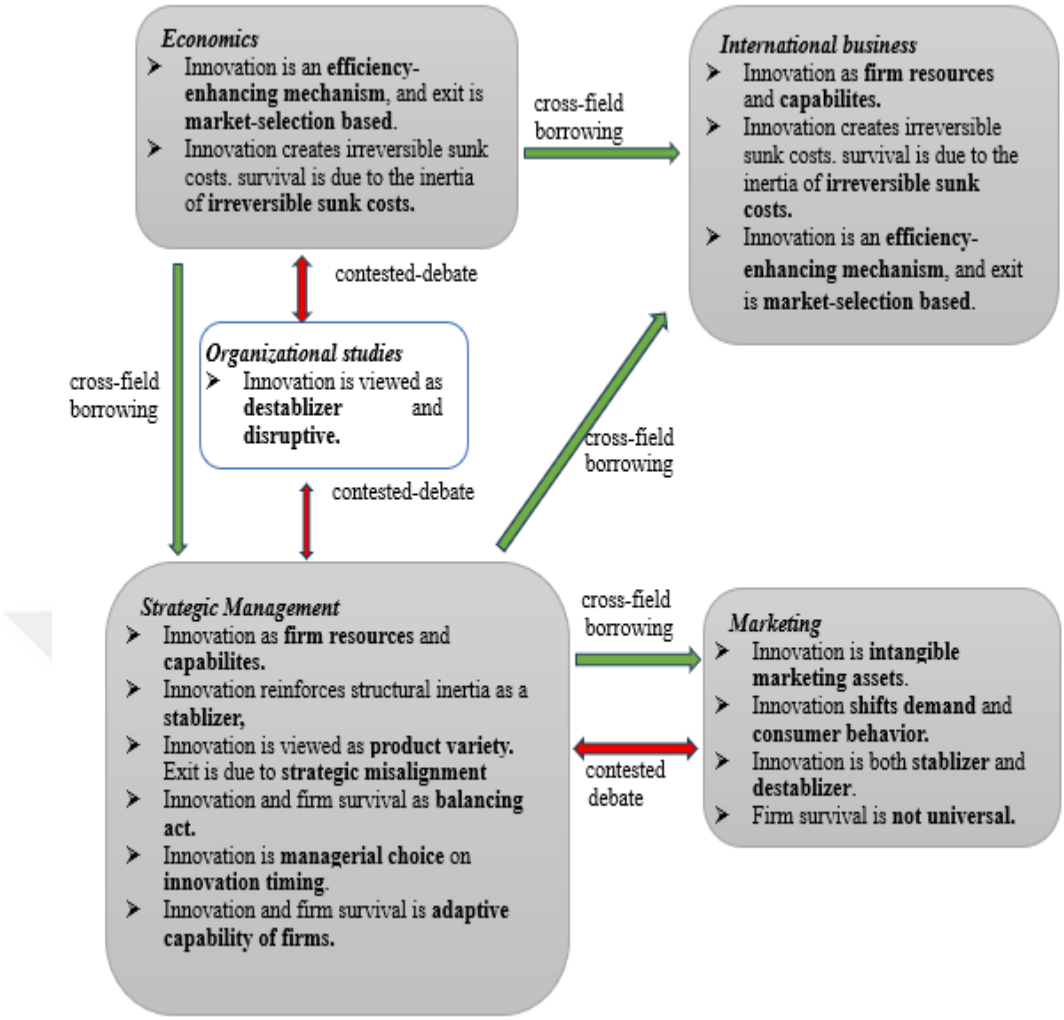


Figure 3.9: Across-field/within-field variations and cross-field borrowing map.

3.3.4 Measurement consequences of firm survival

To further investigate the sources of inconsistency in prior studies, the author examined how the variations in firm survival operationalization influence the reported estimates between innovation and firm survival. The analysis reveals a systematic pattern: the impact of innovation on firm survival varies depending on how firm survival is measured. As shown in Table 3.7, when firm survival is viewed as binary (exit=failure), 82.4% of studies suggest that innovation has a positive effect on firm survival (e.g., Zhang and Mohnen, 2022; Bhattacharjee et al., 2023). However, under competing risk models, the protective effect is largely drawn from studies operationalizing firm survival as continued solvency/bankruptcy (90.9%) (e.g., Fontana and Nesta, 2009; Grazzi et al., 2021), while the results for mergers/ acquisitions are more mixed (72.7% protective effect, 27.2% negative effect, and 9% nonsignificant). Regarding M&A treatment, when M&A is treated as a non-failure,

63.1% of studies report innovation as a protective factor. In contrast, when coded as a failure, the effect of innovation becomes more diverse. This shows that the direction of the reported main effect varies depending on the operationlization of firm survival, underscoring the role of measurement artefacts in shaping theoretical debates.

Table 3.7: Firm survival operationalization and its impact on the overall effect.

Firm survival operationalization	Notes	Enhance survival	Null	Non-linear	Impair survival
Binary	firm exit=failure	82.4%	14%	1.75%	15.7%
Competing risk: bankruptcy/involuntary liquidation	Only involuntary exit or negative exit is considered.	90.9%	18.1%	-	-
Competing risk: mergers and/or acquisitions	Only firms undergoing mergers and/or acquisitions	72.7%	9%	-	27.2%
M&A treated as a failure	Implicitly assuming M&A as a failure by viewing firm exit as a homogenous event	82.4%	14%	1.75%	15.7%
M&A treated as non-failure	Explicitly code M&A as non-failure firms.	63.1%	-	15.7%	26.3%

3.4 Discussions and Implications

3.4.1 Discussions

In this chapter, the author combined bibliometric analysis with field-based content analysis to provide a comprehensive understanding of how the diversity of assumptions embedded within different domains about innovation and firm survival influences the conceptualizaiton of both constructs across fields. The research on innovation and firm survival, despite a slow start, has experienced substantial growth over the past 10 years, suggesting that researchers remain interested in this relationship.

By combining two review approaches, this chapter not only provides the field's intellectual structure but also unearths the underlying assumptions, contested debates, instances of cross-field borrowing, and influence of measurement choices that shape the conceptualization of both constructs. In the following section, the author first highlights the methodological originality of the hybrid approach, articulates how the synthesis advances the prior debates on the topic, proposes a unifying multi-channel framework, and finally outlines directions for future research.

3.4.1.1 Methodological originality of the hybrid approach

As shown in the bibliometric analysis (Figure 3.3), economists such as Joseph Schumpeter, Richard Nelson, SG. Winter and Steven Klepper occupy an intersectional position between economics and management/organizational research, highlighting the exchange of ideas between these domains. However, intellectual structure alone reveals the tip of the iceberg: it shows which fields and scholars are connected, but not how theoretical assumptions transfer between them. By combining bibliometric analysis with field-based content analysis, the author further examines how underlying assumptions about innovation and firm survival are adapted, borrowed, or even challenged across different domains. For example, when Nelson and Winter's evolutionary view aligns with organizational ecology, content analysis demonstrates that innovation shifts from an efficiency-enhancing mechanism to a destabilizing force. Taken together, these approaches reveal that contested debates and conceptual inconsistencies on innovation and firm survival are not random but are systematically

influenced by cross-field variation, borrowing, and within-field differences. This integrated perspective cannot be achieved by either method alone.

3.4.1.2 Efficiency-based exit vs inertia-induced exit

One of the contested debates concerns whether firm exit is driven by efficiency-based market selection or by inertia-induced organizational mortality. From the evolutionary economic perspectives, Nelson and Winter (1982) regard technological innovation as a mechanism that enhances efficiency and productivity. They view organizations as somewhat adaptable to environmental change: the more productive and efficient firms survive, the less efficient ones exit (Jovanovic, 1982). By contrast, population ecology theorists (Hannan and Freeman, 1977; Barnett and Carroll, 1995) argue that organizations are structurally inert and that innovation can be disruptive and detrimental. According to this view, organizational change through technological innovation can risk the firm's survival likelihood.

The intellectual structure of the field (Figure 3.3) shows that Nelson and Winter's evolutionary economics and Hannan and Freeman's population ecology are at opposite ends of the spectrum, highlighting the intellectual gap between these two perspectives and the challenge of reconciliation. The field-based content analysis indicates that strategic management research has linked these viewpoints by reinterpreting firm survival as a function of both efficiency and adaptability (e.g., Bartoloni et al., 2021). In doing so, strategic management scholars shifted from a dichotomous view to a more integrated understanding, in which innovation can improve efficiency and adaptability depending on the boundary conditions.

3.4.1.3 Innovation as stabilizer vs innovation as destabilizer

The second debated issue concerns the role of innovation in shaping a firm's prospects for survival. From one perspective, rooted in the resource-based view and the dynamic capability theory, innovation is seen as a stabilizer: through innovation, firms develop firm-specific resources and capabilities, enhance competitive advantage, efficiency, and market power, and improve their chances of survival. In this view, innovation mainly has a protective effect on firm survival. From another perspective, innovation is regarded as a destabilizer and is inherently risky, as it creates irreversible sunk costs, disrupts organizational routines, and thus increases the likelihood of firm failure.

Unlike the first contested debate (efficiency-based exit versus inertia-induced exit), which was sharply polarized, the second contested debate was interconnected. The theoretical assumptions regarding innovation and firm survival are more integrated and blended. The intellectual structure of the field shows (Figure 3.3) that strategy and management scholars, such as Teece, Barney, Cohen, Levinthal, and Zahra, are clustered closely together, making it difficult to establish clear boundaries between stabilizing and destabilizing innovation. This blended nature of theoretical assumptions creates a fertile ground for both the proliferation of innovation variables and the fragmentation of the field, as studies conceptualize innovation in diverse ways, including resources, capabilities, R&D investment, radical versus incremental innovation, exploratory innovation, innovation timing, and innovation strategy. On one hand, this diversity is a strength because different perspectives offer alternative ways to frame innovation and its impact on a firm's survival. On the other hand, it risks fragmentation. Therefore, a unifying framework is needed to synthesize the insights across studies.

To address this need, the author proposes a multi-channel framework (Figure 3.10) that organizes proliferation and fragmentation into three integrative channels:

- The capability channel, rooted in the resource-based view and the dynamic capability perspectives, innovation functions as innovation resources and capabilities that enhance firms' adaptability and resilience in response to environmental complexity;
- The selection channel, where innovation is viewed as an efficiency and productivity-enhancing mechanism that triggers efficiency-based exit; and
- The legitimacy channel, where innovation impacts on non-economic indicators of firm survival, such as the moral failure of the firm and social reputation, incorporates a broad set of organizational activities and the interests of secondary stakeholders.

This unifying framework captures both the retrospective and prospective dimensions of the field. The upper portion of Figure 3.10 (in blue) represents prior studies on the impact of innovation on firm survival. As illustrated in Figure 3.10, most research has focused on how technological innovation affects firm exit—often equated with firm failure—primarily through the capability and the selection channels. Although

fewer in number, some studies have also examined how different exit routes are influenced by technological innovation (e.g., Cefis and Marsili, 2012). These channels suggest that firms enhance their survival likelihood either by reconfiguring resources and capabilities or by improving productivity and efficiency to increase environmental fit.

The lower portion of the figure (in green) highlights future research avenues, focusing on how non-technological innovations, innovation timing, and non-economic indicators of firm survival can be integrated into three distinct pathways. Figure 3.10 depicts the multi-channel framework, providing a roadmap for investigating how these underexplored factors may shape firm survival in different ways.

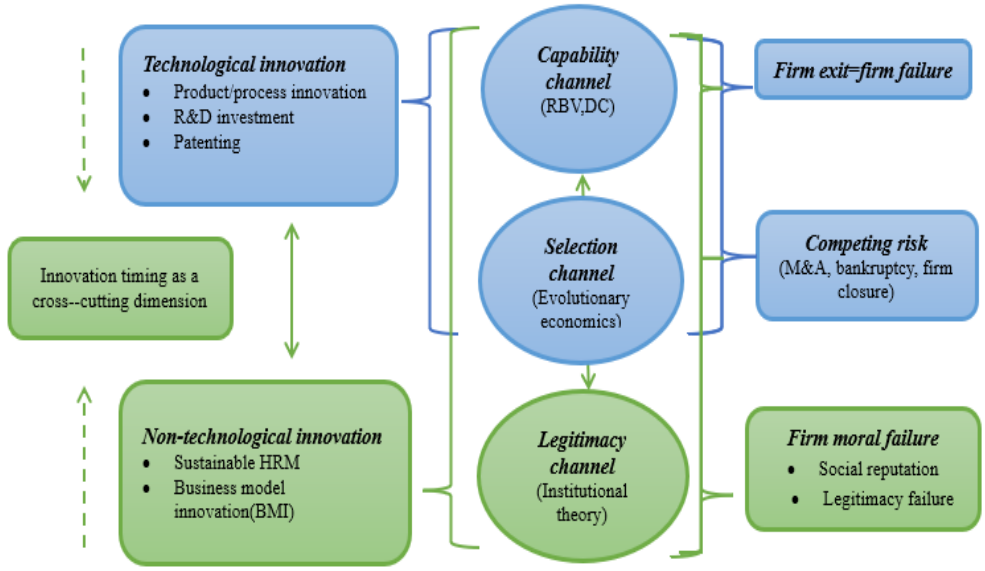


Figure 3.10: Multi-channel framework.

3.5.2 Implications

3.5.2.1 Non-technological innovation

Non-technological innovation was on the agenda of economics, entrepreneurship, and marketing, especially after 2010 (e.g., Naidoo, 2010; Cefis et al., 2023). This is consistent with the development of the management innovation field (e.g., Birkinshaw et al., 2008). However, the hybrid review shows that the innovation and firm survival literature overwhelmingly focuses on technological innovation and its related impact

on firm survival, while non-technological innovations, such as HRM practice, remain underexplored. This omission is critical, since non-technological innovation is increasingly recognized as one of the key drivers with a strong potential to contribute to organizational performance (Damanpour, 2014; Volberda, 2014). Furthermore, non-technological innovation influences firms' outcomes following the logic of institutional perspective, which is an underdeveloped area in innovation and firm survival literature (Figure 3.10). In this regard, future studies should investigate how HRM, and in particular sustainable HRM, shapes firms' survival likelihood. For example, Institutional theory posits that firms can gain legitimacy by conforming to institutional pressure and guarantee their survival and performance by adopting practices, such as HRM (DiMaggio and Powell, 1983; Farndale and Paauwe, 2007). By contrast, RBV contends that firm survival depends on differentiation through the development or acquisition of unique resources, rather than through the force of conformance that institutional theory suggests (Barney, 1991). Reconciling these two competing perspectives opens a new direction to investigate how the forces of conformance (legitimacy channel) and the forces of differentiation (capability channel) shape the relationship between the adoption of sustainable HRM and organizational legitimacy. Considering societal and environmental performance of firms, such as organizational legitimacy, along with the economic one, is essential in contexts of financial crises, grand challenges, and corporate scandals (Westerman et al., 2020). To measure sustainable HRM, several methods are recommended, such as ESG (Environmental, Social, and Governance) and CSR (Corporate Social Responsibility) disclosures or text mining in sustainable reports to identify firms' adoption practices related to employees' well-being, diversity, and inclusion.

Business model innovation (BMI), a form of non-technological innovation, receives scant attention in the literature on firm survival. BMI, compared to the product and process innovation, involves a more systemic change to the customer value proposition, value creation, and value capture (Markides, 2006; Velu and Stiles, 2013). Therefore, BMI may have a differential effect on firm survival compared to product and process innovation (Velu, 2015). BMI, such as modifications to revenue models and partnership structure, influences firm survival through several hazard channels. For instance, diversifying revenue models may help smooth cash flows in times of economic crisis, thereby decreasing the likelihood of firm exit (selection channel).

Collaborating with various types of stakeholders, such as customers, suppliers, universities, and research institutions, enables firms to access a range of external resources (Iglesias et al., 2013; Ind et al., 2017). It also enhances firms' technological capabilities over time and reduces the duration and costs of new product development (Helfat and Peteraf, 2003). To this end, future studies could investigate how modification in stakeholders breadth impact on overall firm survival (capability channel/oevrall firm survival), increase or decrease the likelihood of new firm being acquired, given that new firms send signals to resource providers having the ability to access to various information and resources(capability channel/mergers or acquisitions), or even enhance their legitimacy in the eyes of other audiences (legitimacy channel/non-economic indicator of firm survival). To operationalize BMI, future studies could employ text mining of annual reports and investor communications to detect the adoption of new business model practices.

Additionally, the complementarity of innovation types, especially the interplay between technical and non-technical innovation, boosts organizational performance (Damanpour, 2014; Ettlie, 1988). In this regard, fsQCA represents a promising technique not only to investigate the complex interplay between two types of innovation and organizational factors (e.g., managerial capabilities) but also to provide equifinality, where different combinations of factors (conditions) may lead to the same outcome (e.g., firm survival).

3.5.2.2 Innovation timing

As one of the important elements linking firms' innovation activities to competitive advantage, innovation timing is defined as firms' speed in generating or adopting an innovation relative to competitors in the marketplace (Lengnick-Hall, 1992; Gopalakrishnan, 2000). Rooted in industrial organization economics, the timing decision on whether being the first (first-mover advantage) to capture the monopoly profit and market share or being late (second-mover advantage or followers) to free-ride on first-movers' R&D is an important strategic decision allowing firms to create a sustained competitive advantage over competitors (Gilbert and Birnbaum-More, 1996).

The results of the hybrid review indicate that, while extensive attention has been devoted to technological innovation and R&D intensity, innovation timing has

received comparatively limited attention in the existing literature. Although limited in numbers, prior empirical studies on the innovation and firm survival relationship anchor innovation timing in a traditional focus in which early innovators have first-mover advantages by achieving higher market shares, indirectly, lower exit rates (Banbury and Mitchel, 1995) or drawing on industry- lifecycle theory to propose three years right before the emergence of the dominant design as the "window of learning" in the industry; firms entering during this window were shown to have higher survival rates in the sample (Christensen et al., 1998). Despite providing useful insights, these studies view innovation timing as a discrete (early vs. late) rather than a strategic process unfolding under uncertain conditions, since firms adjust their timing as market conditions change. In this regard, Real Options Theory (ROT) offers a formal decision framework to conceptualize innovation timing as a path under uncertainty, allowing firms to delay, stage, or alter innovation commitments as market conditions evolve (Trigeorgis and Reuer, 2017). Such decision flexibility under uncertainty, when properly managed, can be a source of value creation (Triantis, 2005).

Within the multi-channel framework (Figure 3.10), innovation timing is a cross-cutting dimension that influences all three channels. In the capability channel, aligned with the dynamic capability view, innovation timing is viewed as a firm's ability to seize opportunities. To this end, future research could employ a complementary asset perspective (Teece, 1986) to investigate how different types of resources or capabilities enable firms to recognize favourable timing options. In the selection model, innovation timing determines when firms are exposed to market and environmental selection pressures. The real options theory suggests that firms may delay innovation activities in response to uncertainty in market conditions, complexity, or technological change. In the legitimacy channel, innovation timing refers to the point at which a firm gains social acceptance or legitimacy via innovation. This perspective is especially important in international business contexts, where firms may delay introducing innovative products due to institutional constraints. Institutions vary in their receptivity to innovative products, which affects firms' export market opportunities and the survival of their subsidiaries.

3.5.2.3 Overarching firm survival profile

Most studies on innovation and firm survival conceptualize survival as firms' economic performance and market continuity. This emphasis reflects the interests of

primary stakeholders, such as shareholders and managers, and thus views economic viability as the core outcome of survival. While valuable, this view neglects the broader organizational activities and the interests of secondary stakeholders, including employees, communities, and societies, whose interests encompass ethical and environmental dimensions (Damanpour, 2020).

To address this gap, future studies should view firms' moral survival as a distinct aspect of a firm's overall survival. Firm Moral survival refers to a firm's ability to maintain credibility by complying with ethical, cultural, and environmental requirements. Firms may remain economically viable but still be morally compromised, particularly in socially sensitive industries such as defence, healthcare, or energy, where innovation can harm local values and environmental stability. This perspective aligns with the current literature on responsible and sustainable innovation, which advocates for evaluating innovation not solely on efficiency but also on societal benefits (Tsui, 2021; Damanpour, 2020).

Future research should operationalize moral failure by utilizing data sources such as ESG incident databases (e.g., Refinitiv, MSCI ESG), sanction records (e.g., labour and environmental violations), and media-based measures, such as reputation crises. These indicators can identify instances of moral hazard, which may not immediately affect economic viability but threaten a firm's long-term sustainability. Methodologically, the multi-state survival model offers a promising framework for examining economic and moral survival as separate yet interconnected processes. This approach allows researchers to trace firm trajectories across multiple states. For example, the shift from a legitimate operation to moral failure, or from financial difficulty to moral recovery, reflects the dynamic interaction between economic performance and moral survival.

4. A QUANTITATIVE META-ANALYTICAL REVIEW

In the second and third chapters of the thesis, the author systematically reviews the literature on the impact of innovation on firm survival by using a framework-based review (Paul and Rosado-Serrano, 2019) and a hybrid review and concludes that the relationship between innovation and firm survival is mixed and inconclusive. These inconsistencies stem from differences in theories, contexts, constructs, and methodologies used to explain the focal relationship, as discussed in detail in the second chapter of the thesis using the TCCM framework. Furthermore, the fragmented body of knowledge arises from the various underlying assumptions about innovation and firm survival across domains, leading to the proliferation of both innovation and firm survival constructs. This perspective is scrutinized in the third chapter of the thesis through a hybrid review. While the systematic review approaches seek to synthesize many previous studies and provide insights into the focal relationship, in this chapter, as the final part of the systematic literature review, the author employs meta-analysis to give a deeper statistical assessment of the prior empirical research. Meta-analysis is a useful methodology for quantitatively synthesizing existing empirical evidence and drawing evidence-based recommendations for practice and policymakers (Aguinis et al., 2011). In this chapter, the author aims to address the following research questions:

1) Does innovation enhance firm survival prospects?

2) Does the association between innovation and firm survival get affected by environmental, firm-level, and methodological factors?

3) What are the theoretical and practical implications of innovation for firm survival?

4.1 Conceptual Model and Hypothesis Development

Based on the prior reviews of organizational failure/survival and firm exit (Josefy et al., 2017; Cefis et al., 2021), the author groups firm survival/failure into four types: export market persistence/exit, firm failure/negative exit, mergers and acquisitions (M&A), and pooled exit (no distinction among types). Working definitions of each dimension of firm survival are provided to mitigate conceptual overlap before examining their respective relationships with innovation.

- Overall firm survival refers to a comprehensive definition of firm survival that aggregates all forms of exit, including mergers and acquisitions (M&A), bankruptcy, involuntary liquidation, pooled exits, and export market exit, into a single outcome variable. This definition captures firm continuity in the broadest sense.

- Pooled Exit denotes a nondifferentiated conceptualization of firm discontinuation, where exit events are grouped without distinguishing among their underlying causes (e.g., M&A, failure, voluntary exit) (Cefis et al., 2021). Studies in this category implicitly assume that continued operations constitute survival and discontinuation failure, regardless of exit type.

- Market Persistence captures the continuation or cessation of a firm's operations within a specific market environment. In this study, the focus is on export market survival, whether a firm maintains or exits its foreign market activities.

- Mergers and Acquisitions (M&A) represent a type of exit in which firms cease to exist as independent entities, either by becoming part of an existing firm (acquisition) or through consolidation into a newly formed entity (merger). Although not necessarily indicative of economic failure, M&A results in the loss of organizational identity (Cefis et al., 2023).

- Firm Failure refers to involuntary exits such as bankruptcy and forced liquidation due to poor economic performance. Studies under this category typically use financial distress indicators (e.g., insolvency status or formal bankruptcy filings) to classify firms as failed.

4.1.1 Innovation and firm survival

The impact of innovation on firm performance, particularly on firm survival, has long been a focal point across the disciplines of management, business, and economics (Huang et al., 2019; Fagerberg et al., 2012). However, the literature presents conflicting and often contradictory views on this relationship. Several theoretical perspectives suggest that innovation enhances firm survival. For instance, successful innovation can improve competitiveness and market power (Schumpeter, 1934; Nelson and Winter, 1982), enable firms to escape competition (Porter, 1980), foster organizational learning (Cohen and Levinthal, 1990), and reduce production costs (Cohen and Klepper, 1996). It also strengthens dynamic capabilities (Teece et al., 1997; Eisenhardt and Martin, 2000) and absorptive capacity (Zahra and George, 2002), thereby increasing the likelihood of survival.

Despite this, alternative perspectives suggest that the innovation–survival relationship is indeterminate or even negative. According to active learning theory—an extension of Jovanovic's (1982) passive learning framework—firm survival outcomes from innovation are stochastic, due to the uncertain returns of R&D, competitors' success, and external pressures (Ericson and Pakes, 1995). Similarly, evolutionary theory argues that while innovation enables firms to reach the technological frontier, the survival benefits of innovation decline during economic downturns due to increased risk (Malerba et al., 2016; Destefanis et al., 2023). The Schumpeterian view of creative destruction posits an inverted U-shaped relationship between innovation and firm survival: up to a certain point, innovation is beneficial; beyond that point, it may lead to financial losses (Ugur et al., 2016). Moreover, innovation is costly and risky (Samuelsson and Davidsson, 2009), entails uncertain returns (Scherer and Harhoff, 2000), can provoke internal resistance (Hultink and Atuahene-Gima, 2000), and demands significant organizational capabilities to yield sustainable benefits (Thornhill, 2006).

Empirically, findings on this relationship remain mixed. Some studies indicate a negative relationship. For example, Boyer and Blazy (2014) find that innovative micro-startups in France face higher failure risks than non-innovative ones. Hyytinen et al. (2015) also observe a negative effect of innovation on firm survival in Finland. Fernández-López et al. (2020) show that innovation increases the failure risk for Spanish university spin-offs. In contrast, other studies report positive effects. Cefis and

Marsili (2005) document an "innovation premium" that prolongs firm life in the Netherlands. Subsequently, research has consistently shown that innovation, particularly product innovation, positively affects firm survival (e.g., Wagner and Cockburn, 2010; Esteve-Perez et al., 2010; Zhang et al., 2018; Sandberg et al., 2020; Guerzoni et al., 2021; Reddy and Sasidharan, 2023).

Some scholars have attempted to explain the reasons underlying this heterogeneity. The impact of innovation varies according to the type of innovation (Cefis and Marsili, 2005; Ortiz-Villajos and Sotoca, 2018), level of R&D intensity (Ugur et al., 2016), innovation degree (Wojan et al., 2018), sectoral differences (Helmers and Rogers, 2011; Deng et al., 2014), and firm diversification (Fernandes and Paunov, 2015). Others highlight the importance of innovation measurement (Wilbon, 2002; Jensen et al., 2008). For example, Rosenbusch et al. (2010) report that innovation output measures are more strongly associated with SME performance than input measures. Ugur and Vivarelli (2021) find that output-based innovation measures (e.g., product innovation, IP assets) are more likely to yield favourable survival effects, particularly in pre-2010 studies. Similarly, Buddelmeyer et al. (2010) distinguish between innovation investment and innovation capital, showing that the former increases failure risk while the latter enhances survival.

These inconsistencies reflect conceptual and methodological heterogeneity in both innovation and survival constructs (Ugur and Vivarelli, 2021; Garcia and Calantone, 2002). For instance, some studies define survival as continued operation, regardless of financial performance, whereas others define it in terms of financial solvency or ownership continuity, incorporating outcomes such as M&A (Josefy et al., 2017). Methodologically, although firm survival, by its nature, reflects time-to-event, it is treated differently. Some studies treat survival as time-to-event data using hazard ratios (e.g., Guerzoni et al., 2021; Ebert et al., 2019), whereas others treat survival as a binary outcome using odds ratios (e.g., García-Cabrera et al., 2021; Tan and Sousa, 2019). Salika et al. (2022) show that treating time-to-event data as binary can distort interpretations of the effect size.

In sum, although the literature offers divergent theoretical and empirical perspectives, the review indicates that the balance of evidence leans toward a positive relationship between innovation and overall firm survival. In addition, the author distinguishes between two conceptualizations of firm survival to reflect differences in

conceptualization across the literature. The first considers overall firm survival, incorporating a broad view that encompasses all exit types (e.g., genuine failure/negative exit, M&A, export market exit/export market survival). The second focuses on pooled exit, where no distinction is made between exit event types.

H1: Innovation positively affects a firm's overall survival.

H2**:** Innovation negatively affects the likelihood of pooled exit.

4.1.2 Innovation and dimensions of firm survival

4.1.2.1 Innovation and foreign market persistence (export market survival)

Branching from the literature on innovation and firm survival, which has primarily focused on domestic market survival, the stream on international market survival emphasizes the role of innovation in export performance (Bıçakcıoğlu-Peynirci et al., 2020) and continued export market presence (Azar and Ciabuschi, 2017). In trade literature, export exit takes two forms: a firm may exit the international market while remaining active domestically, or it may exit both markets entirely (Deng et al., 2014). Despite this distinction, trade literature often treats export market exit as a form of firm failure. Evidence shows that withdrawal from foreign markets can reduce firms' exposure to global competition and knowledge flows, thereby adversely affecting productivity and overall performance (Yasar and Rejesus, 2005). Similarly, Ilmakunnas and Nurmi (2010) found that, on average, 49.3% of firms that exited the export market also ceased operations entirely. As a result, export market exit is often interpreted as export failure (Chor and Manova, 2012; Ilmakunnas and Nurmi, 2010). However, the management literature offers a more nuanced interpretation. Josefy et al. (2017) discuss firm survival in terms of continued or discontinued operations within specific market segments—whether domestic or international. According to them, assuming that export market persistence is universally positive and export market exit is a failure provides an incomplete picture. They argue that the meaning of export survival varies depending on a firm's stage of development. For instance, for diversified or multi-unit firms, exiting from a foreign market may be a strategic decision—such as a competitive deterrent (Karnani and Wernerfelt, 1985) or part of an expansion strategy (Hambrick and Fredrickson, 2001). In contrast, for single-unit firms, survival in the export market may be tantamount to overall firm survival (Singh and Mitchell, 1996).

As for the direct relationship between innovation and export market survival, several scholars report a positive effect. Reddy and Sasidharan (2023), for instance, found that innovative firms in the Indian manufacturing industry face a lower export market hazard rate than their non-innovative peers. This finding aligns with other studies as well (Sui and Baum, 2014; Sandberg et al., 2019). Engaging in product innovation, particularly in high-tech sectors, can help exporters seize market opportunities and enhance their survival prospects in international markets (Giovannetti et al., 2011). Innovation also enhances absorptive capacity (Zahra and George, 2002), contributing to better performance indicators such as higher productivity, profitability, and market power, all of which promote survival in both domestic and export markets (Zhang et al., 2018). Nevertheless, other researchers report insignificant or even negative effects of innovation on export survival. Innovation activities are inherently costly and risky (Deng et al., 2014; Zhang et al., 2018). In the context of domestic firm survival, factors such as innovation type, timing, firm size and age, and other firm-specific characteristics have been shown to influence survival outcomes; similar risks may apply to export markets. For example, Deng et al. (2014) show that innovation can become a liability and even contribute to exit from export markets. Likewise, Dai et al. (2020) find that the impact of innovation on export market survival differs by export mode: while innovation enhances survival probability for direct exporters, it has an insignificant or negative effect for indirect exporters. Despite this mixed evidence, the literature predominantly supports the positive role of innovation. Accordingly, the following hypothesis is proposed:

H3: Innovation positively affects firms' persistence in foreign markets (export market survival).

4.1.2.2 Innovation and mergers and acquisitions (M&A)

The industrial organization literature emphasizes that firms can increase market power and productivity through mergers and acquisitions (M&A) by changing the control of assets (Caves, 1998). Within this stream, research has primarily focused on the role of financial, managerial, and tangible assets in determining M&A outcomes (Ambrose and Megginson, 1992; Powell, 1997). In contrast, the knowledge-based view highlights intangible assets—such as innovation and knowledge—as key motives for acquisition (Capron and Mitchell, 2004). From this perspective, M&A is viewed as a strategic tool, particularly for large firms, to acquire external resources and capabilities

(Barney, 1991), including absorptive capacity (Cohen and Levinthal, 1990). Consequently, firms with knowledge capital, such as intellectual property (IP), may signal higher quality and become more attractive acquisition targets (Fontana and Nesta, 2009; Cefis and Marsili, 2011, 2012; Børing, 2015).

However, from a valuation perspective, intangible assets are harder to assess, making firms, especially new firms, more vulnerable to adverse selection in the M&A process (Cotei and Farhat, 2018). Therefore, the impact of innovation on M&A outcomes remains ambiguous. For example, Wagner and Cockburn (2010) distinguish between exit routes via delisting and merger, finding that while patent applications negatively affect exit via merger, high-quality patents increase the probability of such exits. Later studies support this view: Cotei and Farhat (2018) and Kato et al. (2022) provide further evidence on the role of patent quality in determining exit routes via merger or acquisition for new firms.

Another line of research suggests that the effect of innovation on M&A depends on the type of innovation and broader business cycles. For instance, Børing (2015), in a study of Norwegian firms, found that only product-innovative firms that introduce new products to the market are more likely to exit via M&A, while process-innovative firms are generally more likely to exit through this route. In contrast, Cefis and Marsili (2012) found that product innovation enhances firms' attractiveness to acquirers and facilitates strategic exits, whereas process innovation does not significantly affect firms' M&A prospects. Similarly, Cefis et al. (2023) reported that marketing and product innovation reduce the likelihood of firm exit via M&A during crisis and recovery periods, but not during normal times. Conversely, process innovation lowers the likelihood of exit via M&A in normal times.

Overall, despite these divergent findings, the author expects that firms engaging in innovation activities—whether through R&D investment or the development of intellectual property (e.g., patents, trademarks)—are generally more attractive targets for potential acquirers, thereby increasing the likelihood of exit through M&A.

H4: Innovation positively impacts firms' M&A likelihood.

4.1.2.3 Innovation and firm failure

Firm failure, often regarded as bankruptcy or forced liquidation, is the most objective and severe form of firm exit. Unlike voluntary liquidation and firm closure, which are

initiated by firm owners (Cefis et al., 2021), firm failure typically results from poor financial and economic performance and financial distress. Prior research has used a firm's genuine failure, bankruptcy filings, or forced liquidation as an indicator of firm failure (Cefis et al., 2023; Wagner and Cockburn, 2010; Useche, 2015).

While innovation is often viewed as a driver of competitive advantage and organizational adaptability, it often introduces risks that increase firms' vulnerability to failure. Some theoretical perspectives suggest that innovation increase productivity and profitability, strengthen market power, foster organizational learning, and enhance dynamic capability (Schumpeter, 1934; Nelson and Winter, 1982; Cohen and Levinthal, 1990; Zahra and George, 2002; Teece et al., 1997), while other views point to the stochastic nature of innovation and the possibility of diminishing returns, leading to uncertain or even inverted-U relationships between innovation and firm survival (Ericson and Pakes, 1995; Ugur et al., 2016; Ugur and Vivarelli, 2021). Given the empirical inconsistencies in prior research, this study examines whether innovative firms are less likely to experience involuntary failure than their non-innovative counterparts. Building on this, the following hypothesis is proposed:

H5: Innovation reduces the likelihood of firm failure (negative exit)

4.1.3 Innovation and firm survival contingencies

4.1.3.1 Influence of national culture

Research on the role of national culture in shaping innovation outcomes has gained considerable attention in recent decades. Studies have examined the influence of national culture on national innovation rate (Shane,1992; Espig et al., 2022), corporate innovation (Boubakri et al., 2021), innovation strategy and product innovation performance (Beyene et al., 2016), and innovation diffusion process (Desmarchelier and Fang, 2016). These studies indicate that national culture not only explains cross-country variations in innovation but also shapes how organizations adopt new ideas and practices, solve problems, and prioritize teamwork over individual accomplishments (Hofstede et al., 2010). Accordingly, the effectiveness of innovation in fostering firm survival may be contingent on cultural factors.

Most studies in this domain have adopted Hofstede's cultural framework (Flynn and Saladin, 2006), which includes six dimensions: power distance, uncertainty avoidance, individualism versus collectivism, masculinity versus femininity, long-term versus

short-term orientation, and indulgence versus restraint (Hofstede et al., 2010). Of these, two dimensions proposed by Hofstede fit well with innovation studies, given the inherent nature and inclination of extant empirical research (Rosenbusch et al., 2011; Singhal et al., 2020). Individualism refers to a culture in which individuals are motivated by personal goals rather than subordinating them to the goals of the team to which they belong. High-IDV cultures emphasise autonomy, independence, and competition, whereas low-IDV cultures (collectivists) emphasize group harmony, interdependence, and cooperative effort (Hofstede et al., 2010). In this study, the author follows prior meta-analytic and empirical conventions by coding IDV both as a binary (high vs low) and a continuous variable, capturing its nuanced role as a contextual moderator.

The literature provides a contrasting view on the impact of individualism on innovation and firm outcomes. Some scholars support the view that highly IDV culture values autonomy, freedom, competition, and therefore enjoys better financial performance (Flynn and Saladin, 2006). Further, individualism facilitates new product development through product championing (Nakata and Sivakumar, 1996). Conversely, other streams of research highlight the potential limitation of individualism on focal relationships. For example, Power et al. (2009) found that innovation-related investments yielded better outcomes in collectivist (Asian) cultures compared to individualist (Western) cultures. Rosenbusch et al. (2011) observed that organizations in collectivistic cultures derive greater benefits from innovation due to a higher level of collaboration among employees, customers, and suppliers in projects. Moreover, they suggest that in collectivist environments, a few numbers of enterprises engage in innovation, enabling innovative firms to reap more benefits, whereas in individualistic cultures, innovation is more prevalent and competitive, thus diminishing its strategic significance. Singhal et al. (2020) meta-analysis further supports this view, indicating that firms in a highly individualistic culture experience lower firm performance from technological innovation. These findings indicate that although individualism may foster creativity, collectivist cultures may offer a more advantageous environment for actualising the survival-enhancing advantages of innovation through increased cooperation and organizational alignment.

Taken together, these arguments suggest that national culture, particularly individualism, moderates the relationship between innovation and firm survival. In

cultures characterised by lower individualism (i.e., higher collectivism), innovation may be more effectively integrated into organizational routines, enhancing survival outcomes. Accordingly, the following hypothesis is proposed:

H6: The lower the degree of individualism of a nation, the stronger the impact of innovation on firm survival.

Uncertainty avoidance refers to the extent to which a society tolerates ambiguity and risk (Hofstede, 1980; 2001). Cultures with high UAI tend to prefer predictability, rules, and structure, whereas those with low UAI are more willing to take and tolerate risk and uncertainty. Given that innovation inherently involves risks, ambiguity with uncertain outcomes, the level of uncertainty avoidance of a nation may shape how firms benefit from innovation.

Prior research supports this notion. Becheikh et al. (2006) concluded that low-UAI cultures tend to be more innovative than high-UAI ones. Similarly, Singhal et al. (2020) found that firms in high-UAI countries experience lower firm performance from technological innovation. This suggests that in a risk-averse society, the implementation or effective utilization of innovation may be more challenging. Conversely, cultures that exhibit greater tolerance for uncertainty may foster conditions conducive to innovation, hence enhancing long-term organizational sustainability. Based on this reasoning, the following hypothesis is proposed;

H7**:** The lower the degree of uncertainty avoidance of a nation, the stronger the impact of innovation on firm survival.

4.1.3.2. Influence of industry type

Evolutionary economics argue that market selection mechanisms panalize firms based on their "environmental fit". By innovating, firms modify their routines and increase their efficiency, with the intention of expanding market shares and survival likelihood, and ultimately achieving better environmental fit (Nelson and Winter, 1982). In evolutionary economics, particularly in the work of Malerba and Orsenigo (1996), technological regimes are used to characterize the industry-level environments that may influence firms' innovation behaviour. The probability of innovation is higher in un-routinized regimes with higher-level of technological opportunities, but it is lower in routinized regimes with low technological opportunities (Ugur and Vivarelli, 2021).

These perspectives suggest that the impact of innovation on firms' survival prospects is contingent on the environment in which they operate.

Two competing viewpoints have been proposed regarding whether firm survival is favoured by high-tech industries or a stable, low-tech industry. One view suggests that high-tech industries are more favourable for innovative firms to survive. This is because high-tech industries demand continuous innovation in a dynamic, highly technological environment characterised by uncertainty (Todtling et al., 2006). In such settings, innovation can offer a temporary competitive advantage that sustain firm performance (Nelson and Winter, 1982). Furthermore, innovation also allows new entrants to disrupt incumbents (Agarwal, 1996). On the other hand, as Geroski (1995) noted, high-tech industries are usually associated with higher technological opportunities but also higher uncertainty regarding both the technical characteristics of new products and their demand. Therefore, firm failure can be higher in knowledge-intensive high-tech industries. This is supported by further evidence (Audretsch and Mahmood, 1995; Doms et al., 1995).

A contrasting view holds that innovation may yield greater survival benefits in more stable, low-tech industries. In such an environment, innovation is a strong indicator of a firm's survival prospects, particularly when firms face a lower rate of change and greater uncertainty (Cefis and Marsili, 2005, 2011; Deng et al., 2014). Still, some scholars found no significant differences in the effect of innovation across industry types (Rousseau et al., 2016; Ebert et al., 2019). Given these divergent perspectives and inconsistent findings, the author argues that industry types may moderate the association between innovation and firm survival. Therefore, the author hypothesizes:

H8: Industry type moderates the relationship between innovation and firm survival, such that the positive effect of innovation on survival is stronger for high-tech than for low-tech.

4.1.3.3 Influence of firm age

Firm age has been considered a critical determinant of firm survival. According to the selection model, young firms enter the market with limited knowledge of their relative efficiency. Over time, through the process of learning and selection, more efficient firms persist while less efficient ones exit, leading to a stylized fact in industrial organization: older firms, on average, exhibit higher survival probabilities than the

younger ones (Jovanovic, 1982; Ericson and Pakes, 1995; Geroski, 1995; Caves, 1998). In contrast, the organizational ecology perspective highlights more complex patterns. While "liability of newness" suggests a positive age and firm survival association (Stinchcombe, 1965), other views, such as "liability of adolescence" and "liability of senescence", propose a non-linear relationship and older firms facing a higher failure rate due to rigidity and environmental misalignment (Bruderl and Schussler, 1990; Hannan, 1998).

Given the influential role of firm age in firm survival literature, scholars have investigated its role in firm survival in conjunction with innovation. Theoretically, younger firms tend to benefit more from innovation due to their less rigid routines (Freeman et al., 1983), higher adaptability to the changing operating environment (Klepper and Simons, 1997), openness to the possibilities that technologically driven opportunities can create ((Christensen and Bower, 1996), and ability to atttract customers and exernal capital providers (Cefis and Marsili, 2011; Wagner and Cockburn, 2010). In contrast, older firms may face barriers due to routinization, inertia, and environmental misalignment (Sørensen and Stuart, 2000), which make innovation implementation more difficult and are more likely to foster negative process effects. Empirically, this theoretical reasoning received mixed support. A growing body of studies suggests that younger firms benefit more from innovation in terms of survival and firm performance. For example, Rosenbusch et al. (2011), in a meta-analysis of the innovation-SME performance link, found that the positive effect of innovation on firm performance is stronger for younger firms. Similarly, innovation enables young firms to overcome initial disadvantages and enhance their appeal to investors and customers, thereby improving their survival prospects (Cefis and Marsili, 2011; Wagner and Cockburn, 2010). However, other studies present a more cautious view. The "liability of newness" suggests that, despite innovating, younger firms may still struggle to survive due to their limited legitimacy and resource scarcity (Stinchcombe, 1965; Hyytinen et al., 2015). Moreover, innovation in young firms tends to be riskier and more uncertain, potentially increasing their risk of failure (Samuelsson and Davidsson, 2009). Some researchers, such as Carroll and Teo (1996), even report no systematic difference between older and younger firms in how innovation affects survival. Despite these competing perspectives, the author proposes

that younger firms, on average, are more likely to benefit from innovation in terms of survival outcomes. Therefore, the following hypothesis is proposed:

H9: Firm age moderates the relationship between innovation and firm survival, such that the positive effect of innovation on survival is stronger for younger firms than for older firms.

4.1.3.4 Influence of innovation measurement

Innovation is a multidimensional construct and is conceptualized and measured in various ways in the pertinent literature (Garcia and Calantone, 2002; Crossan and Apaydin, 2010). In the literature of innovation and firm survival, three types of innovation measurements have been used to proxy innovation: R&D, innovation output (decomposed into product, process, organizational, and marketing), and intellectual property rights (e.g. patent and trademark) (Zhang and Mohnen, 2022). These measures capture different stages and different aspects of innovation activities, which in turn may have different effects on firm survival outcomes.

R&D is among the most widely used innovation measures in the literature. It reflects firms' commitment to produce new technologies and innovation and therefore emphasizes forward-looking investment and is subject to inherent uncertainty and failure risk (Ugur and Vivarelli, 2021). While some studies find a positive association between R&D intensity and survival (Esteve-Pérez et al., 2004; Reddy and Sasidharan, 2023), others report mixed or even a negative association (Kim and Lee, 2016; Jung et al., 2018). Several studies also suggest a nonlinear (inverted-U) relationship, where very high or very low R&D intensity may increase hazard rates (Ugur et al., 2016).

Patents are attractive as indicators of innovation because of their objectivity and generalizability across contexts (Khessina, 2018). However, patent counts may not reflect the economic value or commercial success of innovation. While some studies report a positive effect of patenting on survival (Helmers and Rogers, 2011; Kato et al., 2022), others observe null or negative effects—particularly in contexts such as micro startups and university spin-offs, where patenting may not translate into viable market entry (Fernández-López et al., 2020).

Product and process innovations, especially those measured by the number of new products introduced or the share of revenue from new products, reflect realized innovation outcomes. These output-based measures are generally more directly linked

to market performance and firm competitiveness and thus are likely to exhibit a stronger and more consistent positive association with firm survival (Cefis and Marsili, 2005, 2006; Rosenbusch et al., 2011; Ugur and Vivarelli, 2021). However, the evidence is not entirely unambiguous. For instance, Giovannetti et al. (2011) find no effect of product or process innovation on Italian firms' survival, and Boyer and Blazy (2014) report a negative relationship for French micro-startups. Nonetheless, the overall trend suggests that output-based innovation measures are more reliable indicators of survival-enhancing innovation activities. Taken together, these distinctions suggest that the strength and direction of the innovation–firm survival relationship may be contingent on how innovation is operationalized. R&D represents potential innovation and carries higher uncertainty and failure risk; patenting captures novelty, but not necessarily commercial viability; and product/process innovations embody realized outputs. Therefore, the following hypothesis are proposed:

H10a: Innovation measured as product or process output is positively associated with firm survival.
H10b: Innovation measured as patenting activity is positively associated with firm survival.
H10c: Innovation measured as R&D intensity has an indeterminate effect on firm survival.

4.1.3.5 Influence of effect size approach

One of the strengths of meta-analysis is its ability to test whether methodological characteristics of primary studies moderate the focal relationship of interest (Hunter and Schmidt, 1990). In this thesis, the author also examines whether the data extraction approach and publication year moderate the focal relationship under investigation.

Of the 29 primary studies included, 16 used multivariate Cox proportional hazards models, enabling direct estimation of log hazard ratios (logHR) and their standard errors. Meta-analysts favour this direct method due to its relative simplicity and transparency (Parmar et al., 1998; Williamson et al., 2002; Tierney et al., 2007). In contrast, indirect methods estimate effect sizes using published aggregate statistics or by published Kaplan-Meier curves, which introduces subjectivity and potential inaccuracies due to image quality, time-interval selection, and assumptions about censoring (Tierney et al., 2007; Tierney et al., 2025). Although prior research has

found no systematic bias across methods (Williamson et al., 2002), the potential for variation and reduced precision remains (Tierney et al., 2025). Given the methodological variation in effect size extraction across primary studies, the author explores whether the data extraction approach (direct vs. indirect) moderates the relationship between innovation and firm survival. Since this is an exploratory variable, the author does not advance an a priori hypothesis. The goal is to assess whether this methodological characteristic accounts for systematic variation in reported effect sizes.

4.1.3.6 Influence of year of publication

Similarly, consistent with prior qualitative reviews (e.g., Ugur and Vivarelli, 2021), the author examines the potential impact of publication year on the relationship between innovation and firm survival. Specifically, studies are divided into those published pre-2010 and post-2010, reflecting a period after which innovation-related data, measurement, and contextual dynamics may have evolved. Although there is no firm theoretical basis to hypothesize a directional change in the relationship over time, Ugur and Vivarelli (2021) note that studies published after 2010 report a more heterogeneous set of findings, with a lower percentage identifying a positive innovation–survival link. Building on this, the author explores whether the publication period moderates the overall effect size, helping to uncover possible temporal changes in empirical patterns or methodological practices in the innovation–survival literature. The overall conceptual framework of the meta-analysis is presented in Figure 4.1.

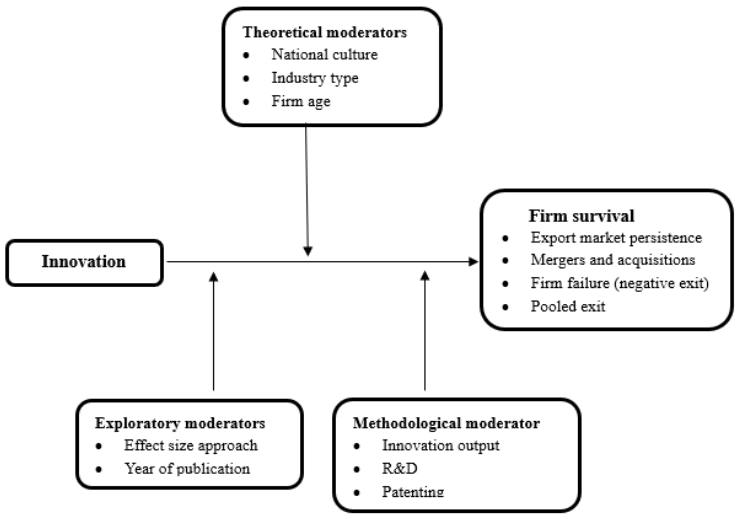


Figure 4.1: Conceptual model.

4.2 Methodology

4.2.1 Search strategy and inclusion criteria

In accordance with the PRISMA guidelines (Moher et al., 2009), the author followed the following steps to identify relevant studies for meta-analysis. In the identification stage, an electronic literature search was conducted across major databases, including Web of Science, Scopus, EBSCOhost, ProQuest Dissertations & Theses, EBSCO Open Dissertations, and Conference Proceedings Citation Index—Social Science & Humanities (CPCI-SSH). Based on previous studies (e.g., Josefy et al., 2017; Rousseau et al., 2016), the following keywords were used to identify the relevant studies in the field of Title/Abstract/Keywords: ("innovation" OR " innovative") AND ("survival" OR "survivor" OR "failure" OR "death" OR "mortality" OR"exit"). In addition, following criteria were set to locate the eligible studies: 1) the subjects of the area were limited to Management, Business, and Economics, 2) the chosen time frame for the pertinent literature was between 1990 and 2023, 3) the document type was restricted to Journal article, dissertation, and conference proceedings and the document language was restricted to "English" on each selected database. This preliminary search yielded 17,616 articles from all databases.

After removing duplicate articles (n=4028) during the screening stage, the author scanned the titles and abstracts to further shortlist relevant articles, selecting those that specifically focus on the impact of firm-level innovation on one or more firm survival-related outcomes. For example, studies investigating the relationship between innovation and firm performance (e.g. Tavassoli and Karlsson, 2015), drivers or antecedents of innovation (e.g., Beshr and Hossan, 2018), innovation failure, project failure, or market failure (e.g., Jenson et al., 2016; Ball and Kittler, 2019), macro-level innovation activities such as innovation ecosystem, metropolitan innovation, or industry level innovation and their impact on firm survival prospects(e.g., Sarkar et al., 2006), and studies that used the keywords in a way that that was not relevant to the current study such as cancer mortality, cancer survival, or premature mortality (e.g., Lichtenberg, 2015) were excluded from the sample. When discrepancies in the appropriateness of the studies arise, they are resolved through discussion with the thesis advisors. After this screening process, 133 studies remained.

Subsequently, 133 studies were reviewed for eligibility. Articles must be empirical and quantitative to be included in the meta-analysis. Therefore, conceptual papers (e.g.,

Ugur and Vivarelli, 2020), case studies, and qualitative studies were omitted (e.g., Choi and Sethi, 2021) (n=18). Additionally, three studies were excluded due to limited accessibility (two conference papers and one doctoral dissertation). Eighty-one studies were removed since they provided a lack of statistical information on the effect size of interests (e.g. log hazard ratio and its standard error). 2 studies investigating the relationship between R&D investment and firm survival prospects using the same sample were removed (e.g., Pérez et al., 2004; Esteve-Pérez and Mañez-Castillejo, 2008), due to the importance of sample independence in a meta-analysis.

Applying these criteria, 29 primary studies with 39 independent effect sizes across 950,000 firms were included in the meta-analysis. The complete list of papers included in the study is provided in Appendix A. Figure 4.2 illustrates the PRISMA diagram and criteria included in the meta-analysis.

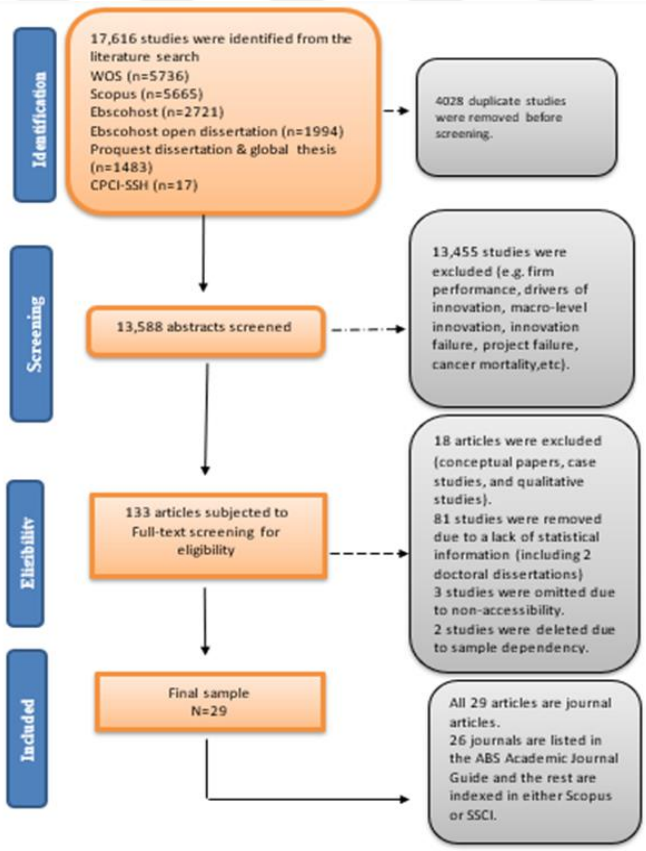


Figure 4.2: PRISMA diagram for study inclusion in the meta-analysis.

4.2.2 Extracting effect size

One of the most challenging aspects of this meta-analysis is the extraction of effect sizes from primary studies. The outcome variable of interest is firm survival, which is

a time-to-event (TTE) data. TTE data are most appropriately analysed using hazard ratios (HRs), which account for the timing of an event (when it occurs), the likelihood of an event (whether it occurs), and censored units (e.g., firms) that have not experienced an event (Tierney et al., 2007). Therefore, correlation coefficients or standardized mean difference effect sizes are not suitable for TTE data given their inherent properties. Following the widely recommended data extraction methods outlined in the medical literature (Parmar et al., 1998; Tierney et al., 2007; Williamson et al., 2002; Tierney et al., 2025), the author directly or indirectly extracts, approximates, or estimates effect sizes from primary studies. It is important to note that the methods described below follow a hierarchy (Table 4.1), with direct methods preferred, followed by indirect methods on summary statistics, and then those based on the Kaplan-Meier curve (Parmar et al., 1998; Williamson et al., 2002). Details on approximating effect sizes from KM curves and on coding related to the key methodological characteristics are provided in Appendix C.

Table 4.1: Extracting effect sizes approaches.

Methods	**# of studies**	**Description**	**Estimation tools/techniques**	**Notes**
Direct method	16	Used the coefficient of multivariate Cox regression to directly report HR and its variance (V) /log (HR) and SE.	Semi-parametric Cox regression hazard model	Considered the most straightforward approach.
Summary statistics	9	Provided HR and confidence intervals, exact p-value, log-rank test p-value, or chi-square statistics	Tierney et al. (2025) updated the Excel spreadsheet	Applied when direct estimates are unavailable.
KM curve with number at risk	2	Manually extracted data (time intervals, survival probability, and number of firms at risk) from published KM curves	Tierney et al. (2025) updated the Excel spreadsheet	Includes a robustness check comparing the shape of published KM curves with those manually reconstructed from extracted survival probabilities to assess estimation accuracy
KM curve with follow-up information	2	Used follow-up period data to estimate HR when other methods were not feasible.	Tierney et al. (2025) updated the Excel spreadsheet	Followed strict interval selection rules to enhance estimation reliability (Tierney et al., 2025)

4.2.3 Coding variables

Firm survival is a multidimensional concept that has been understood in various ways. Based on previous reviews (Josefy et al., 2017; Cefis et al., 2021), the author categorized firm survival into four types: export market survival, mergers and acquisitions, firm failure (negative exit), and pooled exit. Likewise, innovation can be assessed through different measurements. In this thesis, innovation measurements are classified into three categories: innovation output (e.g., the number of product and process innovations, sales revenue from innovative products), patenting activity, and R&D investment. To examine the cultural influence on the relationship between innovation and firm survival, the author ordered countries by Hofstede's cultural scores from low to high for the dimensions of individualism and uncertainty avoidance. The countries were then divided into two subgroups based on median splits (Kirca et al., 2005). Furthermore, studies were coded by the industry surveyed. According to Rauch et al. (2009), high-technology industries included biotechnology, the Internet, software, and electronics, while low-technology industries comprised manufacturing, construction, and retail sectors. Since firms typically take 8 to 12 years to mature, depending on their industry (Zahra, 1996), the author used an average age of 12 years as a dividing line between young and old firms. Regarding effect size estimation, studies were grouped into two categories: the direct approach, in which hazard ratios were reported via multivariate Cox regression, and the indirect approach, which involved either estimating effect sizes from available summary statistics or approximating them using Kaplan–Meier curves. For publication timing, the author adopted Ugur and Vivarelli's (2021) cutoff point, categorizing studies into those published before 2010 and those published in 2010 or later. Any disagreements were resolved through discussion with the thesis supervisors.

4.3 Meta-Analytic Methods

Since the outcome variable is time-to-event data, HRs or log HRs were used as effect size metrics for the meta-analysis (Tierney et al., 2007). The author selected the random-effects model because it accounts for sampling error and other sources of variability (Hedges and Olkin, 1985). When a study reports multiple measures of the same construct (e.g., subjective and objective measures of innovation), the author computed the mean effect size. The standard error was derived using the standard

formula from Borenstein et al. (2009)[1], as the correlations between the two variables whose effect sizes were averaged were reported in the primary studies. When correlations are unknown, the author used studies in the same field to identify a plausible range for the correlation (Borenstein et al., 2009). In the case of two independent subsamples embedded in a study, they were treated as separate studies, as they provide unique information for the meta-analysis (Borenstein et al., 2009). In survival analysis, the hazard ratio is the ratio of hazard rates between innovative and non-innovative firms. An HR above 1 indicates a higher risk of exit (i.e., reduced survival), while an HR below 1 suggests improved survival (Parmar et al., 1998). Heterogeneity was assessed using the I^2 statistic, with $I^2 \geq 50\%$ indicating considerable heterogeneity (Higgins et al., 2003). Publication bias was examined using a funnel plot and supported by Egger's test (Egger and Davey-Smith, 1998). To increase the persuasiveness of the results, publication bias analyses were conducted only for relationships with $k \geq 10$ (Sterne et al., 2008). In Egger's test, a non-zero intercept indicates an asymmetric funnel plot, referring to potential publication bias.

Subgroup analyses were assessed by using the methods of Hedges and Olkin (1985). *Q* statistics were used to examine heterogeneity in effect sizes. A significant *Q*-statistic indicates the likelihood that moderators explain the variability in hazard ratios across studies. The presence of moderators is indicated by statistically significant between-group homogeneity statistics (*QB*), which assesses differences in mean group effect sizes. The author conducted overall effect size and moderator analyses using Review Manager 5.4 (Nordic Cochrane Centre, Copenhagen, Denmark) and robustness tests using the metafor package (Viechtbauer, 2010).

4.4 Results

4.4.1 The hypothesized relationship between innovation and firm survival

Table 4.2 summarizes the results of the meta-analysis on the relationship between innovation and various firm survival-related outcomes. The results show that the impact of innovation on overall firm survival is positive and significant (HR: 0.82, 95% CI: 0.78-0.87) (Figure 4.3). That is, the hazard rate for innovative firms was 18%

[1] The equations used to calculate the mean effect size and variance are as follows: $\overline{Y} = \frac{1}{2}(Y_1 + Y_2)$; $V_{\overline{Y}} = \frac{1}{4}(V_{Y_1} + V_{Y_2} + 2r\sqrt{V_{Y_1}}\sqrt{V_{Y_2}})$, see chapter 24, Borenstein et al. (2009).

lower than that for non-innovative firms. The 95 % CI did not include zero, indicating that the overall effect size was statistically significant. Thus, H1 is supported. It is important to note that the confidence interval reflects the precision with which the mean effect has been estimated, and the prediction interval captures the distribution of true effects across studies and thus directly reflects the extent to which effect sizes vary (Borenstein, 2023). The prediction interval of 0.62–1.08 (innovationn and overall firm survival) indicates that the effect of innovation on firm survival varies meaningfully across contexts: in some studies, innovation is associated with a reduced hazard of exit (HR < 1), in others its effect is negligible, and in some cases it is even associated with an increased hazard of exit (HR > 1). Consequently, strong claims about a uniformly protective effect of innovation on firm survival would be risky and potentially misleading if the discussions were based solely on the average effect size. Moreover, substantial heterogeneity, as indicated by the prediction interval, also suggested the presence of moderators in the relationship between innovation and overall firm survival.

Table 4.2 also presents the disaggregated relationship between innovation and firm survival dimensions (details are in Appendix D). For pooled exit, firms with higher levels of innovation exhibit a significantly lower risk of exit, with a 25% reduction in hazard (HR = 0.75, 95% CI: 0.65–0.87) relative to less innovative firms. This supports H2 and suggests that innovation enhances firm survival; however, the corresponding 95% prediction interval (PI: 0.43-1.13) indicates that effects in new contexts may vary. Furthermore, the meta-analysis reveals a 10% decrease in the hazard rate for innovative firms in the export market compared to non-innovative firms (HR=0.90, 95% CI:0.83-0.97), suggesting that innovation enhances firm survival in the export market. Thus, H3 is supported; likewise, PI spans both null and even negative effects. Innovative firms appear less likely to experience negative exit, although the association is statistically significant at the 10% level, suggesting that innovation may mitigate the risk of firm failure. Thus, H5 is marginally supported. However, the wide prediction interval (0.3-2.05) suggests substantial uncertainty and variation across studies. The meta-analysis investigating the impact of innovation on M&A yielded a nonsignificant hazard ratio of 0.92, as the 95% confidence interval included 1. This suggests that innovation activities do not affect firms' mergers and acquisitions, providing no support for H4. The prediction interval (0.21-3.96) further indicates that

effects across future samples could plausibly range from protective to detrimental. Taken together, the relatively wider prediction intervals in Table 4.2 indicate that the effect of innovation on firm survival is heterogeneous and context-dependent, and that in some settings it may even be neutral or mildly detrimental. To identify the boundary conditions under which innovation is protective for firm survival, the author conducted moderator analysis in the following.

Table 4.2: The meta-analysis results of the association between innovation and firm survival.

Relationship	K	N	Mean HR	95% CI	95%PI	z	P value	Q-test	I^2	Publication bias(Egger)
Innovation-overall firm survival	39	950,667	0.82***	0.78-0.87	0.62-1.08	7.21	0.0000	3098.57***	99%	P=0.6778
Innovation-market persistence	8	439,367	0.90***	0.83-0.97	0.69-1.17	2.71	0.007	910.85***	99%	-
Innovation-M&A	5	13,599	0.92	0.62-1.37	0.21-3.96	0.41	0.68	69.35***	94%	-
Innovation-firm failure	10	292,290	0.78*	0.62-1.02	0.3-2.05	1.82	0.07	535.87***	98%	P=0.554
Innovation-pooled exit	16	382,797	0.75***	0.65- 0.87	0.43-1.3	3.94	0.0000	451.25***	97%	P=0.08

Notes: K= the number of effect sizes; N=the total sample size; Mean HR= mean hazard ratio; 95% CI= 95% confidence interval for mean HR; PI=prediction interval, Q= Cochran's homogeneity test statistic, I^2= scale free index of heterogeneity. * pvalue<0.1, ** p-value<0.05, *** p-value<0.01

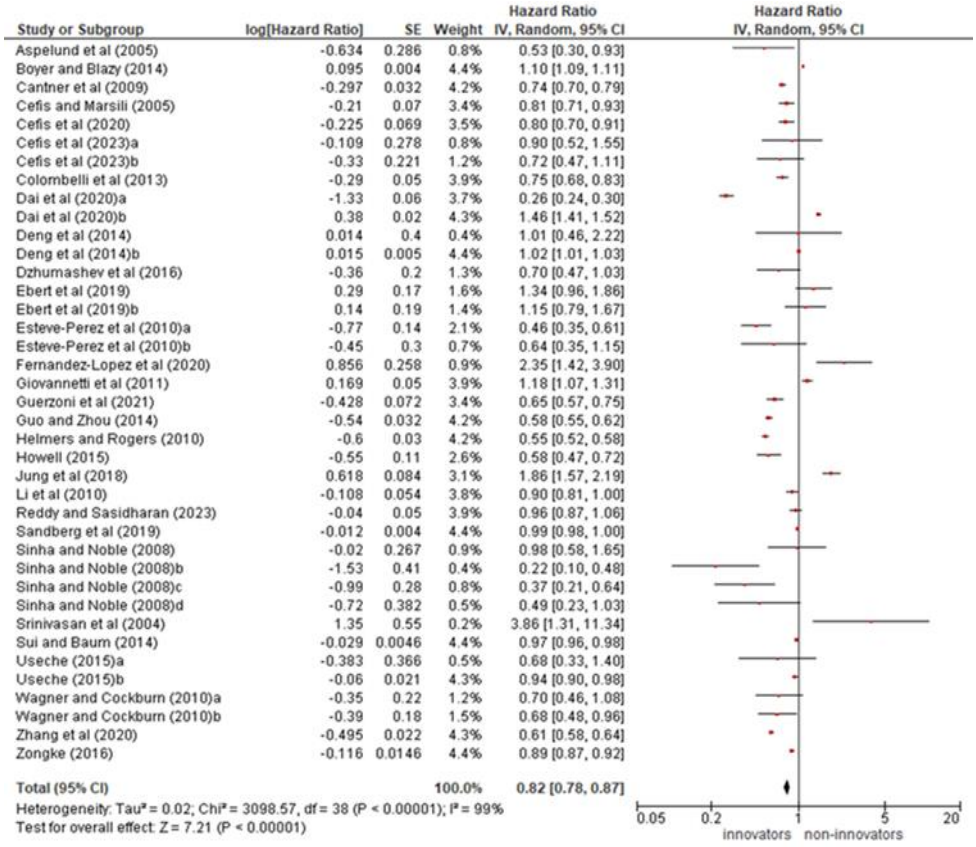


Figure 4.3: Impact of innovation on overall firm survival (N=39) (Review Manager 5.4)

4.4.2 Publication bias

To assess publication bias, this study employs two methods: the funnel plot (Biljana et al., 1999) and the Egger test (Egger et al., 1998). The funnel plot for the relationship between innovation and overall firm survival is shown in Figure 4.4. Although a few sample points deviated from the funnel, most remained within it and were symmetrical, indicating that publication bias in the overall meta-analysis is not significant. To further evaluate publication bias, the Egger test results are displayed in Table 4.2. The p-value for the Egger test was 0.677 (above 0.05), also suggesting no significant publication bias in the meta-analysis. Figure 4.5 presents funnel plots for innovation and firm failure (left), and for innovation and pooled exit (right). As shown on the right side of Figure 4.5, some sample points deviated from the funnel plot and were located at the lower end, suggesting potential missing publications with negative or nonsignificant relationships. However, when applying the Egger tests (Table 4.2), the

p-values for both groups exceeded 0.05, indicating no publication bias in either subgroup. Overall, these findings suggest that the results are unlikely to be influenced by publication bias.

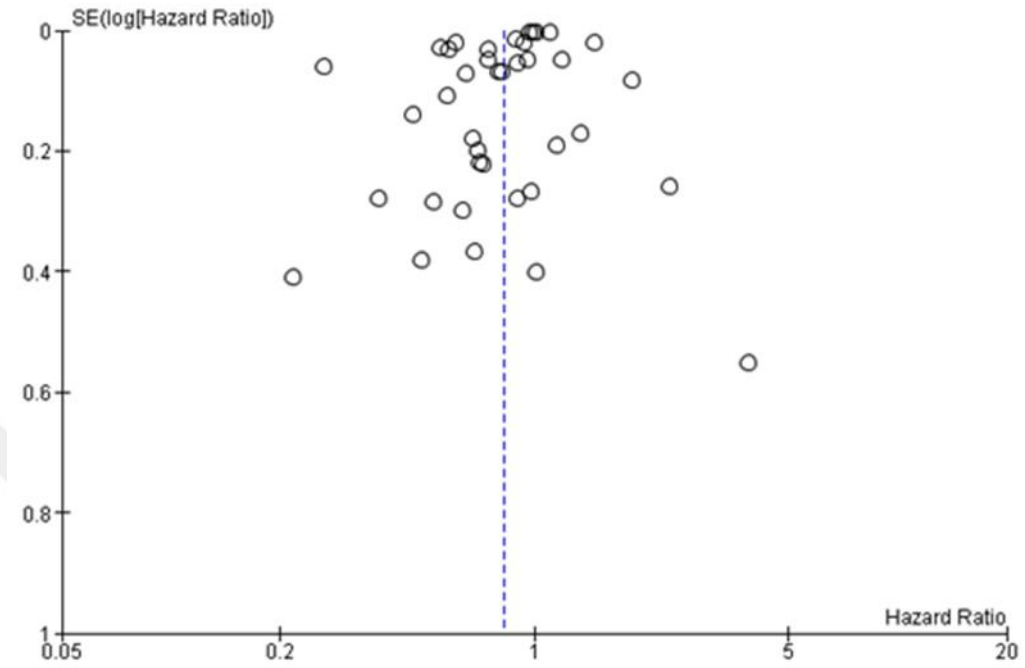


Figure 4.4: Funnel plot: innovation and overall firm survival.

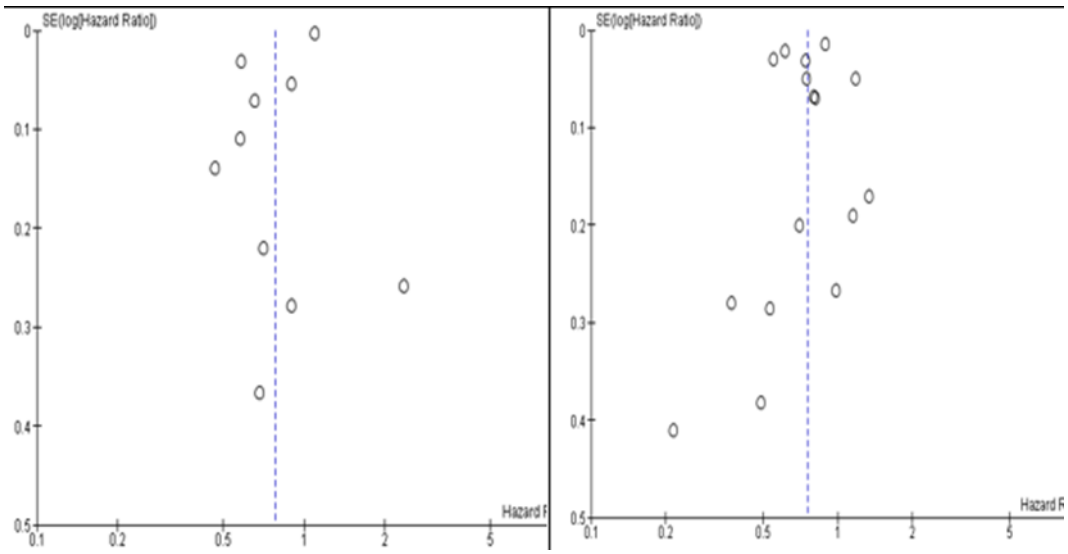


Figure 4.5: Funnel plot left: innovation and firm failure. Right: innovation and pooled exit.

4.4.3 Moderator analysis

4.4.3.1 National culture as moderator

For national culture, H6 predicts that the lower the degree of IDV, the stronger the impact of innovation on firm survival. As shown in Table 4.3, the author found that in a high IDV culture, the pooled hazard ratio is 0.81(CI: 0.76-0.87), indicating a statistically significant reduction in firm failure, while in a low individualism context, the hazard ratio is 0.90 (CI: 0.79-1.04), which is not statistically significant. It is also found that this difference is statistically not significant (QB=1.83, p=0.18). Thus, individualism does not appear to be a significant moderator in this relationship. Therefore, H6 is not supported. For uncertainty avoidance, the protective effect of innovation on firm survival is stronger and statistically significant in a low UAI context (HR: 0.81, CI: 0.76-0.86). In contrast, the effect is weaker and statistically not significant in a high UAI context (HR: 0.92, CI: 0.82-1.02). The between-group Q statistic (QB = 3.47, $p < 0.1$) indicates that the difference in effect sizes across the two subgroups is statistically significant, supporting the role of uncertainty avoidance as a moderator. Hence, H7 is supported.

4.4.3.2 Industry type as a moderator

Subgroup analysis by industry type demonstrated notable variations in the influence of innovation on a firm's overall survival. In the high-tech industry, innovation shows a significant protective effect with a hazard ratio of 0.77 (95% CI: 0.63–0.93, $p< .01$), signifying a 23% decrease in hazard. In the low-tech industry, however, the effect was less pronounced but still statistically significant (HR = 0.93, 95% CI: 0.86–0.99, $p< .05$), indicating a 7% decrease in failure rate. Mixed-industry studies produced a pooled hazard ratio of 0.81 (95% CI: 0.74–0.89, $p< .01$). The analysis of between-group differences was statistically significant ($Q_B = 6.89$, $p < .05$), indicating that industry type significantly moderates the innovation and firm survival link. Hence, hypothesis 8 is supported.

4.4.3.3 Firm age as moderator

Subgroup analysis revealed that firm age did not emerge as a significant moderator ($Q_B = 1.91$, $p = 0.39$). Specifically, the survival benefit of innovation is more pronounced in new firms (HR = 0.84, $p < .05$) than in mature or established ones (HR

= 0.90, p = 0.26). Although this finding is exploratory, innovation may be an essential mechanism for new firms to remain viable. Therefore, hypothesis 9 is not supported.

4.4.3.4 Innovation measurements as moderators

Subgroup analysis by innovation measure type indicated that the impact of innovation on firm survival may differ across measures. Research using innovation output as the metric (e.g., product or process innovations) yielded a pooled hazard ratio of 0.82 (95% CI: 0.77–0.87, p < .01), indicating a substantial protective effect. Similarly, studies using patenting as an indicator of innovation reported a more substantial decrease in hazard (HR = 0.75, 95% CI: 0.60–0.94, p<.05). Therefore, H10a and H10b are supported. Conversely, research examining R&D expenditure revealed no significant effect (HR = 1.02, 95% CI: 0.83–1.25, p = .85), consistent with the indeterminate nature of the relationship proposed in H10c, as no significant moderating effect was found. The analysis of between-group differences was marginally significant (Q_B = 4.97, p <0.1), indicating that the type of innovation measure may exert a moderating influence, although the data do not meet conventional significance standards. All subgroups exhibited significant within-group variability, suggesting additional unexplained variability.

4.4.3.5 Effect size approach as a potential moderator

Subgroup analysis demonstrated that the estimated effect of innovation on firm survival varies depending on the methods used to extract effect sizes during meta-analysis. When hazard ratios were directly extracted from the primary studies (e.g. HRs are explicitly reported), the pooled HR is 0.93 (95% CI: 0.89-0.98), indicating a 7% reduction in failure rate. When HR is approximated indirectly, such as through summary statistics or Kaplan-Meier curve, the pooled effect is stronger (HR: 0.72, 95% CI: 0.56-0.92), corresponding to a 28% hazard reduction. The difference between the extraction methods is statistically significant (QB=4.07, p< .05). Although studies relying on indirect estimates yield a larger hazard ratio estimate (HR: 0.72), the effect size is accompanied by substantially greater uncertainty. In contrast, studies reporting multivariate Cox regression coefficient exhibit a modest but statistically precise estimate, with relatively narrow confidence interval and prediction interval. This pattern suggest that directly estimated effect size may provide more reliable and generalizable evidence regarding the link between innovation and firm survival.

4.4.3.6 Publication year as a potential moderator

Subgroup analysis indicates that the impact of innovation on overall firm survival is much stronger in pre-2010 studies than in post-2010 studies. Specifically, studies published before 2010 reported a 34% decrease in hazard rate associated with innovation, compared to a 7% decrease reported in post-2010 studies. This difference is statistically significant (QB=15.37, p< .01). It is interesting to note that the pooled estimate of post-2010 studies, the confidence interval, and prediction internal is nearly identical to that obtained from studies reportign directly estimated cox regression coeffcient.

Taken together, although several variables were identified as significant moderators in the meta-analysis, the 95% prediction intervals for almost all moderators included 1, suggesting that the strength and the direction of moderation effects may vary across settings. These results indicate that while the identified moderators offer informative but context-dependent insights into the boundary conditions of governing the relationship between innovation and firm survival. Therefore, the breadth of the prediction interval caution against gereneralization and underscore the need for future research to examine the robustness of these moderating effects across organizational institutional context.

Table 4.3: Results of moderator analysis of the impact of innovation on overall firm survival (N=39).

Moderators	*K*	*Mean HR*	*95% CI*	*95% PI*	*z*	*P value*	*Q test*	*QB*
Individualism								
High	24	**0.81**	[0.76, 0.87]	0.65-1.00	6.51	0.0000	1518.33***	1.83
Low	15	**0.90**	[0.79, 1.04]	0.54-1.49	1.45	0.15	1080.42***	
Uncertainty avoidance								
High	17	**0.92**	[0.82, 1.02]	0.59-1.43	1.35	0.18	438.64***	3.47*
Low	22	**0.81**	0.76, 0.86	0.65-1.00	6.02	0.000	1684.49***	
Industry								
High tech	11	**0.77**	[0.63, 0.93]	0.40-1.45	2.69	< . 01	183.43***	6.89**
Low tech	20	**0.93**	[0.86, 0.99]	0.74-1.16	2.11	< . 05	783.15***	
Mixed	8	**0.81**	[0.74, 0.89]	0.62-1.06	4.33	< .01	840.83***	
Firm age								
Old	6	**0.90**	[0.75, 1.08]	0.53-1.52	1.13	0.26	28.06***	1.91
New	18	**0.84**	[0.73, 0.97]	0.45-1.56	2.30	< . 05	1898.21***	
Mixed	15	**0.94**	[0.88, 0.99]	0.75-1.17	2.05	< . 05	582.06***	
Effect size approach								
Direct	23	**0.93**	[0.89, 0.98]	0.75-1.15	2.93	< . 01	1103.26***	4.07**
Indirect	16	**0.72**	[0.56, 0.92]	0.24-2.1	2.62	< . 01	1616.95***	
Year of publication								
Pre_2010	14	**0.66**	[0.56, 0.77]	0.37-1.15	5.05	< .01	124.01***	15.37***
Post_2010	25	**0.93**	[0.88, 0.98]	0.75-1.15	2.82	< .01	2003.46***	
Innovation								
Innovation output	24	**0.82**	[0.77, 0.87]	0.66-1.01	6.71	< . 01	1891.45***	4.97*
R&D	8	**1.02**	[0.83, 1.25]	0.50-2.04	0.19	0.85	151.40***	
Patenting	9	**0.75**	[0.60, 0.94]	0.34-1.60	2.51	< . 05	446.26***	

Notes: *K*= number of total effect sizes, Q = Q-statistic for heterogeneity; QB = Q-statistic for between-group homogeneity $\chi 2$.

* pvalue<0.1, ** p-value<0.05, *** p-value<0.01,

4.5 Sensitivity and Robustness Checks

To assess the stability of the main findings, the author conducted several robustness tests. First, a sensitivity analysis was conducted to assess the stability of the meta-analysis results. Leave-One-Out (LOO) analysis was performed by examining the influence of excluding a single study on the estimate of the mean effect size (Viechtbauer and Cheung, 2010). If the exclusion of a single study does not lead to a considerable statistical change (in terms of direction), then the results can be considered robust. Figure 4.6 shows that no single test changes the significance of the 95% CI of the mean effect size. Although the direction of the mean effect size shows no significant change, one study appears to be the most influential in terms of magnitude (study 7 in Figure 4.6 and Figure 4.7).

Second, outlier analysis was conducted to further assess the potential impact of study 7. The five most influential studies identified in the LOO analysis (Figure 4.7) suggest that study 7 may be a potential outlier, as its exclusion produces a noticeable shift in the estimated mean effect size. To examine this possibility, the overall meta-analysis and the subgroup analyses were rerun without this study, and the results showed that excluding this study slightly underestimates the innovation's impact on overall firm survival, with the hazard ratio increasing from 0.82 to 0.84 (Table 4.4). However, the direction and magnitude of the effect remain broadly stable. In contrast, the impact of innovation on export market survival is sensitive to this exclusion: the protective effect of innovation disappears (HR: 0.90), and innovation becomes a detrimental factor for firm export market survival (HR: 1.07). The contradictory results might be due to the methodological heterogeneity of study 7, which employs propensity score matching as its research design; however, because the hazard ratio of study 7 was extracted indirectly from summary statistics, it is difficult to determine whether these differences in research design explain the observed sensitivity. Therefore, the findings should be interpreted with caution. Excluding this study also affects the significance of some variables in the subgroup analysis (Table 4.5). For example, excluding the study slightly underestimates the moderating role of low IDV on the innovation and firm survival relationship, with the hazard ratio increasing from 0.90 to 0.92; however, the direction and significance of IDV and UAI remain broadly stable. However, one of the exploratory variables, the effect size approach and the methodological moderator,

innovation measurement, are sensitive to its exclusion. Excluding study 7 renders these two variables nonsignificant moderators of the innovation-firm survival link.

Third, two studies with the smallest sample size were excluded to test the "small study effect", where smaller samples may report inflated effect sizes (Sterne et al., 2000), The resulting HR was 0.82 (95% CI: 0.78–0.87, P< .01), indicating minimal influence.

Fourth, removing studies that explicitly addressed endogeneity yielded a hazard ratio of 0.83 (95% CI=0.76, 0.90; P<.01), consistent with the main findings. Taken together, these results provide robustness of the overall innovation and firm survival relationship. However, the impact of innovation on export market survival is sensitive to the exclusion of certain studies and should be interpreted with caution.

Taken together, these sensitivity and robustness checks support the main findings on the innovation and overall firm survival link while highlighting the context-dependent and potentially unstable nature of innovation and export market survival relationship. These results reinforce caution with the interpretation of the results and call for further research to clarify the boundary conditions. The implications of these patterns are discussed in the next section.

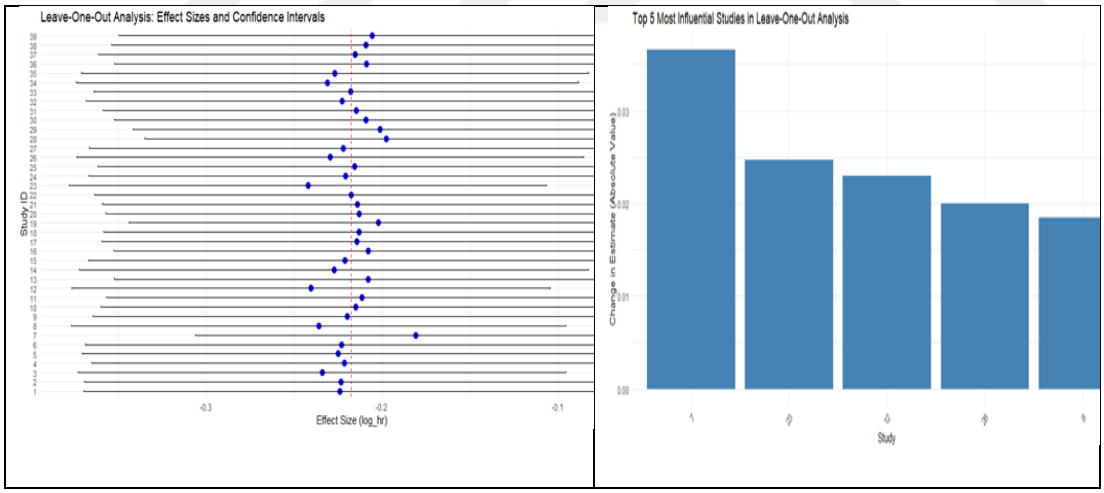


Figure 4.6 (left): Leave-one-out analysis (LOO) (from the R program, Metafor package).

Figure 4.7 (right): Top 5 most influential studies in LOO analysis (from the R program metafor package

Table 4.4: Robustness checks: Results of the overall analysis without outlier.

Relationship	***K***	***N***	***Mean HR***	***95% CI***	***95% PI***	***z***	***P value***	***Q-test***	***I²***
Innovation-overall firm survival	38	892,277	0.86***	0.82-0.91	0.72-1.07	5.71	0.0000	2479.06***	99%
Innovation-market persistence	7	380,977	1.07**	1.01-1.14	0.99-1.16	2.30	0.02	423.19***	99%
Innovation-M&A	5	13,599	0.92	0.62-1.37	0.21-3.96	0.41	0.68	69.35***	94%
Innovation-firm failure	10	292,290	0.78*	0.62-0.98	0.3-2.05	1.82	0.07	535.87***	98%
Innovation-pooled exit	16	382,797	0.75***	0.70- 0.91	0.43-1.3	3.94	0.0000	451.25***	97%

Notes: K= the number of effect sizes; N=the total sample size; Mean HR= mean hazard ratio; 95% CI= 95% confidence interval for mean HR; PI=prediction interval, Q= Cochran's homogeneity test statistic, I^2= scale free index of heterogeneity. * pvalue<0.1, ** p-value<0.05, *** p-value<0.01

Table 4.5: Robustness checks: Results of the subgroup analysis without outlier (N=38).

Moderators	*K*	*Mean HR*	*95% CI*	*95%PI*	*z*	*P value*	*Q test*	*QB*
Individualism								
High	24	**0.81**	[0.76, 0.87]	0.65-1.00	6.51	0.0000	1518.33***	2.47
Low	14	**0.92**	[0.86, 1.06]	0.55-1.53	1.20	0.23	1074.60***	
Uncertainty avoidance								
High	17	**0.92**	[0.82, 1.04]	0.59-1.43	1.35	0.18	438.64***	3.23*
Low	21	**0.81**	[0.77,0.86]	0.65-1.00	5.89	0.0000	1678.83***	
Industry								
High tech	11	**0.77**	[0.63, 0.93]	0.40-1.45	2.69	< . 01	183.43***	7.40**
Low tech	19	**0.93**	[0.87, 1.00]	0.74-1.16	1.96	0.05	776.71***	
Mixed	8	**0.81**	[0.74, 0.89]	0.62-1.06	4.33	< .01	840.83***	
Firm age								
Old	6	**0.90**	[0.75, 1.08]	0.53-1.52	1.13	0.26	28.06***	2.08
New	18	**0.84**	[0.73, 0.97]	0.45-1.56	2.30	< . 05	1898.21***	
Mixed	14	**0.94**	[0.90, 0.99]	0.75-1.17	1.92	0.06	576.27***	
Effect size approach								
Direct	23	**0.93**	[0.89, 0.98]	0.75-1.15	2.93	< . 01	1103.26***	2.44
Indirect	15	**0.77**	[0.61, 0.97]	0.28-2.00	2.20	< . 05	1252.53***	
Time								
Pre_2010	14	**0.66**	[0.56, 0.77]	0.37-1.15	5.05	< .01	124.01***	15.63***
Post_2010	24	**0.93**	[0.88, 0.98]	0.75-1.15	2.71	< .01	1997.49***	
Innovation								
Innovation output	23	**0.89**	[0.84, 0.94]	0.72-1.10	4.34	0.0000	1386.06***	3.94
R&D	8	**1.02**	[0.83, 1.25]	0.50-2.04	0.19	0.85	151.40***	
Patenting	9	**0.75**	[0.60, 0.94]	0.34-1.60	2.51	< . 05	446.26***	

Notes: *K*= number of total effect sizes, Q = Q-statistic for heterogeneity; QB = Q-statistic for between-group homogeneity $\chi 2$.

* pvalue<0.1, ** p-value<0.05, *** p-value<0.01

4.6 Discussions

The topic of the impact of innovation on firm survival prospects has attracted the attention of management and business scholars for several decades. Prior empirical studies have provided mixed and inconclusive conclusions, limiting scholarly and practical insights. Therefore, to clarify these mixed findings, the author systematically reviews the empirical literature on the impact of innovation on firm survival to address the following three research questions. 1) Do innovation activities enhance firms' survival prospects? 2) How do environmental and methodological heterogeneities moderate the innovation and firm survival linkage? 3) What theoretical and practical implications does innovation offer for firm viability? The author used the data of 29 studies involving over 950,000 firms to quantify the impact of innovation on firm survival in a meta-analytic framework. Furthermore, the related effect of innovation on various dimensions of firm survival was also examined, including firm export market survival, mergers and acquisitions, firm failure, and pooled exit. Additionally, the author explored the moderating roles of environmental factors (e.g., national culture and industry type), firm characteristics (e.g., firm age), methodological factors, and exploratory moderators (e.g., effect size approach and year of publication) on the focal relationship. Next, the theoretical and practical implications of the meta-analysis are discussed.

4.6.1 Theoretical implications

4.6.1.1 Reassessing the innovation–firm survival link: evidence of heterogeneity and contextual sensitivity

As markets become more volatile and competition intensifies, innovation is often portrayed as a strategic imperative for firms seeking to adapt, differentiate, and be resilient. However, while innovation is widely recognized for its role in firm performance, its impact on firm survival remains theoretically and empirically debated (Nelson and Winter, 1982; Teece et al., 1997; Zahra and George, 2002; Ericson and Pakes, 1995; Samuelsson and Davidsson, 2009) and has received limited systematic attention. In contrast, the relationship between innovation and firm performance has been extensively studied and synthesized through multiple meta-analysis (e.g., Rosenbusch et al., 2011; Singhal et al., 2020); Despite the widely held view that innovation enhances firm survival, this view remains largely untested through

quantitative synthesis. To date, no meta-analysis has focused explicitly on this association, leaving an important conceptual and empirical gap in the literature. Reflecting this tension and fragmentation, prior studies on innovation and firm survival have produced mixed findings across industries, firm stage of development, innovation types, and various firm survival outcomes. Consequently, a coherent understanding of when innovation enhances or impairs firm survival has yet to emerge. To address his gap, this meta-analysis synthesizes this diverse body of work to provide a more integrated and theoretically grounded perspective.

The results demonstrate that innovative firms have a lower hazard rate than non-innovative firms (HR = 0.82), suggesting that, on average, innovation reduces the instantaneous risk of failure by 18%. However, as indicated by the prediction interval, this average effect masks substantial between-study heterogeneity, implying that the survival benefit of innovation is contingent on contextual conditions rather than uniform across studies. Furthermore, prior meta-analysis on innovation and firm performance found a weak-to-moderate positive relationship between innovation and firm performance, suggesting that on average, innovative firms perform better in the marketplace (e.g., Singhal et al., 2020; Rousseau et al., 2016; Rosenbusch et al., 2011). However, the correlation coefficient, as an effect size, primarily reflects the co-movement between innovation and firm growth or financial returns, whereas the hazard ratio captures the instantaneous risk at any given time (firm failure, market exit, or M&A), providing a theoretically distinct and richer perspective on the outcome of innovation. Table 4.6 presents the comparison between the prior meta-analysis on the innovation and firm performance link and the current meta-analysis regarding several dimensions. Although some scholars caution against equating firm survival directly with firm success (or exit with failure) (Cefis et al., 2021; Josefy et al., 2017), most studies in the pertinent literature implicitly assume that avoiding firm exit is the ultimate goal. This implicit assumption allows this meta-analysis to highlight innovation' role in avoiding firm exit risk even though that was not the primary aim of the primary studies.

Additionally, the author has divided firm survival into four outcomes: foreign market persistence (market exit), mergers and acquisitions, firm failure (negative exit), and pooled exit (undifferentiated survival) to examine the influence of innovation on various firm-survival outcomes. Since previous studies have approached firm survival

in different ways, the author systematically categorized and integrated researchers' diverse conceptualizations of firm survival into our classification. The findings indicate that innovative firms are more likely to survive in export markets compared to their non-innovative counterparts. It was also found that there is a strong positive association between innovation and firm pooled exit, whereas the association between innovation and firm failure is weak but positive. Although innovation positively affects M&A activities, this result is not statistically significant. These findings underscore the influence of innovation on firm survival is outcome-specific: the magnitude and even the direction can vary depending on which firm survival dimension is considered.

Importantly, the meta-analysis results indicate that innovation's role in firm survival-related outcomes is context-dependent and sensitive to outliers (as indicated by relatively wide prediction intervals and outlier analyses). For example, certain firm survival dimensions, such as export market survival, are highly context-dependent: in robustness tests, the protective effect of innovation disappears and becomes detrimental to firm export market survival, demonstrating that innovation does not uniformly affect firm survival dimensions and highlighting the importance of considering contextual factors.

Table 4.6: Meta-analytical evidence across firm performance and firm survival studies.

Features	Prior Meta-Analyses on Innovation and Firm Performance	Current Meta-Analysis on Innovation and Firm Survival
Outcome Construct	Performance levels (e.g., growth, financial returns).	Firm survival (e.g., market persistence, mergers and acquisitions, or firm solvency)
Effect Size Metric	Correlation coefficient (*r*), capturing co-movement (association) between innovation and performance.	Hazard ratio (HR), capturing instantaneous risk at a given time (firm failure, market exit, or M&A).
Interpretive Meaning	Indicates whether innovative firms tend to perform better on average.	Represents the ratio of the instantaneous failure rate among innovative firms to that of non-innovative firms, showing whether innovation reduces or increases exit risk at any point in time.
Temporal Nature of the Construct	Often cross-sectional or short-term.	Longitudinal survival analysis.
Magnitude of Findings	Weak-to-moderate positive correlations: e.g., r = 0.099, SE = 0.016(Singhal et al., 2020); r = 0.133, 95%CI: 0.096-0.16(Rosenbusch et al., 2011); r=0.19, 95% CI(0.15-0.22) (Rousseau et al., 2016)	HR < 1 (e.g., HR = 0.82), indicating an 18% reduction in the failure rate for innovative firms.
Theoretical Insight	Innovation boosts average performance levels.	Innovation shapes the dynamics of firm survival, shaping when and whether firms fail.
Type of Heterogeneity	Variation in performance benefits across contexts (e.g., culture, innovation types)	Strong contextual variation and outlier sensitivity, reflecting the context-dependent nature of survival outcomes.
Unique Contribution	Consolidates evidence for innovation's performance benefits.	Extends the current debate by demonstrating the theoretically distinct role of innovation in shaping exit risk, offering outcome-specific insights into survival trajectories that performance correlations cannot capture.

4.6.1.2 Beyond uniform effects: when, where, and for whom innovation matters most

The results show that national culture partially moderates the effect of innovation on overall firm survival. Specifically, uncertainty avoidance emerges as a significant moderator, suggesting that firms operating in a low-uncertainty avoidance context exhibit a stronger protective effect of innovation on firm survival. This result aligns with a firm performance study by Singhal et al. (2020), who argue that firms based in nations with lower UAI tend to achieve higher performance outcomes from technological innovation. Prior studies have found that lower levels of individualism (IDV) are more conducive to innovation-driven firm performance (e.g., Rosenbusch

et al., 2011; Singhal et al., 2020). In contrast, current moderator analysis shows that IDV did not emerge as a significant moderator. This divergence may reflect the fundamental differences in how cultural values affect different firm outcomes over time. Specifically, as indicated in Table 4.6, firm performance is assessed in the short term through financial or market performance over one to three years, while firm survival captures the long-term continuations of operations (the average observation window of the study included is 10 years). In this respect, the beneficial effect of a lower IDV, such as fostering social interaction and collaboration, may be advantageous for short-term gains from innovation. However, the characteristics of a lower IDV culture, where individual aspirations and initiatives are subordinate to the group priority, are typically believed to be detrimental to innovation (Jones and Davis, 2000), as they may inhibit adaptability and responsiveness to environmental change, which are critical factors to sustained innovation and survival over a decade or more. These findings highlight the need for future research to investigate whether cultural values also exert different effects depending on short versus long-term survival. Examining how national culture shapes both short-term performance and long-term viability could help clarify the complex role of cultural context in shaping innovation outcomes in the temporal dimension.

The finding that the protective effect of innovation on firm survival is stronger in high-tech industries empirically supports the Schumpeterian and evolutionary view (Nelson and Winter, 1982). In high-tech industries, the rapid pace of technological development and the ever-increasing market competition intensify the selective pressures on firms, rendering innovation a crucial survival strategy. This result confirms the prior arguments that the high-tech industry demands continuous innovation, which offers a temporary competitive advantage to sustain firm performance (T¨odtling et al., 2006) and helps resolve prior mixed findings on the innovation and firm survival association across industry types (Cefis and Marsili, 2005; Rousseau et al., 2016). This finding also validates the theoretical concern raised in the innovation and firm survival association regarding the inadequacy of using an industry dummy to account for the inter-industry variations (Ugur and Vivarelli, 2021; Cefis and Marsili, 2005). By modelling industry type as an explicit moderator rather than a control, this meta-analysis demonstrates that the associations between innovation and firm survival are meaningfully contingent on industry type.

The nonsignificant effect of firm age on innovation and firm survival link challenges the common assumption that younger firms benefit more from innovation (Rosenbusch et al., 2011; Cefis and Marsili, 2011) or that the older firms' routinization and inertia erode innovation value (Sørensen and Stuart, 2000). The findings suggest that firm age may exert a consistent effect across firms at different stages of their life cycle, or that there exists a more complex, potentially non-linear association between firm age and innovation outcomes, or the association depends on the differences in firm stage of development (Josefy et al., 2017). However, most studies did not provide sufficient information to classify firms by development stage, limiting the ability to systematically test this factor. Future research could address this limitation by collecting detailed firm-level data to explain how the firm development stage shapes the innovation–survival link.

Furthermore, the subgroup analysis reveals that innovation measurement is a weak but statistically significant moderator of the focal association ($p < 0.1$). Innovation output and intellectual property show a protective effect on firm survival, whereas R&D does not. This suggests that simply investing in innovation may not be sufficient to enhance survival unless it generates tangible outcomes. This pattern echoes Ugur and Vivarelli (2021), who found that output-based measures—particularly those pre-2010—were more likely to report positive effects than input-based measures. Similarly, Rosenbusch et al. (2011) found strong associations between innovation output and SME performance, whereas Zhang and Mohnen (2022) found that R&D had a greater marginal impact than product innovation, highlighting inconsistencies in the literature. Importantly, the moderating role of innovation measurement is context-dependent: in the outlier analysis, the marginal effect disappears, becoming insignificant, suggesting that its influence is sensitive to extreme cases.

For exploratory moderators, the author found a strong protective effect of innovation when the hazard ratio is indirectly estimated from the summary statistics and Kaplan-Meier (KM) curve, compared to direct extraction from multivariate Cox regression. This is somewhat unexpected, given that the Cox models are often seen as more rigorous due to their ability to adjust for confounders. However, this pattern should not be interpreted as evdience of a superior inferential quality. Rather, the larger point estimate from the indirect approach is accompanied by a greater uncertainty, as reflected in a relatively wider confidence interval and prediction interval. Indirect

estimates capture unadjusted survival patterns, while the adjusted model, such as Cox, may attenuate the effects by adjusting for firm-level characteristics that are often related to innovation (e.g. firm age and size). As Tierney et al. (2025) note, KM-derived HRs are, by definition, unadjusted and may serve for different inferential purposes than multivariate Cox regression models. Importantly, Tierney et al. (2025) also emphasize that, if standardized procedures are followed, small inaccuracies in KM-derived HRs are unlikely to substantially bias results. Consistent with this, the pooled estimates from the post-2010 studies closely aligned with those obtained from directly extracted Cox regression coefficients, yielding nearly identical hazard ratios and comparable confidence intervals and prediction intervals. This convergence suggests that as the reporting standard and methodological practices have improved over the years, the estimated effect stabilized toward a modest but more precise association between innovation and the firm survival relationship.

Taken together, even though some moderators were identified as significant moderators on the relationship between innovation and firm survival (e.g. UAI, industry type, innovation measurement, effect size approach, and year of publication), the wide prediction interval suggests that the impact of innovation on firm survival is highly context-dependent and cannot be interpreted as universally applicable. This highlights that the relationship between innovation and firm survival is far more complex than a bivariate association. This points to the need to conduct more nuanced, configurational, and multi-level models that explicitly account for interactions among innovation types, firm characteristics, firm capabilities, industry dynamics, and institutional factors to better capture the mechanisms by which innovation affects firm survival. In doing so, such models would help clarify when, how, and under what conditions firms enhance or impair their survival prospects.

4.6.2 Practical implications

The meta-analysis findings also offer novel insights for managing innovation activities more effectively. Since innovation is a double-edged sword, it may not always generate a competitive advantage or guarantee firm survival. Thus, managers need to understand under which conditions innovation is more likely to enhance firm viability. Such understanding will help firms formulate successful business strategies tailored to their specific situations and guide the efforts to strengthen innovation capabilities.

4.6.2.1 National contexts shape the protective effect of innovation

The findings confirm that the protective effect of innovation is stronger in a low UAI environment, indicating that the cultural setting influences how markets and institutions respond to innovation. Therefore, managers must consider national culture when devising corporate strategies, especially those related to market expansion. Parent companies may gain advantages by focusing on low UAI countries such as China, Singapore, or Sweden, where employees, customers, and regulators are more receptive to new ideas, products, and technologies for selecting locations for subsidiaries. Prior studies suggest that countries and firms with low UAI have an advantage in explorative activities, such as developing new ideas and products (Ambos and Schlegelmilch, 2008). Countries fitting this profile, therefore, may serve as an innovation hub, generating novel ideas and prototyping new offerings, which can later be transferred to high UAI markets that favour structured implementation (Nakata and Sivakumar, 1996). For exporting firms, especially SMEs, innovation success abroad depends in part on customer and institutional openness to novelty and risk. Laukkanen (2015) found that higher UAI is associated with greater innovation resistance. Therefore, exporters introducing new products should prioritize low UAI countries where innovation is more likely to be embraced. This is particularly crucial for export-dependent economies, such as China, where failure in foreign markets can lead to serious consequences, including firm failure rather than strategic withdrawal (Sharif and Huang, 2012).

4.6.2.2 Industry type shapes the payoff of innovation

Another implication of this meta-analysis is the relevance of innovation to firm survival in high-tech industries. The recent development suggests that healthcare-related industries, such as biotechnology, pharmaceuticals, and life sciences, exhibit dynamics similar to those observed in high-tech industries. Firms operating in these industries not only face rapid technological change but also undertake significant responsibilities in addressing public health. Recent evidence shows that investment in these sectors remained resilient throughout and after the pandemic, with consistent R&D spending supporting biotechnology and pharmaceutical innovation globally (WIPO, 2022). In this context, innovation can enable firms to remain viable while also contributing to social well-being. Therefore, managers in biotechnology and pharmaceuticals should prioritize R&D investment and collaborative innovation to

enhance competitive positioning and social responsibility. Overall, these findings suggest that in high-tech industries, innovation is not only a driver of firm growth but also a critical determinant of organizational survival and societal impact.

4.6.2.3 The tentative influence of firm age on innovation's impact

Another notable finding of the meta-analysis is that firm age did not emerge as a significant moderator of the association between innovation and firm survival. However, the exploratory subgroup analysis demonstrated that the protective effect of innovation on survival is stronger in younger firms compared to the mature ones, indicating that younger firms typically face higher liability of newness, lack of resources or legitimacy, making innovation a critical mechanism of differentiating themselves and securing survival. Therefore, managers of younger firms, startups, should prioritize innovation activities not only to pursue firm growth but also as an approach to mitigate the heightened risks of exit and failure. While these insights are promising, further research is needed to confirm the contingent role of firm age before firm-age-specific prescriptions can be firmly established.

4.7 Limitations of the Meta-Analysis

The current meta-analysis has several limitations. First, the study sample is not exhaustive. Based on the inclusion criteria, 133 empirical studies were identified examining the impact of innovation on firm survival. Among these, 81 studies, including unpublished works, were excluded due to the lack of required summary statistics or poor image quality of Kaplan-Meier curves, which were essential for approximating the effect size. Second, subsequent research may examine additional moderating variables, such as ownership structure, to enhance our comprehension of the relationship between innovation and firm survival. Third, due to the limited number of studies, the author was unable to conduct a multivariate meta-regression, which would allow researchers to account for unobserved interdependencies between variables that remain unobserved in univariate analysis. Finally, given that enough studies are available, the moderator analysis can be conducted separately for each sub-dimension of firm survival to capture how different types of exits are shaped by innovation activities, or extended further through a multivariate meta-regression to provide a more nuanced perspective.

5. CONCLUSION AND RECOMMENDATIONS

5.1 General Discussion

This thesis systematically reviews the research on the impact of innovation on firm survival using a multi-method approach that integrates framework-based systematic review, bibliometric analysis, content analysis, and meta-analysis. There are three rationales for using multiple methods or methodological triangulation in this dissertation. First, any single research method chosen has an inherent flaw, and the choice of that method will limit the conclusions that can be drawn; therefore, it is essential to corroborate evidence using a variety of methods, which can be classified as either qualitative or quantitative (McGrath, 1981). Second, methodological triangulation enhances researchers' ability to conclude their studies and may yield a more robust and generalizable set of findings (Morse et al., 2014). Third, innovation and firm survival are complex, multi-dimensional concepts spanning diverse disciplines and domains (Wolfe, 1995; Crossan and Apaydin, 2010; Josefy et al., 2017; Damanpour, 2020; Hayirli et al., 2025); therefore, no single systematic review method can fully address these complexities. Herein, The TCCM framework offers a structured review under four different themes (Paul and Criado, 2020), bibliometric analysis organizes and visualizes large bodies of unstructured knowledge on the topic (Block and Fisch, 2020), content analysis identifies patterns within research areas (Potter and Levine-Donnelle, 1999), and meta-analysis quantitatively synthesizes effect sizes and directions, accounting for moderator variables (Klier et al., 2017). Integrating these methods enables a comprehensive understanding of how innovation influences firm survival.

The systematic review based on the TCCM framework (Chapter 2) examined the theoretical foundations, contextual factors, methods, and conceptual developments in the relationship between innovation and firm survival. Theoretically, it highlights the frequent use of theories such as contingency theory, the resource-based view, dynamic capabilities, evolutionary economics, and active learning theory, indicating the

dominance of economic-oriented views. Contextually, most research focuses on manufacturing industries in developed economies such as the US and the UK, although recent studies are increasingly investigating China and South Korea as research settings. Moreover, earlier studies mainly analyze the survival of new ventures and entrepreneurial firms. This highlights a gap: most research centres on manufacturing in developed economies, offering limited insights into how innovation activities unfold in other emerging markets and industries, such as healthcare or defence. Regarding constructs, the research mainly emphasizes technological innovation and views firm survival as a continuous operation, equating firm exit with failure. Additionally, firm survival indicators focus on economic performance, overlooking non-economic indicators such as benefits to employees and society at large. While providing valuable insights, this narrow focus on technological innovation and a homogeneous view of survival limits our understanding of how nontechnological innovations, such as business models or green innovations, influence long-term viability from the perspective of secondary shareholders (e.g., employees, society). To this end, studying firm moral failure, reputation loss, or legitimacy can provide a fruitful avenue for future research in innovation management. Methodologically, since firm survival is a time-to-event outcome, most studies use survival analysis, particularly the Cox proportional hazards model, to examine how innovation affects survival. Most studies use large, longitudinal samples, ranging from 101 to 10,000 firms.

Building on the thematic knowledge of theory, context, characteristics, and methodology, further analysis and visualization of the scientific knowledge were carried out through bibliometric analysis and field-based content analysis (Chapter 3). The first part of this chapter highlights the influential studies, authors, and publication outlets that have shaped the field's development. Subsequently, author-based co-citation analysis and thematic analysis were conducted to examine the field's intellectual and conceptual structure. The bibliometric analysis shows that the primary research interest is among scholars in economics and management. Theories are mostly economics-oriented, including RBV, dynamic capabilities, evolutionary economics, and active learning theory, and are becoming increasingly prominent in the literature. This pattern aligns with the findings from the framework-based review in Chapter 2. Additionally, the field's intellectual structure (Figure 3.3) shows that core concepts from economics, such as innovation and evolutionary dynamics, influence

management and organizational research related to innovation and firm survival. This exchange of ideas was absent from the TCCM framework discussed in Chapter 2, highlighting the need to employ multiple methods in this thesis. The combination of bibliometric and content analysis reveals how theoretical perspectives and assumptions about innovation and firm survival are transferred, adapted, or reinterpreted across domains. The findings indicate that diverse theoretical perspectives entail different underlying assumptions about innovation and firm survival, leading to conceptual proliferation of both concepts and fragmentation of the field. For example, economists view innovation as a mechanism that improves efficiency and productivity, thereby reducing firms' hazard rates (Cefis and Marsili, 2005; 2006). In contrast, organizational studies see innovation as disruptive and destabilizing, which increases the risk of organizational failure (Barnett and Freeman, 2001). Even within a single field, theories may yield conflicting interpretations. For instance, in the field of strategic management, innovation is conceptualized as resources and capabilities (resource-based view and dynamic capabilities) (Landini et al., 2020; Ali, 2022), exploratory innovation (ambidexterity view) (Kim and Huh, 2015), innovation timing (first-mover advantage/disadvantage) (Banbury and Mitchell, 1995; Christensen et al., 1998), or product variety (economies of scope) (Cottrell and Nault, 2004). These inconsistency hinders the development of a coherent conceptualization of innovation. Notably, these cross-field and within-field variations enable the "borrowing" of assumptions about innovation and firm survival across disciplines. This "construct drift" complicates the understanding of the key relationship and underscores the need for building a unifying framework to synthesize insights from various studies.

Building on the systematic reviews discussed earlier, Chapter four presented a meta-analysis to statistically quantify the effect of innovation on overall firm survival. The results reveal that innovation has a protective effect on overall firm survival, with innovative firms experiencing an 18% lower hazard rate than noninnovative ones. This hazard ratio is important, as it reflects the timing and likelihood of firm failure, offering a more dynamic view than previous meta-analysis linking innovation to firm performance. Earlier meta-analyses suggest a positive correlation between innovation and firm performance (e.g., Singhal et al., 2020; Rousseau et al., 2016; Rosenbusch et al., 2011), indicating that, on average, innovative firms tend to perform better in the

marketplace. However, these correlations primarily reflect the relationships between innovation and cross-sectional financial metrics of firm performance. In contrast, hazard ratios, as in this thesis, offer longitudinal insights into the instantaneous risk of failure, exit, or M&A at any given time. Moreover, the current meta-analysis reveals that the impact of innovation varies across different dimensions of firm survival. Specifically, innovative firms are more likely to survive in export markets and are less likely to face negative or pooled exits. Although innovative firms are more likely to experience M&A, the impact is statistically insignificant. These results highlight that the influence of innovation on firm survival is outcome-specific. In addition, the results of moderator analysis reveal that innovation's protective effect varies across contexts, such as national culture, industry type, firm characteristics, and innovation measurement, underscoring the outcome and context-dependent nature of the focal relationship.

The combined insights from the multi-method approaches highlight that, while innovation generally supports firm survival, this effect varies widely across contexts. The framework-based review reveals that studies frame the relationship between innovation and firm survival differently, often relying on disconnected theories and assumptions, leading to conceptual inconsistencies and theoretical fragmentation. Furthermore, the bibliometric and content analysis reinforce this view, showing that such fragmentation exists both within and across fields, and may even facilitate the exchange of ideas about innovation and firm survival across domains. Likewise, the meta-analysis provides empirical evidence that innovation generally has a protective effect on firm survival, but emphasizes the large variability and the importance of context-specific factors. Together, these findings explain why existing results on the innovation-survival link are inconsistent and mixed. The diverse conceptualizations of both constructs, identified in the framework-based review and content analysis, align with the observed variation in effect sizes in meta-analysis, making conceptual inconsistencies of innovation one of the key sources of high heterogeneity. Additionally, the intellectual clusters found in the bibliometric analysis (Figure 3.3, green and red clusters) correspond to the empirical distinction between innovation output and input, suggesting that scholarly segmentation influences methodological differences. Overall, combining evidence from conceptual, structural, and empirical approaches reveals that the influence of innovation on firm survival is context-

dependent and multi-channel-driven. No single approach alone fully captures this complexity and yields a more robust, generalizable set of conclusions; rather, methodological triangulation highlights the contingent, multi-pathway nature of the innovation and survival link. This multi-method approach thus offers a more detailed understanding of how innovation affects firm survival and enables the development of a theoretically grounded, testable framework that accounts for the intricate interactions among firm capabilities, environmental factors, and societal norms

5.2 Theoretical Implications

This dissertation has several theoretical contributions to the existing body of knowledge.

First, multiple reviews indicate that research on the impact of innovation on firm survival requires new theoretical perspectives distinct from the broader innovation and firm performance discourse. Firm survival reflects a firm's ability to remain in the market, continued solvency, and ownership (Josefy et al., 2017), whereas firm performance pertains to growth and financial returns. This conceptual distinction makes firm survival not merely an extension of firm performance. Therefore, concluding that better-performing firms survive while weaker ones fail, as economics-oriented theories suggest, is somewhat superficial. In this regard, the threshold theory of firm survival (Gimeno et al., 1997) is a proper lens to understand not only the relationship between two sibling concepts: performance and survival, but also to propose a theoretical reconciliation of conflicting findings in prior research. The theory suggests that firm survival depends not only on overall performance but also on whether firms are above or below certain performance thresholds (Gimeno et al., 1997). Considering firm survival as a function of both firm performance and relative performance thresholds allows us to examine how innovation affects firms' performance thresholds. As previous evidence suggests, on average, innovative firms perform better (e.g., Rosenbusch et al., 2011; Singhal et al., 2020). Furthermore, the current meta-analysis on innovation and firm survival link suggests considerable heterogeneity and a wide prediction interval. Accordingly, the author proposes that the dual effect of innovation on performance thresholds may contribute to the substantial heterogeneity of focal relationships. There are cases in which innovation may raise the performance thresholds needed for survival. This positive effect of

innovation on performance threshold may support the view that innovation is costly and risky (Samuelsson and Davidsson, 2009), entails uncertain returns (Scherer and Harhoff, 2000), can provoke internal resistance (Hultink and Atuahene-Gima, 2000), and demands significant organizational capabilities to yield sustainable benefits (Thornhill, 2006). In contrast, the adverse effect of innovation on performance threshold suggests that innovation is configured with other firm and environmental factors, such as social capital, resource mobilization, and /or credit market, so that it helps firms surpass the performance thresholds. Approaching the innovation and firm survival relationship from a threshold theory perspective explains why empirical findings on innovation's influence on survival are highly heterogeneous and context-dependent, unlike the more consistent relationship between innovation and performance, and why the bivariate direct relationship is insufficient to capture this complex phenomenon. Therefore, the author argues that the relationship between innovation and firm survival cannot be fully understood through performance-based theories alone; instead, survival requires a distinct theoretical approach grounded in interactive, complex models. In this regard, future studies can use configurational theorizing to examine the combination and interaction of multiple interdependent conditions, along with innovation, and their potential impact on performance thresholds and, therefore, firm survival.

Secondly, integrating insights from framework-based reviews, bibliometric analysis, and field-based content analysis, the author develops a new theoretical model that explains the relationship between innovation and firm survival (Figure 3.10). This synthesis suggests that innovation impacts firm survival not through a single pathway, but through multiple pathways influenced by specific contextual factors. In this regard, the author proposes a multi-channel framework, which includes:

- The capability channel, rooted in the resource-based view and the dynamic capability perspectives, innovation functions as innovation resources and capabilities that enhance firms' adaptability and resilience in response to environmental complexity;
- The selection channel, where innovation is viewed as an efficiency and productivity-enhancing mechanism that triggers efficiency-based exit; and

- The legitimacy channel, where innovation impacts on non-economic indicators of firm survival, such as the moral failure of the firm and social reputation, incorporates a broad set of organizational activities and the interests of secondary stakeholders.

The multi-channel framework further suggests that innovation does not uniformly affect firm survival; rather, its impact depends on the activation of the relevant channels under specific conditions. In the following, the author delineates the boundary conditions under which the capability, selection, and legitimacy channels are more likely to come into play and relates each channel to different dimensions of firm survival.

The legitimacy channel is more likely to be triggered when firms, especially new ventures, face high uncertainty and lack established performance records. In this context, adopting a non-technological innovation primarily functions as symbolic signalling to the external audience rather than as a direct source of efficiency gains (Abrahamson, 1991). To this end, the related propositions are:

P1a: The symbolic adoption of nontechnological innovation (e.g., sustainable HRM, green business model innovation, or new managerial practice) is more likely to enhance firm survival under high environmental uncertainty than under stable conditions.

P1b: The positive effect of symbolic adoption of nontechnological innovation is more likely to be stronger for startups than for established firms.

P1c: By strengthening the legitimacy and social reputation of firms, symbolic adoption of nontechnological innovation may decrease startups' and new ventures' likelihood of outright failure, rather than enhancing long-term survival.

Furthermore, while established firms certainly benefit from internally developed knowledge and innovation, they may find it challenging to consistently generate new ideas internally (Dushnitsky and Lenox, 2005). Accordingly, established firms are increasingly assessing and integrating external knowledge to enhance their technological and innovation capability. In this open innovation context, the capability channel may be examined to assess how collaborating with external knowledge sources enhances technological innovation in established firms, thereby reducing their

likelihood of involuntary exit (e.g., bankruptcy, negative exit). Therefore, it was posited that:

P2a: In the open innovation context, collaborating with external knowledge sources (e.g., end users, patients) tends to increase the innovation capability of established firms.

P2b: The positive effect of collaborating with external knowledge sources is more likely to be stronger for radical technological innovation than for incremental innovation.

P2c: Enhanced innovation capability through collaboration may decrease established firms' involuntary exit (e.g., bankruptcy, negative exit).

From the startups' viewpoint, R&D collaboration with established firms generates regulatory market signalling to investors, customers, and incumbents, thereby reducing information asymmetry regarding startups' technological credibility and regulatory compliance. As a result, startups become attractivetarget for M&A. As a result, it was proposed that:

P3: Stronger regulatory and market signaling increases startups' likelihood of being selected for acquisition by established firms.

Framing the link between innovation and firm survival as a multi-pathway, context-dependent process provides a basis for understanding inconsistent results. Consequently, this thesis offers a unified, multi-channel theoretical framework that integrates the fragmented literature.

Third, the meta-analysis provides empirical support for the multi-channel framework. Notably, consistent with the capability channel, in which a firm's ability to convert knowledge into tangible outcomes enhances its survival prospects, meta-analysis indicates that output-based innovations, such as the number of product innovations and innovation-related revenues, tend to yield a stronger and more consistent survival benefit. Similarly, the protective role of innovation for firms operating in highly technological or competitive environments underscores the selection channel, suggesting that innovation helps firms withstand more intense environmental pressures and thereby increase their environmental fitness. Additionally, national cultural factors, particularly uncertainty avoidance, moderate the link between innovation and firm survival through the legitimacy channel,

suggesting that societal norms may influence stakeholder perceptions of innovation and its effectiveness in securing survival advantages. However, scant attention has been paid to investigating the legitimacy channel in the area of innovation and firm survival. Future studies can use the legitimacy channel to investigate non-economic indicators of firm survival, such as firm moral failure and reputational loss. Overall, the results of the meta-analysis provide empirical support for the multi-channel framework, highlighting the significant roles of the capability, selection, and legitimacy forces.

5.3 Practical Implications

Short-term innovation strategy: in today's fast-changing world, firms may encounter immediate pressures of sudden shifts in demand, cash flow issues, or regulatory changes, leading them to prioritize short-term survival over long-term capability-building. In such situations, managers and companies may intentionally adopt a short-term innovation strategy, emphasizing efficiency-driven innovations to improve efficiency and better align with their environment. Take digital transformation in Healthcare as an example: hospitals adopt technological innovation, such as wearable devices and hospital apps, aiming to improve the quality of care and operational efficiency by facilitating clinical and administrative tasks (Kraus et al., 2021). Adopting such technologies does not develop long-term capabilities; rather, it affects internal operational processes by leveraging current progress in big data. In doing so, firms catch the wind of digital transformation in healthcare, increase their environmental fitness, and therefore decrease the likelihood of outright failure

Engaging in socially visible and responsible innovation: the actual or symbolic value of engaging in socially responsible innovation, such as green innovation, eco-friendly product design, sustainable human resource management, or responsible AI, surpasses the technical value, encouraging firms to adopt such innovation for building legitimacy or strengthening social reputation. Although this type of innovation doesn't directly enhance firms' technical performance, it reduces the risk of morality-induced failure, such as customer boycotts or regulatory sanctions, in the long run.

5.4 Concluding Remarks

This dissertation provides a comprehensive review of how innovation influences firm survival-related outcomes by integrating four review methods: framework-based reviews, bibliometric analyses, field content analyses, and meta-analyses. This methodological triangulation allows for convergent and divergent inferences on the innovation-firm survival relationship and, therefore, draws a more robust and generalizable set of findings. The findings show that innovation has a protective effect on overall firm survival. However, this effect is outcome-specific and context-dependent. By developing a multi-channel framework and conducting the first meta-analytic assessment of this relationship, the thesis unifies a fragmented body of research into a solid theoretical and empirical foundation for examining how innovation affects firm survival.

REFERENCES

Abrahamson, E. (1991). Managerial fads and fashions: The diffusion and rejection of innovations. *Academy of Management Review*, *16*(3), 586-612.

Achbah, R., & Fréchet, M. (2024). Fostering SME survival through insolvency proceedings: a legitimacy perspective on retrenchment, age, and firm-specific distress. *Small Business Economics*, *63*(4), 1585–1614. https://doi.org/10.1007/s11187-024-00874-7

Agarwal, R. (1996). Technological activity and survival of firms. *Economics Letters*, *52*(1), 101–108. https://doi.org/10.1016/0165-1765(96)00837-3

Agarwal, R., & Gort, M. (1996). The evolution of markets and entry, exit and survival of firms. *The Review of Economics and Statistics*, *78*(3), 489. https://doi.org/10.2307/2109796

Agostino, M., Scalera, D., Succurro, M., & Trivieri, F. (2021). Research, innovation, and bankruptcy: evidence from European manufacturing firms. *Industrial and Corporate Change*, *31*(1), 137–160. https://doi.org/10.1093/icc/dtab057

Aguinis, H., Dalton, D. R., Bosco, F. A., Pierce, C. A., & Dalton, C. M. (2011). Meta-Analytic Choices and Judgment Calls: Implications for Theory Building and Testing, Obtained Effect Sizes, and Scholarly Impact. *Journal of Management*, *37*(1), 5–38. https://doi.org/10.1177/0149206310377113

Ahen, F., & Amankwah-Amoah, J. (2021). Sustainable Waste Management Innovations in Africa: New Perspectives and Research Agenda for Improving Global Health. *Sustainability*, *13*(12), 6646. https://doi.org/10.3390/su13126646

Alderman, N. (1996). Innovation and survival amongst mature establishments in the mechanical engineering industry. *Geoforum*, *27*(4), 461–477. https://doi.org/10.1016/s0016-7185(96)00031-0

Ali, H. S. (2021). The role of firm innovativeness in the time of Covid-19 crisis: Evidence from Chinese manufacturing firms. *Asian Journal of Technology Innovation*, *30*(3), 689–714. https://doi.org/10.1080/19761597.2021.1976063

Ambos, B., & Schlegelmilch, B. B. (2008). Innovation in multinational firms: Does cultural fit enhance performance? *Management International Review*, *48*(2), 189–206. https://doi.org/10.1007/s11575-008-0011-2

Amankwah-Amoah, J. (2016). An integrative process model of organisational failure. *Journal of Business Research*, *69*(9), 3388-3397.

Anderson, N., De Dreu, C. K. W., & Nijstad, B. A. (2004). The routinization of innovation research: a constructively critical review of the state-of-the-science. *Journal of Organizational Behavior*, *25*(2), 147–173. https://doi.org/10.1002/job.236

Ambrose, B. W., & Megginson, W. L. (1992). The role of asset structure, ownership structure, and takeover defenses in determining acquisition likelihood. *Journal of financial and quantitative analysis*, *27*(4), 575-589.

Aria, M., & Cuccurullo, C. (2017). Bibliometrix: An R tool for comprehensive science mapping analysis. *Journal of informetrics*, *11*(4), 959-975.

Aspelund, A., Berg-Utby, T., & Skjevdal, R. (2005). Initial resources' influence on new venture survival: a longitudinal study of new technology-based firms. *Technovation*, *25*(11), 1337–1347. https://doi.org/10.1016/j.technovation.2004.06.004

Audretsch, D. B. (1991). New-Firm Survival and the Technological Regime. *The Review of Economics and Statistics*, *73*(3), 441. https://doi.org/10.2307/2109568

Audretsch, D. B., & Mahmood, T. (1995). New Firm Survival: New Results Using a Hazard Function. *The Review of Economics and Statistics*, *77*(1), 97. https://doi.org/10.2307/2109995

Azar, G., & Ciabuschi, F. (2017). Organizational innovation, technological innovation, and export performance: The effects of innovation radicalness and extensiveness. *International business review*, *26*(2), 324-336.

Ball, C., & Kittler, M. (2019). Removing environmental market failure through support mechanisms: insights from green start-ups in the British, French and German energy sectors. *Small Business Economics*, *52*(4), 831–844. https://doi.org/10.1007/s11187-017-9937-8

Balzano, M., & Marzi, G. (2023). Exploring the pathways of learning from project failure and success in new product development teams. *Technovation*, *128*, 102878. https://doi.org/10.1016/j.technovation.2023.102878

Banbury, C. M., & Mitchell, W. (1995). The effect of introducing important incremental innovations on market share and business survival. *Strategic Management Journal*, *16*(S1), 161–182. https://doi.org/10.1002/smj.4250160922

Barnett, W. P., & Carroll, G. R. (1995). Modeling internal organizational change. *Annual Review of Sociology*, *21*(1), 217–236. https://doi.org/10.1146/annurev.so.21.080195.001245

Barnett, W. P., & Freeman, J. (2001). Too Much of a Good Thing? Product Proliferation and Organizational Failure. *Organization Science*, *12*(5), 539–558. https://doi.org/10.1287/orsc.12.5.539.10095

Barney, J. (1991). Firm Resources and Sustained Competitive Advantage. *Journal of Management*, *17*(1), 99–120. https://doi.org/10.1177/014920639101700108

Bartoloni, E., Arrighetti, A., & Landini, F. (2021). Recession and firm survival: is selection based on cleansing or skill accumulation? *Small Business Economics*, *57*(4), 1893–1914. https://doi.org/10.1007/s11187-020-00378-0

Becheikh, N., Landry, R., & Amara, N. (2006). Lessons from innovation empirical studies in the manufacturing sector: A systematic review of the literature from 1993–2003. *Technovation*, *26*(5–6), 644–664.

Beshr, H. A., & Hossan, C. G. (2018). Key drivers for service innovation in the UAE's hotel sector. *International Journal of Entrepreneurship and Innovation Management*, *22*(3), 251. https://doi.org/10.1504/ijeim.2018.091769

Beyene, K. T., Shi, C. S., & Wu, W. W. (2016). The impact of innovation strategy on organizational learning and innovation performance: do firm size and ownership type make a difference?. *South African Journal of Industrial Engineering*, *27*(1), 125-136.

Bhattacharjee, A., Maietta, O., & Mazzotta, F. (2023). Spatial agglomeration, innovation and firm survival for Italian manufacturing firms. *Spatial Economic Analysis*, *18*(3), 318–345. https://doi.org/10.1080/17421772.2023.2176538

Bıçakcıoğlu-Peynirci, N., Hizarci-Payne, A. K., Özgen, Ö., & Madran, C. (2020). Innovation and export performance: a meta-analytic review and theoretical integration. *European Journal of Innovation Management*, *23*(5), 789-812.

Biljana, M., Jelena, M., Branislav, J., & Milorad, R. (1999). Bias in meta-analysis and funnel plot asymmetry. In *Medical Informatics Europe'99* (pp. 323-328). IOS Press.

Birkinshaw, J., Hamel, G., & Mol, M. J. (2008). Management Innovation. *Academy of Management Review*, *33*(4), 825–845. https://doi.org/10.5465/amr.2008.34421969

Block, J. H., & Fisch, C. (2020). Eight tips and questions for your bibliographic study in business and management research. *Management Review Quarterly*, *70*(3), 307–312. https://doi.org/10.1007/s11301-020-00188-4

Boubakri, N., Chkir, I., Saadi, S., & Zhu, H. (2021). Does national culture affect corporate innovation? International evidence. *Journal of Corporate Finance*, *66*, 101847.

Borenstein, M., Hedges, L. V., Higgins, J. P. T., & Rothstein, H. R. (2009). *Introduction to Meta-Analysis*. https://doi.org/10.1002/9780470743386

Borenstein, M. (2023). How to understand and report heterogeneity in a meta-analysis: The difference between I-squared and prediction intervals. *Integrative Medicine Research*, *12*(4), 101014.

Børing, P. (2015). The effects of firms' R&D and innovation activities on their survival: a competing risks analysis. *Empirical Economics*, *49*(3), 1045–1069. https://doi.org/10.1007/s00181-014-0901-z

Boyer, T., & Blazy, R. (2013). Born to be alive? The survival of innovative and non-innovative French micro-start-ups. *Small Business Economics*, *42*(4), 669–683. https://doi.org/10.1007/s11187-013-9522-8

Bruce, J. R., De Figueiredo, J. M., & Silverman, B. S. (2019). Public contracting for private innovation: Government capabilities, decision rights, and performance outcomes. *Strategic Management Journal*, *40*(4), 533–555. https://doi.org/10.1002/smj.2973

Bruderl, J., & Schussler, R. (1990). Organizational mortality: the liabilities of newness and Adolescence. *Administrative Science Quarterly*, *35*(3), 530. https://doi.org/10.2307/2393316

Buddelmeyer, H., Jensen, P. H., & Webster, E. (2009). Innovation and the determinants of company survival. *Oxford Economic Papers*, *62*(2), 261–285. https://doi.org/10.1093/oep/gpp012

Calantone, R. J., Cavusgil, S., & Zhao, Y. (2002). Learning orientation, firm innovation capability, and firm performance. *Industrial Marketing Management*, *31*(6), 515–524. https://doi.org/10.1016/s0019-8501(01)00203-6

Callon, M., Courtial, J. P., & Laville, F. (1991). Co-word analysis as a tool for describing the network of interactions between basic and technological research: The case of polymer chemsitry. *Scientometrics*, *22*(1), 155–205. https://doi.org/10.1007/bf02019280

Cantner, U., Krüger, J. J., & Von rhein, K. (2008). Knowledge and Creative Destruction over the Industry Life Cycle: The Case of the German Automobile Industry. *Economica*, *76*(301), 132–148. https://doi.org/10.1111/j.1468-0335.2007.00672.x

Capron, L., & Mitchell, W. (2004). Where firms change: internal development versus external capability sourcing in the global telecommunications industry. *European Management Review*, *1*(2), 157–174. https://doi.org/10.1057/palgrave.emr.1500017

Carnes, C. M., Hitt, M. A., Sirmon, D. G., Chirico, F., & Huh, D. W. (2021). Leveraging resources for innovation: The role of synchronization. *Journal of Product Innovation Management*, *39*(2), 160–176. https://doi.org/10.1111/jpim.12606

Caves, R. E. (1998). Industrial organization and new findings on the turnover and mobility of firms. *Journal of economic literature*, *36*(4), 1947-1982.

Carroll, G. R., & Teo, A. C. (1996). Creative Self-Destruction Among Organizations: An Empirical Study of Technical Innovation and Organizational Failure in the American Automobile Industry, 1885-1981. *Industrial and Corporate Change*, *5*(2), 619–644. https://doi.org/10.1093/icc/5.2.619

Chatzoudes, D., Chatzoglou, P., & Diamantidis, A. (2021). Examining the impact of firm-specific and environmental-specific factors on short and long-

term firm survival during an economic crisis. *EuroMed Journal of Business*, *17*(4), 698–730. https://doi.org/10.1108/emjb-02-2021-0026

Cefis, E., & Marsili, O. (2005). A matter of life and death: innovation and firm survival. *Industrial and Corporate Change*, *14*(6), 1167–1192. https://doi.org/10.1093/icc/dth081

Cefis, E., & Marsili, O. (2006). Survivor: The role of innovation in firms' survival. *Research Policy*, *35*(5), 626–641. https://doi.org/10.1016/j.respol.2006.02.006

Cefis, E., & Marsili, O. (2011). Born to flip. Exit decisions of entrepreneurial firms in high-tech and low-tech industries. *Journal of Evolutionary Economics*, *21*(3), 473–498. https://doi.org/10.1007/s00191-010-0210-4

Cefis, E., & Marsili, O. (2012). Going, going, gone. Exit forms and the innovative capabilities of firms. *Research Policy*, *41*(5), 795–807. https://doi.org/10.1016/j.respol.2012.01.006

Cefis, E., & Marsili, O. (2019). Good times, bad times: innovation and survival over the business cycle. *Industrial and Corporate Change*, *28*(3), 565–587. https://doi.org/10.1093/icc/dty072

Cefis, E., Bartoloni, E., & Bonati, M. (2020). Show me how to live: Firms' financial conditions and innovation during the crisis. *Structural Change and Economic Dynamics*, *52*, 63–81. https://doi.org/10.1016/j.strueco.2019.10.001

Cefis, E., Bettinelli, C., Coad, A., & Marsili, O. (2021). Understanding firm exit: a systematic literature review. *Small Business Economics*, *59*(2), 423–446. https://doi.org/10.1007/s11187-021-00480-x

Cefis, E., Coad, A., & Lucini-Paioni, A. (2023). Landmarks as lighthouses: firms' innovation and modes of exit during the business cycle. *Research Policy*, *52*(8), 104778. https://doi.org/10.1016/j.respol.2023.104778

Cennamo, C., Oliveira, P., & Zejnilovic, L. (2022). Unlocking Innovation in Healthcare: The Case of the Patient Innovation Platform. *California Management Review*, *64*(4), 47–77. https://doi.org/10.1177/00081256221101657

Chatzoudes, D., Chatzoglou, P., & Diamantidis, A. (2021). Examining the impact of firm-specific and environmental-specific factors on short and long-term firm survival during an economic crisis. *EuroMed Journal of Business*, *17*(4), 698–730. https://doi.org/10.1108/emjb-02-2021-0026

Choi, T., & Sethi, S. P. (2021). Innovative Service Operations for survivals of SMEs under COVID-19: Two cases in Hong Kong. *IEEE Engineering Management Review*, *49*(1), 50–54. https://doi.org/10.1109/emr.2021.3050406

Chor, D., & Manova, K. (2012). Off the cliff and back? Credit conditions and international trade during the global financial crisis. *Journal of International Economics*, *87*(1), 117–133. https://doi.org/10.1016/j.jinteco.2011.04.001

Christensen, C. M., & Bower, J. L. (1996). CUSTOMER POWER, STRATEGIC INVESTMENT, AND THE FAILURE OF LEADING FIRMS. *Strategic Management Journal*, *17*(3), 197–218. https://doi.org/10.1002/(sici)1097-0266(199603)17:3

Christensen, C. M., Suárez, F. F., & Utterback, J. M. (1998). Strategies for Survival in Fast-Changing Industries. *Management Science*, *44*(12-part-2), S207–S220. https://doi.org/10.1287/mnsc.44.12.s207

Cleves, M. (2008). An introduction to survival analysis using Stata. *StataCorp LP*.

Cohen, W. M., & Levinthal, D. A. (1990). Absorptive Capacity: A New Perspective on Learning and Innovation. *Administrative Science Quarterly*, *35*(1), 128. https://doi.org/10.2307/2393553

Cohen, W. M., & Klepper, S. (1996). Firm size and the nature of innovation within industries: the case of process and product R&D. *The review of Economics and Statistics*, 232-243.

Colombelli, A., Krafft, J., & Quatraro, F. (2013). Properties of knowledge base and firm survival: Evidence from a sample of French manufacturing firms. *Technological Forecasting and Social Change*, *80*(8), 1469–1483. https://doi.org/10.1016/j.techfore.2013.03.003

Colombelli, A., Krafft, J., & Vivarelli, M. (2016). To be born is not enough: the key role of innovative start-ups. *Small Business Economics*, *47*(2), 277–291. https://doi.org/10.1007/s11187-016-9716-y

Colombo, M. G., & Delmastro, M. (2001). Technology use and plant closure. *Research Policy*, *30*(1), 21–34. https://doi.org/10.1016/s0048-7333(99)00079-7

Cotei, C., & Farhat, J. (2018). The M&A exit outcomes of new, young firms. *Small Business Economics*, *50*(3), 545–567. https://doi.org/10.1007/s11187-017-9907-1

Cottrell, T., & Nault, B. R. (2004). Product variety and firm survival in the microcomputer software industry. *Strategic Management Journal*, *25*(10), 1005–1025. https://doi.org/10.1002/smj.408

Cox, D. R. (1972). Regression models and life-tables. *Journal of the Royal Statistical Society: Series B (Methodological)*, *34*(2), 187-202.

Crossan, M. M., & Apaydin, M. (2010). A Multi-Dimensional Framework of Organizational Innovation: A Systematic Review of the Literature. *Journal of Management Studies*, *47*(6), 1154–1191. https://doi.org/10.1111/j.1467-6486.2009.00880.x

Dai, M., Liu, H., & Lin, L. (2019). How innovation impacts firms' export survival: Does export mode matter? *World Economy*, *43*(1), 81–113. https://doi.org/10.1111/twec.12847

Dalglish, C., & Newton, C. (2002). The relationship between firm survival and innovation: An introduction to the literature (review). *Innovation*, *4*(1–3), 209–214. https://doi.org/10.5172/impp.2001.4.1-3.209

Damanpour, F. (1991). Organizational Innovation: A Meta-Analysis Of Effects Of Determinants and Moderators. *Academy of Management Journal*, *34*(3), 555–590. https://doi.org/10.5465/256406

Damanpour, F. (2014). Footnotes to Research on Management Innovation. *Organization Studies*, *35*(9), 1265–1285. https://doi.org/10.1177/0170840614539312

Damanpour, F. (2020). *Organizational Innovation*. Edward Elgar Publishing.

DeMonaco, H., Oliveira, P., Torrance, A., Von Hippel, C., & Von Hippel, E. (2019). When patients become innovators. *MIT Sloan Management Review*, *60*(3), 81–88.

Deng, Z., Guo, H., Zhang, W., & Wang, C. (2014). Innovation and survival of exporters: A contingency perspective. *International Business Review*, *23*(2), 396–406. https://doi.org/10.1016/j.ibusrev.2013.06.003

Desmarchelier, B., & Fang, E. S. (2016). National culture and innovation diffusion. Exploratory insights from agent-based modeling. *Technological Forecasting and Social Change*, *105*, 121-128.

Destefanis, S., Maietta, O. W., Mazzotta, F., & Parisi, L. (2023). Firm survival and innovation: direct and indirect effects of knowledge for SMEs. *Economics of Innovation and New Technology*, 1–29. https://doi.org/10.1080/10438599.2023.2263371

DiMaggio, P. J., & Powell, W. W. (1983). The Iron Cage revisited: institutional isomorphism and collective rationality in organizational fields. *American Sociological Review*, *48*(2), 147. https://doi.org/10.2307/2095101

Donthu, N., Kumar, S., Mukherjee, D., Pandey, N., & Lim, W. M. (2021). How to conduct a bibliometric analysis: An overview and guidelines. *Journal of Business Research*, *133*, 285–296. https://doi.org/10.1016/j.jbusres.2021.04.070

Doms, M., Dunne, T., & Roberts, M. J. (1995). The role of technology use in the survival and growth of manufacturing plants. *International Journal of Industrial Organization*, *13*(4), 523–542. https://doi.org/10.1016/0167-7187(95)00503-x

Dowell, G., & Swaminathan, A. (2000). Racing and Back-Pedalling into the Future: New Product Introduction and Organizational Mortality in the US Bicycle Industry, 1880-1918. *Organization Studies*, *21*(2), 405–431. https://doi.org/10.1177/0170840600212005

Dunne, T., Roberts, M. J., & Samuelson, L. (1988). Patterns of Firm Entry and Exit in U.S. Manufacturing Industries. *The RAND Journal of Economics*, *19*(4), 495. https://doi.org/10.2307/2555454

Dunne, T., Roberts, M. J., & Samuelson, L. (1989). The Growth and Failure of U. S. Manufacturing Plants. *The Quarterly Journal of Economics*, *104*(4), 671. https://doi.org/10.2307/2937862

Dushnitsky, G., & Lenox, M. J. (2005). When do firms undertake R&D by investing in new ventures?. *Strategic Management Journal*, *26*(10), 947-965.

Ebert, T., Brenner, T., & Brixy, U. (2018). New firm survival: the interdependence between regional externalities and innovativeness. *Small Business Economics*, *53*(1), 287–309. https://doi.org/10.1007/s11187-018-0026-4

Egger, M., Smith, G. D., Schneider, M., & Minder, C. (1998). Bias in meta-analysis detected by a simple, graphical test. *BMJ*, *315*(7109), 629–634. https://doi.org/10.1136/bmj.315.7109.629

Eisenhardt, K. M., & Martin, J. A. (2000). Dynamic capabilities: what are they? *Strategic Management Journal*, *21*(10–11), 1105–1121. http://dx.doi.org/10.1002/1097-0266(200010/11)21:10/11<1105::aid-smj133>3.0.co;2-e

Ericson, R., & Pakes, A. (1995). Markov-Perfect Industry Dynamics: A Framework for Empirical Work. *The Review of Economic Studies*, *62*(1), 53. https://doi.org/10.2307/2297841

Espig, A., Mazzini, I. T., Zimmermann, C., & de Carvalho, L. C. (2022). National culture and innovation: a multidimensional analysis. *Innovation & management review*, *19*(4), 322-338.

Esteve-Pérez, S., & Mañez-Castillejo, J. A. (2008). The Resource-Based Theory of the Firm and Firm Survival. *Small Business Economics*, *30*(3), 231–249. https://doi.org/10.1007/s11187-006-9011-4

Esteve-Pérez, S., Sanchis-Llopis, A., & Sanchis-Llopis, J. A. (2010). A competing risks analysis of firms' exit. *Empirical Economics*, *38*(2), 281–304. https://doi.org/10.1007/s00181-009-0266-x

Ettlie, J. E. (1988). Manufacturing technology policy and deployment of processing innovations. *Annals of Operations Research*, *15*(1), 1-20.

Evans, D. S. (1987). Tests of alternative theories of firm growth. *Journal of Political Economy*, *95*(4), 657–674. https://doi.org/10.1086/261480

Fagerberg, J., Fosaas, M., & Sapprasert, K. (2012). Innovation: Exploring the knowledge base. *Research Policy*, *41*(7), 1132–1153. https://doi.org/10.1016/j.respol.2012.03.008

Farndale, E., & Paauwe, J. (2007). Uncovering competitive and institutional drivers of HRM practices in multinational corporations. *Human Resource Management Journal*, *17*(4), 355–375. https://doi.org/10.1111/j.1748-8583.2007.00050.x

Fernandes, A. M., & Paunov, C. (2015). The Risks of Innovation: Are Innovating Firms Less Likely to Die? *Review of Economics and Statistics*, *97*(3), 638–653. https://doi.org/10.1162/rest_a_00446

Fernández-López, S., Rodríguez-Gulías, M. J., Dios-Vicente, A., & Rodeiro-Pazos, D. (2020). Individual and joint effect of patenting and exporting on the university spin-offs' survival. *Technology in Society*, *62*, 101326. https://doi.org/10.1016/j.techsoc.2020.101326

Flynn, B. B., & Saladin, B. (2006). Relevance of Baldrige constructs in an international context: A study of national culture. *Journal of Operations Management*, *24*(5), 583–603. https://doi.org/10.1016/j.jom.2005.09.002

Fontana, R., & Nesta, L. (2009). Product Innovation and Survival in a High-Tech Industry. *Review of Industrial Organization*, *34*(4), 287–306. https://doi.org/10.1007/s11151-009-9210-7

Freeman, J., Carroll, G. R., & Hannan, M. T. (1983). The Liability of Newness: age dependence in organizational death rates. *American Sociological Review*, *48*(5), 692. https://doi.org/10.2307/2094928

Gambardella, A., Raasch, C., & Von Hippel, E. (2017). The User Innovation Paradigm: Impacts on Markets and Welfare. *Management Science*, *63*(5), 1450–1468. https://doi.org/10.1287/mnsc.2015.2393

Garcia Martinez, M., Zouaghi, F., Garcia Marco, T., & Robinson, C. (2019). What drives business failure? Exploring the role of internal and external knowledge capabilities during the global financial crisis. *Journal of Business Research*, *98*, 441–449. https://doi.org/10.1016/j.jbusres.2018.07.032

García-Cabrera, A. M., García-Soto, M. G., & Nieves, J. (2021). Knowledge, innovation and NTBF short- and long-term performance. *International Entrepreneurship and Management Journal*, *17*(3), 1067–1089. https://doi.org/10.1007/s11365-020-00656-z

Garcia, R., & Calantone, R. (2002). A critical look at technological innovation typology and innovativeness terminology: a literature review. *Journal of Product Innovation Management*, *19*(2), 110–132. https://doi.org/10.1111/1540-5885.1920110

Geroski, P. (1995). What do we know about entry? *International Journal of Industrial Organization*, *13*(4), 421–440. https://doi.org/10.1016/0167-7187(95)00498-x

Gilbert, J. T., & Birnbaum-More, P. H. (1996). Innovation timing advantages: From economic theory to strategic application. *Journal of Engineering and Technology Management*, *12*(4), 245–266. https://doi.org/10.1016/0923-4748(95)00017-8

Gimeno, J., Folta, T. B., Cooper, A. C., & Woo, C. Y. (1997). Survival of the Fittest? Entrepreneurial Human Capital and the Persistence of Underperforming Firms. *Administrative Science Quarterly*, *42*(4), 750. https://doi.org/10.2307/2393656

Giovannetti, G., Ricchiuti, G., & Velucchi, M. (2011). Size, innovation and internationalization: a survival analysis of Italian firms. *Applied Economics*, *43*(12), 1511–1520. https://doi.org/10.1080/00036840802600566

Gopalakrishnan, S., & Damanpour, F. (1997). A review of innovation research in economics, sociology and technology management. *Omega*, *25*(1), 15–28. https://doi.org/10.1016/s0305-0483(96)00043-6

Gopalakrishnan, S. (2000). Unraveling the links between dimensions of innovation and organizational performance. *Journal of High Technology Management Research*, *11*(1), 137–153. https://doi.org/10.1016/s1047-8310(00)00024-9

Grazzi, M., Piccardo, C., & Vergari, C. (2021). Turmoil over the crisis: innovation capabilities and firm exit. *Small Business Economics*, *59*(2), 537–564. https://doi.org/10.1007/s11187-021-00485-6

Gu, Y., Mao, C. X., & Tian, X. (2017). Banks' Interventions and Firms' Innovation: Evidence from Debt Covenant Violations. *The Journal of Law and Economics*, *60*(4), 637–671. https://doi.org/10.1086/696703

Guerzoni, M., Nava, C. R., & Nuccio, M. (2021). Start-ups survival through a crisis. Combining machine learning with econometrics to measure innovation. *Economics of Innovation and New Technology*, *30*(5), 468–493. https://doi.org/10.1080/10438599.2020.1769810

Hambrick, D. C., & Fredrickson, J. W. (2001). Are you sure you have a strategy?. *Academy of Management Perspectives*, *15*(4), 48-59

Hannan, M. T., & Freeman, J. (1977). The population ecology of organizations. *American journal of sociology*, *82*(5), 929-964.

Hannan, M. T., & Freeman, J. (1984). Structural inertia and organizational change. *American Sociological Review*, *49*(2), 149. https://doi.org/10.2307/2095567

Hannan, M. T. (1998). Rethinking age dependence in Organizational mortality: Logical fromalizations. *American Journal of Sociology*, *104*(1), 126–164. https://doi.org/10.1086/210004

He, J., & Tian, X. (2020). Institutions and Innovation. *Annual Review of Financial Economics*, *12*, 377–398.

Hedges, L. V., & Olkin, I. (1985). *Statistical methods for Meta-Analysis*. Academic Press.

Helmers, C., & Rogers, M. (2010). Innovation and the Survival of New Firms in the UK. *Review of Industrial Organization*, *36*(3), 227–248. https://doi.org/10.1007/s11151-010-9247-7

Helmers, C., & Rogers, M. (2011). Does patenting help high-tech start-ups? *Research Policy*, *40*(7), 1016–1027. https://doi.org/10.1016/j.respol.2011.05.003

Helfat, C. E., & Peteraf, M. A. (2003). The dynamic resource-based view: capability lifecycles. *Strategic Management Journal*, *24*(10), 997–1010. https://doi.org/10.1002/smj.332

Henderson, R. M., & Clark, K. B. (1990). Architectural innovation: The reconfiguration of existing product technologies and the failure of established firms. *Administrative science quarterly*, 9-30.

Hillman, A. J., Withers, M. C., & Collins, B. J. (2009). Resource Dependence Theory: A Review. *Journal of Management*, *35*(6), 1404–1427. https://doi.org/10.1177/0149206309343469

Hofstede, G. (2001). Culture's recent consequences: Using dimension scores in theory and research. *International Journal of cross cultural management*, *1*(1), 11-17.

Hofstede, G., Hofstede, G. J., & Minkov, M. (2010). *Cultures and Organizations: Software of the Mind, third edition*. McGraw Hill Professional.

Howell, A. (2015). 'Indigenous' innovation with heterogeneous risk and new firm survival in a transitioning Chinese economy. *Research Policy*, *44*(10), 1866–1876. https://doi.org/10.1016/j.respol.2015.06.012

Hunter, J. E., & Schmidt, F. L. (1990). *Methods of meta-analysis: Correcting error and bias in research findings*. Thousand Oaks, CA: Sage publications.

Hyytinen, A., Pajarinen, M., & Rouvinen, P. (2015). Does innovativeness reduce startup survival rates? *Journal of Business Venturing*, *30*(4), 564–581. https://doi.org/10.1016/j.jbusvent.2014.10.001

Inui, T., Ito, K., & Miyakawa, D. (2017). Export experience, product differentiation and firm survival in export markets. *Japanese Economic Review*, *68*(2), 217–231. https://doi.org/10.1111/jere.12083

Jack, E. P., & Raturi, A. S. (2006). Lessons learned from methodological triangulation in management research. *Management research news*, *29*(6), 345-357.

Jensen, P. H., Webster, E., & Buddelmeyer, H. (2008). Innovation, Technological Conditions and New Firm Survival*. *Economic Record*, *84*(267), 434–448. https://doi.org/10.1111/j.1475-4932.2008.00509.x

Jenson, I., Leith, P., Doyle, R., West, J., & Miles, M. P. (2016). Innovation system problems: Causal configurations of innovation failure. *Journal of Business Research*, *69*(11), 5408–5412. https://doi.org/10.1016/j.jbusres.2016.04.146

Jitsutthiphakorn, U. (2021). Innovation, firm productivity, and export survival: firm-level evidence from ASEAN developing countries. *Journal of Economic Structures*, *10*(1). https://doi.org/10.1186/s40008-021-00251-7

Jones, G. K., & Davis, H. J. (2000). National culture and innovation: Implications for locating global R& D operations. *MIR: Management International Review*, 11-39.

Josefy, M. A., Harrison, J. S., Sirmon, D. G., & Carnes, C. (2017). Living and Dying: Synthesizing the Literature on Firm Survival and Failure across Stages of Development. *Academy of Management Annals*, *11*(2), 770–799. https://doi.org/10.5465/annals.2015.0148

Jovanovic, B. (1982). Selection and the Evolution of Industry. *Econometrica*, *50*(3), 649. https://doi.org/10.2307/1912606

Jung, H., Hwang, J., & Kim, B. K. (2018). Does R&D investment increase SME survival during a recession? *Technological Forecasting and Social Change*, *137*, 190–198. https://doi.org/10.1016/j.techfore.2018.07.042

Huang, Y., Ding, X. H., Liu, R., He, Y., & Wu, S. (2019). Reviewing the Domain of Technology and Innovation Management: A Visualizing Bibliometric Analysis. *SAGE Open*, *9*(2), 215824401985464. https://doi.org/10.1177/2158244019854644

Hultink, E. J., & Atuahene-Gima, K. (2000). The effect of sales force adoption on new product selling performance. *Journal of Product Innovation Management*, *17*(6), 435–450. https://doi.org/10.1016/s0737-6782(00)00058-8

Iglesias, O., Ind, N., & Alfaro, M. (2013). The organic view of the brand: A brand value co-creation model. *Journal of Brand Management*, *20*(8), 670–688. https://doi.org/10.1057/bm.2013.8

Ilmakunnas, P., & Nurmi, S. (2010). Dynamics of export market entry and exit. *Scandinavian Journal of Economics*, *112*(1), 101-126.

Ind, N., Iglesias, O., & Markovic, S. (2017). The co-creation continuum: from tactical market research tool to strategic collaborative innovation method. *Journal of Brand Management*, *24*(4), 310–321. https://doi.org/10.1057/s41262-017-0051-7

Karlsson, C., & Tavassoli, S. (2015). Innovation strategies of firms: What strategies and why? *The Journal of Technology Transfer*, *41*(6), 1483–1506. https://doi.org/10.1007/s10961-015-9453-4

Karnani, A., & Wernerfelt, B. (1985). Multiple point competition. *Strategic Management Journal*, *6*(1), 87-96.

Kato, M., Onishi, K., & Honjo, Y. (2022). Does patenting always help new firm survival? Understanding heterogeneity among exit routes. *Small Business Economics*, *59*(2), 449–475. https://doi.org/10.1007/s11187-021-00481-w

Kirca, A. H., Jayachandran, S., & Bearden, W. O. (2005). Market orientation: A meta-analytic review and assessment of its antecedents and impact on performance. *Journal of marketing*, *69*(2), 24-41.

Kim, J., & Lee, C. Y. (2016). Technological regimes and firm survival. *Research Policy*, *45*(1), 232–243. https://doi.org/10.1016/j.respol.2015.09.006

Kim, G., & Huh, M. G. (2014). Exploration and organizational longevity: The moderating role of strategy and environment. *Asia Pacific Journal of Management*, *32*(2), 389–414. https://doi.org/10.1007/s10490-014-9399-3

Khanna, T., & Palepu, K. G. (1997). Why focused strategies may be wrong for emerging markets. *Harvard Business Review*, *75*(4), 41–48.

Khessina, O. M., Goncalo, J. A., & Krause, V. (2018). It's time to sober up: The direct costs, side effects and long-term consequences of creativity and innovation. *Research in Organizational Behavior*, *38*, 107–135. https://doi.org/10.1016/j.riob.2018.11.003

Kittur, P., & Agarwal, S. (2024). Cultural bridges in Business: Critical review and future directions in cross-cultural B2B relationships. *Journal of Business Research*, *180*, 114721.

Klepper, S. (1996). Entry, Exit, Growth, and Innovation over the Product Life Cycle. *American Economic Review*, *86*(3), 562–583.

Klepper, S., & Simons, K. L. (1997). Technological Extinctions of Industrial Firms: An Inquiry into their Nature and Causes. *Industrial and Corporate Change*, *6*(2), 379–460. https://doi.org/10.1093/icc/6.2.379

Klier, H., Schwens, C., Zapkau, F. B., & Dikova, D. (2017). Which resources matter how and where? A meta-analysis on firms' foreign establishment mode choice. *Journal of Management Studies*, *54*(3), 304-339.

Kraus, S., Schiavone, F., Pluzhnikova, A., & Invernizzi, A. C. (2021). Digital transformation in healthcare: Analyzing the current state-of-research. *Journal of Business Research*, *123*, 557-567.

Kücher, A., & Feldbauer-Durstmüller, B. (2019). Organizational failure and decline–A bibliometric study of the scientific frontend. *Journal of Business Research*, *98*, 503-516.

McGrath, J. E. (1981). Dilemmatics: The study of research choices and dilemmas. *American Behavioral Scientist*, *25*(2), 179-210.

Morse, J., Knafl, K. A., & Breitmayer, B. J. (2014). Triangulation in Qualitative Research: Issues of Conceptual Clarity and Purpose. *Qualitative Nursing Research: A Contemporary Dialogue*.

Landini, F., Arrighetti, A., & Lasagni, A. (2020). Economic crisis and firm exit: do intangibles matter? *Industry and Innovation*, *27*(5), 445–479. https://doi.org/10.1080/13662716.2018.1544065

Laukkanen, T. (2015). How Uncertainty Avoidance Affects Innovation Resistance in Mobile Banking: The Moderating Role of Age and Gender. In *In 2015 48th Hawaii international conference on system sciences* (pp. 3601–3610). IEEE. https://doi.org/10.1109/hicss.2015.433

Lee, H., Kelley, D., Lee, J., & Lee, S. (2012). SME Survival: The Impact of Internationalization, Technology Resources, and Alliances. *Journal of Small Business Management*, *50*(1), 1–19. https://doi.org/10.1111/j.1540-627x.2011.00341.x

Lengnick-Hall, C. A. (1992). Innovation and Competitive Advantage: What We Know and What We Need to Learn. *Journal of Management*, *18*(2), 399–429. https://doi.org/10.1177/014920639201800209

Levitas, E. F., McFadyen, M. A., & Loree, D. (2006). Survival and the introduction of new technology: A patent analysis in the integrated circuit industry. *Journal of Engineering and Technology Management*, *23*(3), 182–201. https://doi.org/10.1016/j.jengtecman.2006.06.008

Li, S., Shang, J., & Slaughter, S. A. (2010). Why Do Software Firms Fail? Capabilities, Competitive Actions, and Firm Survival in the Software Industry from 1995 to 2007. *Information Systems Research*, *21*(3), 631–654. https://doi.org/10.1287/isre.1100.0281

Lichtenberg, F. R. (2015). The impact of pharmaceutical innovation on premature cancer mortality in Switzerland, 1995–2012. *The European Journal of Health Economics*, *17*(7), 833–854. https://doi.org/10.1007/s10198-015-0725-6

Lieberman, M. B., & Montgomery, D. B. (1988). First-mover advantages. *Strategic management journal*, *9*(S1), 41-58.

Lipsey, M. W., & Wilson, D. B. (2001). *Practical Meta-Analysis*. SAGE Publications.

Löfsten, H. (2016). Business and innovation resources. *Management Decision*, *54*(1), 88–106. https://doi.org/10.1108/md-04-2015-0139

Malerba, F., & Orsenigo, L. (1996). Schumpeterian patterns of innovation are technology-specific. *Research Policy*, *25*(3), 451–478. https://doi.org/10.1016/0048-7333(95)00840-3

Malerba, F., Nelson, R. R., Orsenigo, L., & Winter, S. G. (2016). Innovation and the evolution of industries: History-friendly models, Innov. *Evol. Ind. Hist. Model*, *172*, 1-274.

Manjón-Antolín, M. C., & Arauzo-Carod, J. M. (2008). Firm survival: methods and evidence. *Empirica*, *35*(1), 1–24. https://doi.org/10.1007/s10663-007-9048-x

Markides, C. (2006). Disruptive innovation: in need of better theory*. *Journal of Product Innovation Management*, *23*(1), 19–25. https://doi.org/10.1111/j.1540-5885.2005.00177.x

Mata, J., & Portugal, P. (1994). Life Duration of New Firms. *The Journal of Industrial Economics*, *42*(3), 227. https://doi.org/10.2307/2950567

Miller, D., & Friesen, P. H. (1984). A Longitudinal Study of the Corporate Life Cycle. *Management Science*, *30*(10), 1161–1183. https://doi.org/10.1287/mnsc.30.10.1161

Min, S., Kalwani, M. U., & Robinson, W. T. (2006). Market Pioneer and Early Follower Survival Risks: A Contingency Analysis of Really New Versus Incrementally New Product-Markets. *Journal of Marketing*, *70*(1), 15–33. https://doi.org/10.1509/jmkg.2006.70.1.15

Mintzberg, H., Ahlstrand, B., & Lampel, J. B. (2020). *Strategy Safari*. Pearson UK.

Mohamad, T. A., Bastone, A., Bernhard, F., & Schiavone, F. (2023). How artificial intelligence impacts the competitive position of healthcare organizations. *Journal of Organizational Change Management*, *36*(8), 49–70. https://doi.org/10.1108/jocm-03-2023-0057

Moher, D., Liberati, A., Tetzlaff, J., & Altman, D. G. (2009). Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. *Bmj*, *339*.

Muzi, S., Jolevski, F., Ueda, K., & Viganola, D. (2023). Productivity and firm exit during the COVID-19 crisis: cross-country evidence. *Small Business Economics*, *60*(4), 1719–1760. https://doi.org/10.1007/s11187-022-00675-w

Naidoo, V. (2010). Firm survival through a crisis: The influence of market orientation, marketing innovation and business strategy. *Industrial Marketing Management*, *39*(8), 1311–1320. https://doi.org/10.1016/j.indmarman.2010.02.005

Nakata, C., & Sivakumar, K. (1996). National Culture and New Product Development: An Integrative review. *Journal of Marketing*, *60*(1), 61. https://doi.org/10.2307/1251888

Nelson, R. R., & Winter, S. G. (1982). *An Evolutionary Theory of Economic Change*. Harvard University Press.

OECD/Eurostat. (2005). Guidelines for Collecting and Interpreting Innovation Data–The Oslo Manual.

Özşuca, E. A. (2023). Firm Survival in Times of Crisis: Do Innovation and Financing Constraints Matter? Insights from the COVID-19 Pandemic. *Eastern European Economics*, *61*(5), 421–456. https://doi.org/10.1080/00128775.2023.2221229

Ortiz-Villajos, J. M., & Sotoca, S. (2018). Innovation and business survival: A long-term approach. *Research Policy*, *47*(8), 1418–1436. https://doi.org/10.1016/j.respol.2018.04.019

Pajunen, K., & Järvinen, J. (2018). To survive or succeed? An analysis of biotechnology firms. *Small Business Economics*, *51*(3), 757–771. https://doi.org/10.1007/s11187-017-9963-6

Parmar, M. K. B., Torri, V., & Stewart, L. (1998). Extracting summary statistics to perform meta-analyses of the published literature for survival endpoints. *Statistics in Medicine*, *17*(24), 2815–2834. https://doi.org/10.1002/(sici)1097-0258(19981230)17:24

Paul, J., & Rosado-Serrano, A. (2019). Gradual Internationalization vs Born-Global/International new venture models. *International Marketing Review*, *36*(6), 830–858. https://doi.org/10.1108/imr-10-2018-0280

Paul, J., & Criado, A. R. (2020). The art of writing literature review: What do we know and what do we need to know? *International Business Review*, *29*(4), 101717. https://doi.org/10.1016/j.ibusrev.2020.101717

Porter, M. E. (1980). *Competitive Strategy*. New York : Free Press ; Toronto : Maxwell Macmillan Canada.

Potter, W. J., & Levine-Donnerstein, D. (1999). Rethinking validity and reliability in content analysis.

Power, D., Schoenherr, T., & Samson, D. (2010). The cultural characteristic of individualism/collectivism: A comparative study of implications for investment in operations between emerging Asian and industrialized Western countries. *Journal of Operations Management*, *28*(3), 206–222. https://doi.org/10.1016/j.jom.2009.11.002

Powell, R. G. (1997). Modelling takeover likelihood. *Journal of Business Finance & Accounting*, *24*(7-8), 1009-1030.

Pérez, S. E., Llopis, A. S., & Llopis, J. a. S. (2004). The Determinants of Survival of Spanish Manufacturing Firms. *Review of Industrial Organization*, *25*(3), 251–273. https://doi.org/10.1007/s11151-004-1972-3

Rauch, A., Wiklund, J., Lumpkin, G., & Frese, M. (2009). Entrepreneurial Orientation and Business Performance: An Assessment of past Research and Suggestions for the Future. *Entrepreneurship Theory and*

Practice, *33*(3), 761–787. https://doi.org/10.1111/j.1540-6520.2009.00308.x

Reddy, K., & Sasidharan, S. (2022). Innovative efforts and export market survival: Evidence from an emerging economy. *Technological Forecasting and Social Change*, *186*, 122109. https://doi.org/10.1016/j.techfore.2022.122109

Rosenbusch, N., Brinckmann, J., & Bausch, A. (2011). Is innovation always beneficial? A meta-analysis of the relationship between innovation and performance in SMEs. *Journal of Business Venturing*, *26*(4), 441–457. https://doi.org/10.1016/j.jbusvent.2009.12.002

Rousseau, M. B., Mathias, B. D., Madden, L. T., & Crook, T. R. (2016). Innovation, firm performance, and appropriation: a meta-analysis. *International Journal of Innovation Management*, *20*(03), 1650033. https://doi.org/10.1142/s136391961650033x

Rubera, G., & Kirca, A. H. (2012). Firm Innovativeness and Its Performance Outcomes: A Meta-Analytic Review and Theoretical Integration. *Journal of Marketing*, *76*(3), 130–147. https://doi.org/10.1509/jm.10.0494

Rumelt, R. P. (1991). How much does industry matter? *Strategic Management Journal*, *12*(3), 167–185. https://doi.org/10.1002/smj.4250120302

Salika, T., Turner, R. M., Fisher, D., Tierney, J. F., & White, I. R. (2022). Implications of analysing time-to-event outcomes as binary in meta-analysis: empirical evidence from the Cochrane Database of Systematic Reviews. *BMC medical research methodology*, *22*(1), 73.

Samuelsson, M., & Davidsson, P. (2009). Does venture opportunity variation matter? Investigating systematic process differences between innovative and imitative new ventures. *Small Business Economics*, *33*(2), 229–255. https://doi.org/10.1007/s11187-007-9093-7

Sandberg, S., Sui, S., & Baum, M. (2019). Effects of prior market experiences and firm-specific resources on developed economy SMEs' export exit from emerging markets: Complementary or compensatory? *Journal of Business Research*, *98*, 489–502. https://doi.org/10.1016/j.jbusres.2018.10.014

Sarkar, M. B., Echambadi, R., Agarwal, R., & Sen, B. (2006). The effect of the innovative environment on exit of entrepreneurial firms. *Strategic Management Journal*, *27*(6), 519–539. https://doi.org/10.1002/smj.534

Schumpeter, J. (1934). *The Theory of Economic Development*. Harvard University Press.

Schumpeter, J. (1942). *Capitalism, Socialism, and Democracy*. Harper & Brothers, New York, London.

Scott, W. R. (2008). Approaching adulthood: the maturing of institutional theory. *Theory and Society*, *37*(5), 427–442. https://doi.org/10.1007/s11186-008-9067-z

Scott, W. R. (2013). *Institutions and organizations: Ideas, interests, and identities*. Sage Publications.

Sharif, N., & Huang, C. (2012). Innovation strategy, firm survival and relocation: The case of Hong Kong-owned manufacturing in Guangdong Province, China. *Research Policy*, *41*(1), 69–78. https://doi.org/10.1016/j.respol.2011.06.003

Shane, S. A. (1992). Why do some societies invent more than others?. *Journal of business venturing*, *7*(1), 29-46.

Scherer, F., & Harhoff, D. (2000). Technology policy for a world of skew-distributed outcomes. *Research Policy*, *29*(4–5), 559–566. https://doi.org/10.1016/s0048-7333(99)00089-x

Shim, J., & Davidsson, P. (2018). Shorter than we thought: The duration of venture creation processes. *Journal of Business Venturing Insights*, *9*, 10–16. https://doi.org/10.1016/j.jbvi.2017.12.003

Singh, K., & Mitchell, W. (1996). Precarious collaboration: Business survival after partners shut down or form new partnerships. *Strategic management journal*, *17*(S1), 99-115.

Sinha, R. K., & Noble, C. H. (2008). The adoption of radical manufacturing technologies and firm survival. *Strategic Management Journal*, *29*(9), 943–962. https://doi.org/10.1002/smj.687

Sørensen, J. B., & Stuart, T. E. (2000). Aging, obsolescence, and organizational innovation. *Administrative Science Quarterly*, *45*(1), 81–112. https://doi.org/10.2307/2666980

Soto-Simeone, A., Sirén, C., & Antretter, T. (2020). New Venture Survival: A Review and Extension. *International Journal of Management Reviews*, *22*(4), 378–407. https://doi.org/10.1111/ijmr.12229

Srinivasan, R., Lilien, G. L., & Rangaswamy, A. (2004). First in, First out? The Effects of Network Externalities on Pioneer Survival. *Journal of Marketing*, *68*(1), 41–58. https://doi.org/10.1509/jmkg.68.1.41.24026

Sterne, J. A., Egger, M., & Moher, D. (2008). Addressing reporting biases. *Cochrane handbook for systematic reviews of interventions: Cochrane book series*, 297-333.

Sterne, J. A., Gavaghan, D., & Egger, M. (2000). Publication and related bias in meta-analysis: power of statistical tests and prevalence in the literature. *Journal of Clinical Epidemiology*, *53*(11), 1119–1129.

Stinchcombe, A. L. (1965). Social structure and organizations. In J. G. March (Ed.), *Handbook of organizations* (pp. 142–193). Rand McNally, Chicago.

Sturdy, A. (2004). The Adoption of Management Ideas and Practices. *Management Learning*, *35*(2), 155–179. https://doi.org/10.1177/1350507604043023

Sui, S., & Baum, M. (2014). Internationalization strategy, firm resources and the survival of SMEs in the export market. *Journal of International Business Studies*, *45*(7), 821–841. https://doi.org/10.1057/jibs.2014.11

Talay, M. B., Calantone, R. J., & Voorhees, C. M. (2014). Coevolutionary Dynamics of Automotive Competition: Product Innovation, Change, and Marketplace Survival. *Journal of Product Innovation Management*, *31*(1), 61–78. https://doi.org/10.1111/jpim.12080

Tan, Q., & Sousa, C. M. P. (2019). Why Poor Performance is Not Enough for a Foreign Exit: The Importance of Innovation Capability and International Experience. *Management International Review*, *59*(3), 465–498. https://doi.org/10.1007/s11575-019-00384-9

Tavassoli, S., & Karlsson, C. (2015). Innovation strategies and firm performance: Simple or complex strategies? *Economics of Innovation and New Technology*, *25*(7), 631–650. https://doi.org/10.1080/10438599.2015.1108109

Teece, D. J. (1986). Profiting from technological innovation: Implications for integration, collaboration, licensing and public policy. *Research Policy*, *15*(6), 285–305. https://doi.org/10.1016/0048-7333(86)90027-2

Teece, D. J., Pisano, G., & Shuen, A. (1997). Dynamic capabilities and strategic management. *Strategic Management Journal*, *18*(7), 509–533. http://dx.doi.org/10.1002/(sici)1097-0266(199708)18:7<509::aid-smj882>3.0.co;2-z

The World Intellectual Property Organization. (2022). Global Innovation Index 2022. In *https://www.wipo.int/global_innovation_index/en/2022/*.

Tierney, J. F., Stewart, L. A., Ghersi, D., Burdett, S., & Sydes, M. R. (2007). Practical methods for incorporating summary time-to-event data into meta-analysis. *Trials*, *8*(1). https://doi.org/10.1186/1745-6215-8-16

Tierney, J. F., Burdett, S., & Fisher, D. J. (2025). Practical methods for incorporating summary time-to-event data into meta-analysis: updated guidance. *Systematic Reviews*, *14*(1). https://doi.org/10.1186/s13643-025-02752-z

Thornhill, S. (2006). Knowledge, innovation and firm performance in high- and low-technology regimes. *Journal of Business Venturing*, *21*(5), 687–703. https://doi.org/10.1016/j.jbusvent.2005.06.001

Tödtling, F., Lehner, P., & Trippl, M. (2006). Innovation in knowledge intensive industries: The nature and geography of knowledge links. *European planning studies*, *14*(8), 1035-1058.

Triantis, A. (2005). Realizing the potential of real options: Does theory meet practice? *Journal of Applied Corporate Finance*, *17*(2), 8–16. https://doi.org/10.1111/j.1745-6622.2005.00028.x

Trigeorgis, L., & Reuer, J. J. (2017). Real options theory in strategic management. *Strategic Management Journal*, *38*(1), 42–63. https://doi.org/10.1002/smj.2593

Tsui, A. S. (2021). Responsible Research and Responsible Leadership Studies. *Academy of Management Discoveries*, *7*(2), 166–170. https://doi.org/10.5465/amd.2019.0244

Ugur, M., Trushin, E., & Solomon, E. (2016). Inverted-U relationship between R&D intensity and survival: Evidence on scale and complementarity effects in UK data. *Research Policy*, *45*(7), 1474–1492. https://doi.org/10.1016/j.respol.2016.04.007

Ugur, M., & Vivarelli, M. (2021). Innovation, firm survival and productivity: the state of the art. *Economics of Innovation and New Technology*, *30*(5), 433-467.

Useche, D. (2015). Patenting Behaviour and the Survival of Newly Listed European Software Firms. *Industry and Innovation*, *22*(1), 37–58. https://doi.org/10.1080/13662716.2015.1013733

Velu, C., & Stiles, P. (2013). Managing Decision-Making and cannibalization for parallel business models. *Long Range Planning*, *46*(6), 443–458. https://doi.org/10.1016/j.lrp.2013.08.003

Velu, C. (2015). Business model innovation and third-party alliance on the survival of new firms. *Technovation*, *35*, 1–11. https://doi.org/10.1016/j.technovation.2014.09.007

Venkatraman, N. (1989). The Concept of Fit in Strategy Research: Toward Verbal and Statistical Correspondence. *Academy of Management Review*, *14*(3), 423–444. https://doi.org/10.5465/amr.1989.4279078

Viechtbauer, W. (2010). Conducting Meta-Analyses in R with the Metafor Package. *Journal of Statistical Software*, *36*(3). https://doi.org/10.18637/jss.v036.i03

Viechtbauer, W., & Cheung, M. W. L. (2010). Outlier and influence diagnostics for meta-analysis. *Research synthesis methods*, *1*(2), 112-125.

Volberda, H. W., Van Den Bosch, F. A., & Mihalache, O. R. (2014). Advancing Management Innovation: Synthesizing Processes, Levels of Analysis, and Change Agents. *Organization Studies*, *35*(9), 1245–1264. https://doi.org/10.1177/0170840614546155

Wagner, S., & Cockburn, I. (2010). Patents and the survival of Internet-related IPOs. *Research Policy*, *39*(2), 214–228. https://doi.org/10.1016/j.respol.2009.12.003

Wang, A. X., & Zhou, K. Z. (2022). Financial munificence, R&D intensity, and new venture survival: critical roles of CEO attributes. *Small Business Economics*, *59*(4), 1641–1659. https://doi.org/10.1007/s11187-021-00592-4

Wernerfelt, B. (1984). A resource-based view of the firm. *Strategic Management Journal*, *5*(2), 171–180. https://doi.org/10.1002/smj.4250050207

Westerman, J. W., Rao, M. B., Vanka, S., & Gupta, M. (2020). Sustainable human resource management and the triple bottom line: Multi-stakeholder strategies, concepts, and engagement. *Human Resource Management Review*, *30*(3), 100742. https://doi.org/10.1016/j.hrmr.2020.100742

Wilbon, A. D. (2002). Predicting survival of high-technology initial public offering firms. *The Journal of High Technology Management Research*, *13*(1), 127–141. https://doi.org/10.1016/s1047-8310(01)00052-9

Williamson, P. R., Smith, C. T., Hutton, J. L., & Marson, A. G. (2002). Aggregate data meta-analysis with time-to-event outcomes. *Statistics in Medicine*, *21*(22), 3337–3351. https://doi.org/10.1002/sim.1303

Wolfe, R. A. (1995). Organizational innovation: review, critique and suggested research directions*. *Journal of Management Studies*, *31*(3), 405–431. https://doi.org/10.1111/j.1467-6486.1994.tb00624.x

Wojan, T. R., Crown, D., & Rupasingha, A. (2018). Varieties of innovation and business survival: Does pursuit of incremental or far-ranging innovation make manufacturing establishments more resilient? *Research Policy*, *47*(9), 1801–1810. https://doi.org/10.1016/j.respol.2018.06.011

Yang, C., Bossink, B., & Peverelli, P. (2017). High-tech start-up firm survival originating from a combined use of internal resources. *Small Business Economics*, *49*(4), 799–824. https://doi.org/10.1007/s11187-017-9858-6

Yang, T., & Aldrich, H. E. (2012). Out of sight but not out of mind: Why failure to account for left truncation biases research on failure rates. *Journal of Business Venturing*, *27*(4), 477–492. https://doi.org/10.1016/j.jbusvent.2012.01.001

Yasar, M., & Rejesus, R. M. (2005). Exporting status and firm performance: Evidence from a matched sample. *Economics Letters*, *88*(3), 397–402. https://doi.org/10.1016/j.econlet.2005.05.001

Zahra, S. A. (1996). Technology strategy and new venture performance: A study of corporate-sponsored and independent biotechnology ventures. *Journal of Business Venturing*, *11*(4), 289–321. https://doi.org/10.1016/0883-9026(95)00128-x

Zahra, S. A., & George, G. (2002). Absorptive Capacity: A Review, Reconceptualization, and Extension. *Academy of Management Review*, *27*(2), 185–203. https://doi.org/10.5465/amr.2002.6587995

Zajac, E. J., Kraatz, M. S., & Bresser, R. K. F. (2000). Modeling the dynamics of strategic fit: a normative approach to strategic change. *Strategic Management Journal*, *21*(4), 429–453. http://dx.doi.org/10.1002/(sici)1097-0266(200004)21:4<429::aid-smj81>3.0.co;2-#

Zhang, D., Zheng, W., & Ning, L. (2018). Does innovation facilitate firm survival? Evidence from Chinese high-tech firms. *Economic Modelling*, *75*, 458–468. https://doi.org/10.1016/j.econmod.2018.07.030

Zhang, D., Zhuge, L., & Freeman, R. B. (2020). Firm dynamics of hi-tech start-ups: Does innovation matter? *China Economic Review*, *59*, 101370. https://doi.org/10.1016/j.chieco.2019.101370

Zhang, M., & Mohnen, P. (2022). R&D, innovation and firm survival in Chinese manufacturing, 2000–2006. *Eurasian Business Review*, *12*(1), 59–95. https://doi.org/10.1007/s40821-021-00200-1

APPENDICES

APPENDIX A: Studies included in the meta-analysis

APPENDIX B: The variables coded in the primary studies.

APPENDIX C: Hazard ratios estimation process based on the Excel spreadsheet by Tierney et al. (2025).

APPENDIX D: The results of innovation and various firm survival dimensions (from Review Manager 5.4)

APPENDIX A

Table A.1: Studies included in the meta-analysis

Authors(year)	Firm age	Industry	Observation window	Country	Data extraction approach*	Innovation	Firm survival
Cefis et al (2023)	Old	Mixed	2006-2015	Netherland	D	Output	Firm closure, firm failure, and M&A
Guerzoni et al (2021)	New	High-tech	2008-2015	Italy	D	Output	Firm failure
Fernández-López (2020)	New	Mixed	2005-2015	Spain	D	Patenting	Firm failure
Cefis et al (2020)	Old	Low-tech	2006-2013	Italy	D	Output	Pooled exit (no distinction)
Sandberg et al (2019)	Mixed	Mixed	1993-2008	Canada	D	Output	Foreign market survival
Jung et al (2018)	New	Low-tech	2008-2014	Korea	D	R&D	Discontinued ownership (M&A)
Zongke (2016)	New	Mixed	2000-2007	China	D	R&D	Pooled exit
Useche (2015)	New	High-tech	1997-2005	Multiple	D	patenting	M&A, firm failure
Boyer and Blazy (2014)	New	Low-tech	1998-2003	France	D	Output	Legal liquidation (firm failure)
Sui and Baum (2014)	Mixed	Mixed	1997-2005	Canada	D	Output	Export market survival
Giovannetti et al (2011)	Old	Low-tech	2001-2005	Italy	D	R&D and output	Pooled exit
Li et al (2010)	New	High-tech	1995-2007	US	D	R&D	Firm failure
Sinha and Noble (2008)	Mixed	Low-tech	1981-1986	UK	D	Output	Pooled exit
Aspelund et al (2005)	New	High-tech	1995-2002	Multiple	D	Output	Pooled exit
Srinivasan et al (2004)	Mixed	Low-tech	NA	US	D	Output	Product market survival
Deng et al (2014)	Mixed	Mixed	2006-2010	China	D	Output	Export market survival

Table A.1(continued): Studies included in the meta-analysis

Authors(year)	Firm age	Industry	Observation window	Country	Data extraction approach*	Innovation	Firm survival
Ebert et al (2019)	New	Mixed	2007-2011	Germany	S	Output	Pooled exit
Dai et al (2020)	Mixed	Low-tech	2000-2010	China	S	Output	Export market survival
Dzhumashev et al (2016)	old	High-tech	1991-2008	India	S	R&D	pooled exit
Guo and Zhou (2014)	New	High-tech	1991-2012	US	S	R&D	Involuntary delisting (firm failure)
Wagner and Cockburn (2010)	New	High-tech	1998-2001	US	S	Patenting	Firm failure and M&A
Esteve Perez et al (2010)	Mixed	Low-tech	1990-2000	Spain	S	R&D	Firm failure and acquisition
Cantner et al (2009)	Mixed	Low-tech	1886-1936	Germany	S	patenting	Pooled exit
Colombelli et al (2013)	Mixed	Low-tech	2001-2011	France	S	R&D	Pooled exit
Cefis and Marsili (2005)	Mixed	Low-tech	1996-2003	Netherland	S	Output	Pooled exit
Zhang et al (2020)	New	Mixed	2007-2013	China	KM with n risk	Patenting and output	Pooled exit
Helmers and Rogers (2010)	New	Mixed	2001-2005	UK	KM with n risk	Patenting	Pooled exit
Reddy and Sasidharan (2023)	Old	Low-tech	2001-2018	India	KM with follow-up	Input	Export market survival
Howell (2015)	New	Low-tech	1998-2007	China	KM with follow-up	Output	Firm failure

Note: D: direct approach, S: summary statistics, KM with n risk: Kaplan -Meier curve with numbers of firms at risk.

APPENDIX B

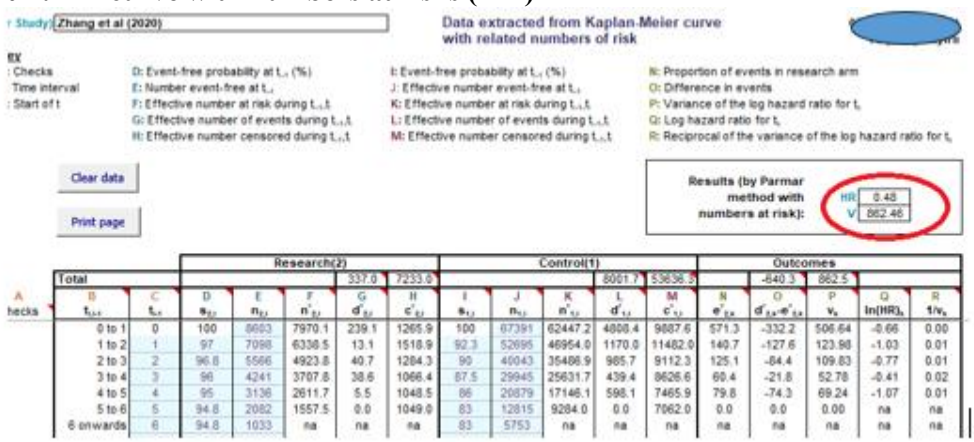
The variables coded in the primary studies:

Author(s) name; 2) year of publication; 3) publication outlet; 4) sample size; 5) country; 6)industry; 7) firm types; 8) observation period; 9) innovation types and magnitude; 10) innovation measurement (output/input/subjective/objective); 11) firm survival dimensions; 12) minimum follow-up duration(if given); 13) maximum follow-up duration(if given); 14) statistical technique used; 15) number of firms in innovators and non-innovators (if any); 16) number of exit (failure) in innovators and non-innovators; 17) number of total events; 18) HR and its confidence interval;19) exact p-value; 20) chi-square statistics; 21) p-value from the log-rank test; 22) coefficients of Cox regression model; 23) Kaplan-Meier survival curve (if provided); 24) life-table (if provided).

APPENDIX C

Hazard ratios estimation based on the Excel spreadsheet by Tierney et al. (2025).

Part 1:KM curve with numbers at risks (n=2)



Study: Zhang et al (2020)

Data extracted from Kaplan-Meier curve with related numbers of risk

Clear data

Print page

Results (by Parmar method with numbers at risk): HR 0.48, V 862.46

hecks			Research(2)					Control(1)					Outcomes				
Total						337.0	7233.0				6001.7	53696.3		-840.3	862.5		
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
	$t_{i,x}$	$t_{i,x}$	$s_{2,i}$	$n_{2,i}$	$n'_{2,i}$	$d'_{2,i}$	$c'_{2,i}$	$s_{1,i}$	$n_{1,i}$	$n'_{1,i}$	$d'_{1,i}$	$c'_{1,i}$	$e'_{1,x}$	$d'_{1,x}-e'_{1,x}$	v_x	$\ln(HR)_x$	$1/v_x$
0 to 1	0	1	100	8603	7970.1	239.1	1265.9	100	67391	62447.2	4808.4	9887.6	571.3	-332.2	506.64	-0.66	0.00
1 to 2	1	2	97	7098	6338.5	13.1	1518.9	92.3	52695	46954.0	1170.0	11482.0	140.7	-127.6	123.98	-1.03	0.01
2 to 3	2	3	96.8	5566	4923.8	40.7	1284.3	90	40043	35486.9	985.7	9112.3	125.1	-84.4	109.83	-0.77	0.01
3 to 4	3	4	96	4241	3707.8	38.6	1066.4	87.5	29945	25631.7	439.4	8626.6	60.4	-21.8	52.78	-0.41	0.02
4 to 5	4	5	95	3136	2611.7	5.5	1048.5	86	20879	17146.1	598.1	7465.9	79.8	-74.3	69.24	-1.07	0.01
5 to 6	5	6	94.8	2082	1557.5	0.0	1049.0	83	12815	9284.0	0.0	7062.0	0.0	0.0	0.00	na	na
6 onwards	6		94.8	1033	na	na	na	83	5753	na	na	na	na	na	na	na	na

Figure C.1: Estimation of HR with published KM curve with *n* risk (Zhang et al., 2020) (firms with and without patents)

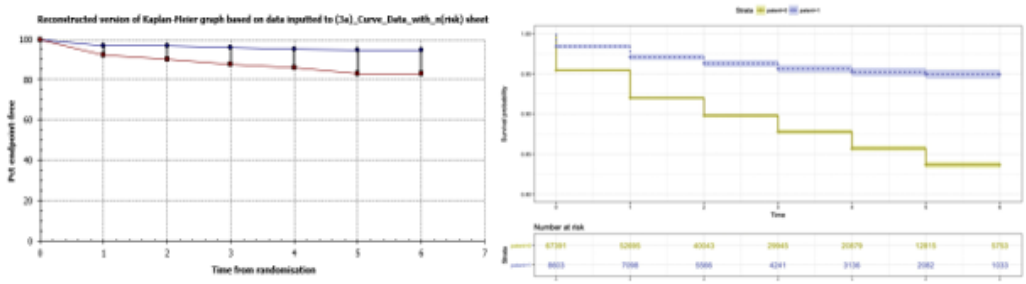


Figure C.2: Left: Constructed version of KM curve based on the number of firms at risk. Right: Published KM curve (Zhang et al, 2020).

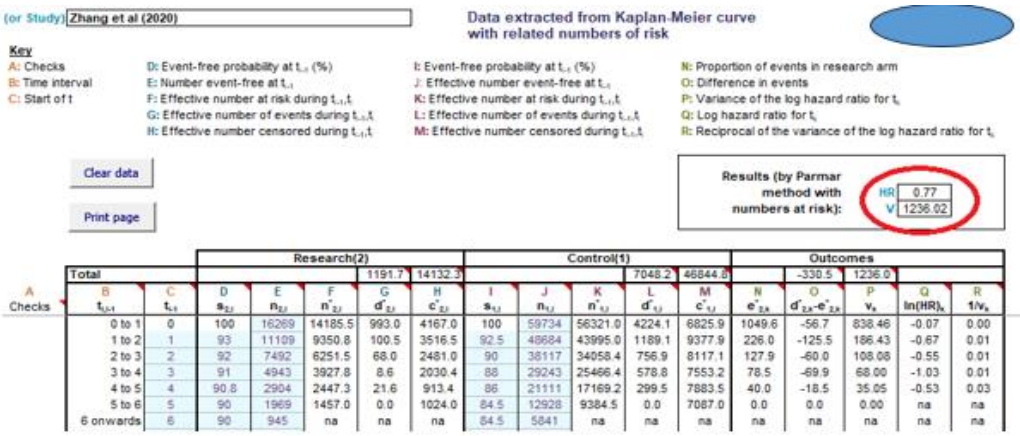


Figure C.3: Estimation of HR with published KM curve with *n* risk (Zhang et al., 2020) (firms with and without product innovation.

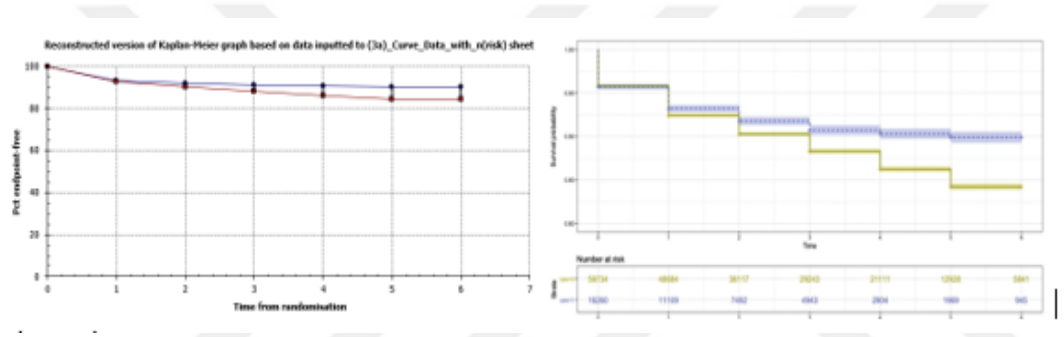


Figure C.4: Left: Constructed version of KM curve based on the numbers of firms at risk. Right: Published KM curve (Zhang et al, 2020).

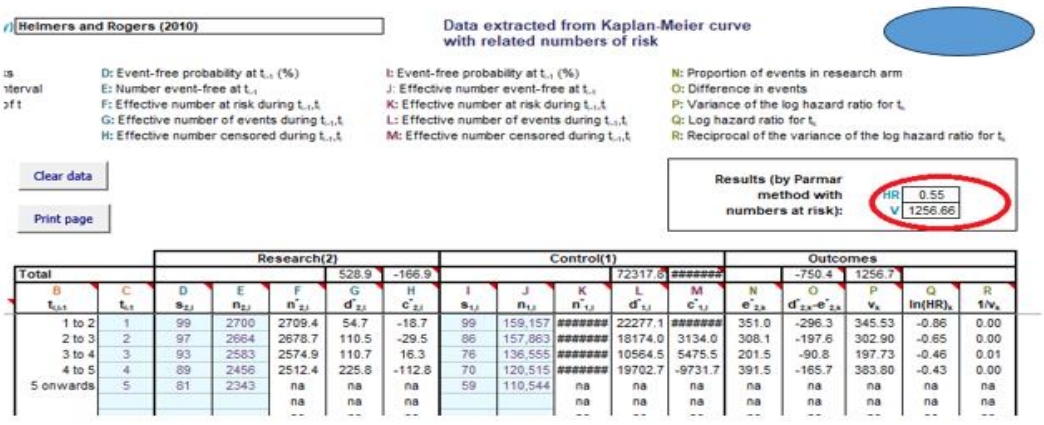


Figure C.5: Estimation of HR with published KM curve with *n* risk (Helmers and Rogers, 2010) (firms with and without patent).

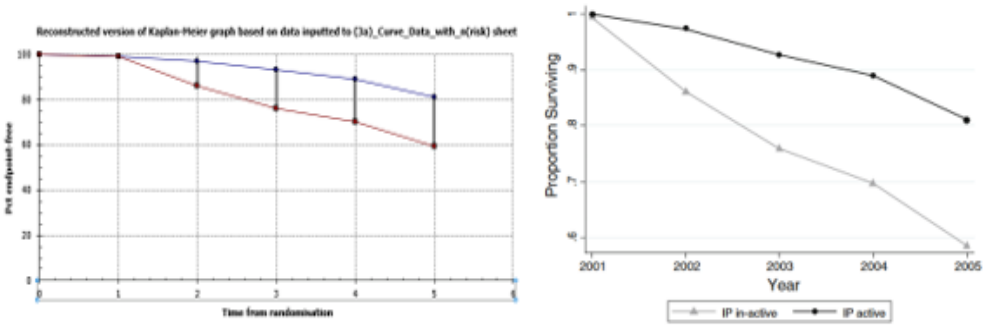
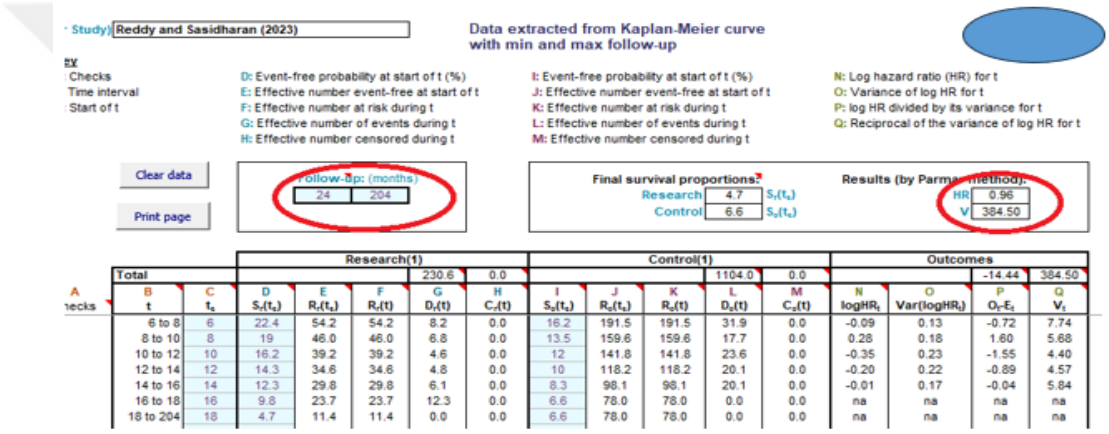


Figure C.6: Left: Constructed version of KM curve generated from the Excel spreadsheet (Tierney et al 2025): Published KM curve (Helmers and Rogers, 2010).

Part 2: KM curve with follow-up information (n=2)



			Research(1)					Control(1)					Outcomes			
Total						230.6	0.0				1104.0	0.0			-14.44	384.50
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
hecks	t	t_e	$S_r(t_e)$	$R_r(t_e)$	$R_r(t)$	$D_r(t)$	$C_r(t)$	$S_c(t_e)$	$R_c(t_e)$	$R_c(t)$	$D_c(t)$	$C_c(t)$	$\log HR_t$	$Var(\log HR_t)$	O_T-E_t	V_t
	6 to 8	6	22.4	54.2	54.2	8.2	0.0	16.2	191.5	191.5	31.9	0.0	-0.09	0.13	-0.72	7.74
	8 to 10	8	19	46.0	46.0	6.8	0.0	13.5	159.6	159.6	17.7	0.0	0.28	0.18	1.60	5.68
	10 to 12	10	16.2	39.2	39.2	4.6	0.0	12	141.8	141.8	23.6	0.0	-0.35	0.23	-1.55	4.40
	12 to 14	12	14.3	34.6	34.6	4.8	0.0	10	118.2	118.2	20.1	0.0	-0.20	0.22	-0.89	4.57
	14 to 16	14	12.3	29.8	29.8	6.1	0.0	8.3	98.1	98.1	20.1	0.0	-0.01	0.17	-0.04	5.84
	16 to 18	16	9.8	23.7	23.7	12.3	0.0	6.6	78.0	78.0	0.0	0.0	na	na	na	na
	18 to 204	18	4.7	11.4	11.4	0.0	0.0	6.6	78.0	78.0	0.0	0.0	na	na	na	na

Figure C.7: Estimation of HR with published KM curve with min and max follow-up (Reddy and Sasidharan, 2023)

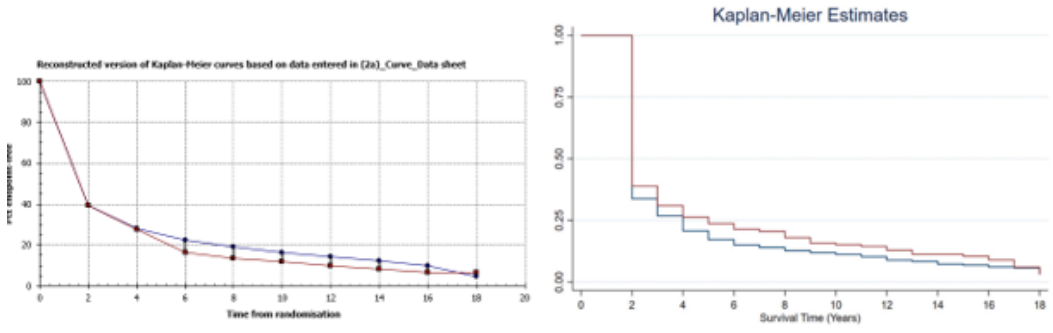
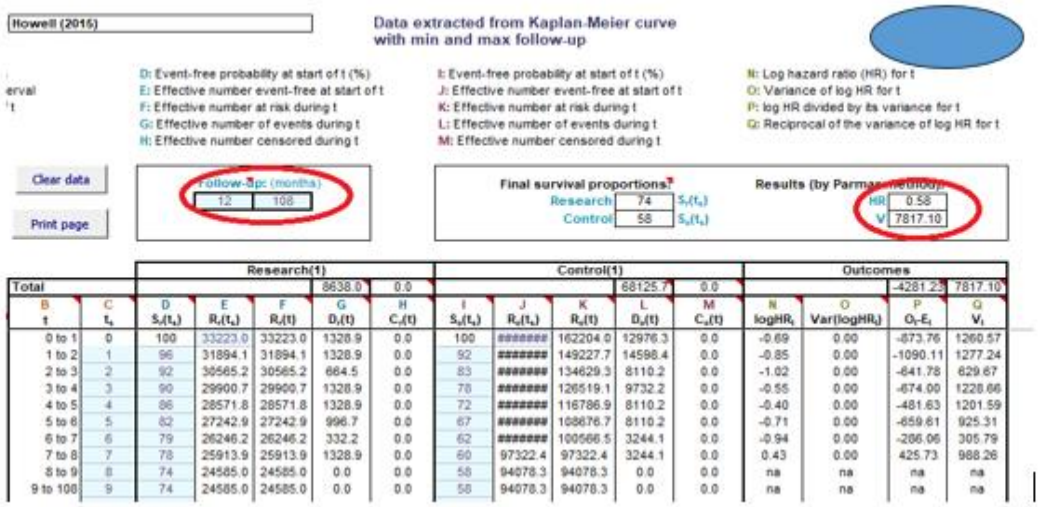


Figure C.8: Left: Constructed version of KM curve generated from the Excel spreadsheet (Tierney et al., 2025): Published KM curve (Reddy and Sasidharan, 2023).



		Research(1)					Control(1)					Outcomes			
Total					8638.0	0.0				68125.7	0.0			-4281.23	7817.10
B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
t	t_0	$S_r(t_0)$	$R_r(t_0)$	$R_r(t)$	$D_r(t)$	$C_r(t)$	$S_c(t_0)$	$R_c(t_0)$	$R_c(t)$	$D_c(t)$	$C_c(t)$	$\log HR_t$	$Var(\log HR_t)$	O_t-E_t	V_t
0 to 1	0	100	33223.0	33223.0	1328.9	0.0	100	#######	162204.0	12976.3	0.0	-0.69	0.00	-873.76	1260.57
1 to 2	1	96	31894.1	31894.1	1328.9	0.0	92	#######	149227.7	14598.4	0.0	-0.85	0.00	-1090.11	1277.24
2 to 3	2	92	30565.2	30565.2	664.5	0.0	83	#######	134629.3	8110.2	0.0	-1.02	0.00	-641.78	629.67
3 to 4	3	90	29900.7	29900.7	1328.9	0.0	78	#######	126519.1	9732.2	0.0	-0.55	0.00	-674.00	1228.66
4 to 5	4	86	28571.8	28571.8	1328.9	0.0	72	#######	116786.9	8110.2	0.0	-0.40	0.00	-481.63	1201.59
5 to 6	5	82	27242.9	27242.9	996.7	0.0	67	#######	108676.7	8110.2	0.0	-0.71	0.00	-659.61	925.31
6 to 7	6	79	26246.2	26246.2	332.2	0.0	62	#######	100566.5	3244.1	0.0	-0.94	0.00	-286.06	305.79
7 to 8	7	78	25913.9	25913.9	1328.9	0.0	60	97322.4	97322.4	3244.1	0.0	0.43	0.00	425.73	988.26
8 to 9	8	74	24585.0	24585.0	0.0	0.0	58	94078.3	94078.3	0.0	0.0	na	na	na	na
9 to 108	9	74	24585.0	24585.0	0.0	0.0	58	94078.3	94078.3	0.0	0.0	na	na	na	na

Figure C.9: Estimation of HR with published KM curve with min and max follow-up (Howell, 2015).

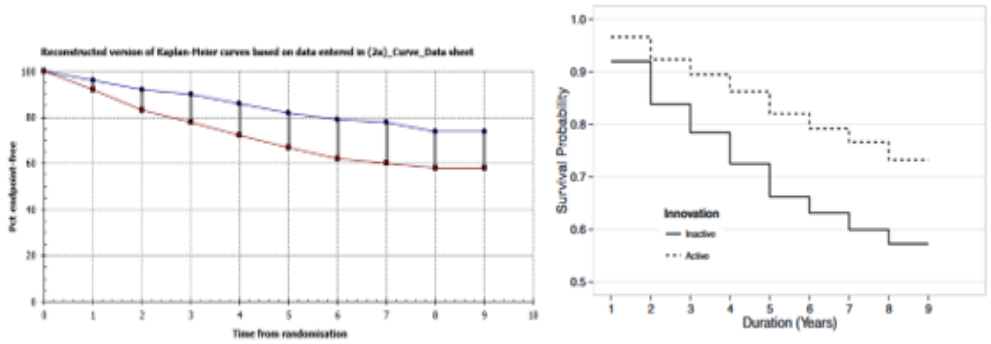


Figure C.10: Left: Constructed version of KM curve generated from the Excel spreadsheet (Tierney et al., 2025): Published KM curve (Howell, 2015).

APPENDIX D

The results of innovation and various firm survival dimensions (from Review Manager 5.4)

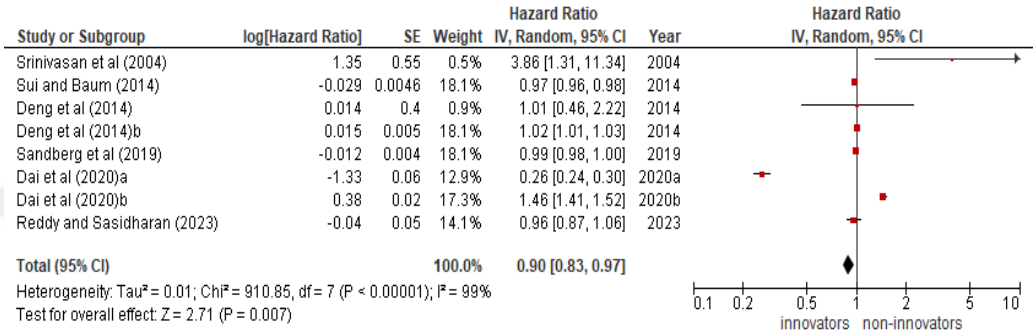


Figure D.1: innovation and market exit (market persistence) (N=8)

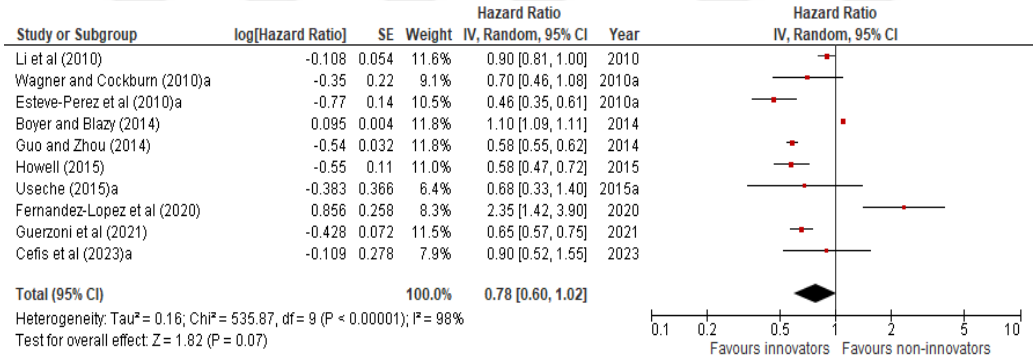


Figure D.2: innovation and firm failure (negative exit) (N=10)

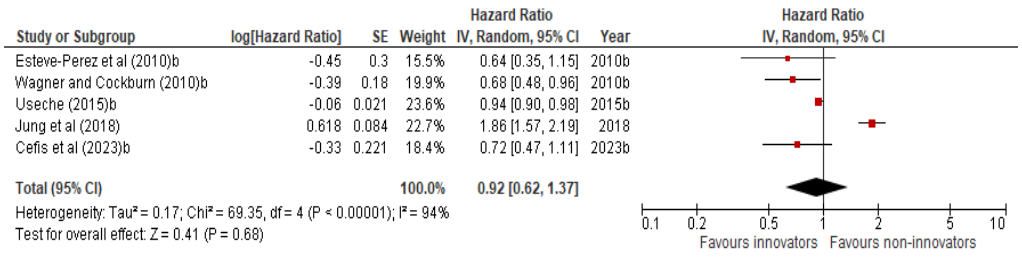


Figure D.3: innovation and M&A (N=5)

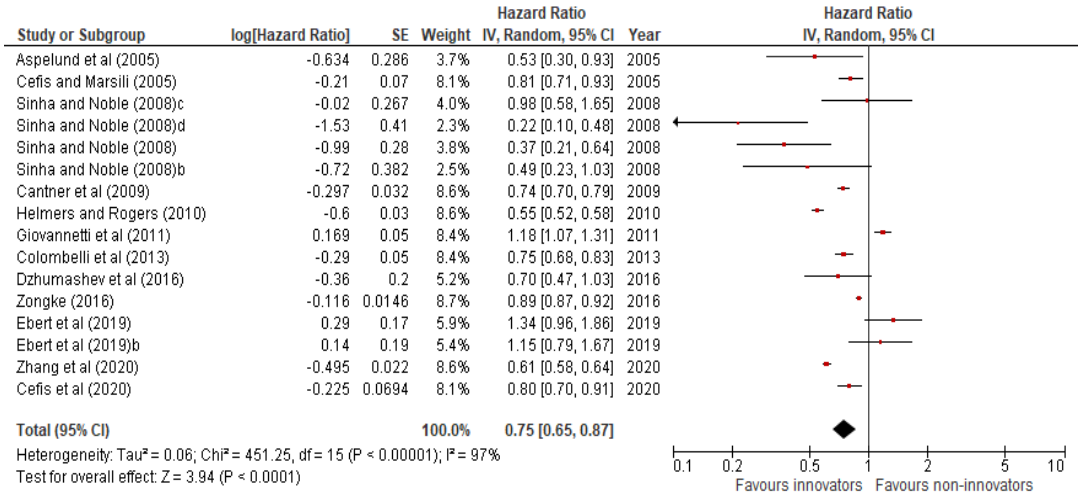


Figure D.4: innovation and pooled exit (N=16)

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- **Hayırlı, T., Alpkan, L. & Yıldız, B.** Innovation and firm survival: a systematic literature review and future research directions. *Review of Managerial Science* (2025). https://doi.org/10.1007/s11846-025-00936-4