

BUSINESS SURVIVAL, A LITERARY REVIEW OF INTERNAL AND EXTERNAL DETERMINANTS*

SUPERVIVENCIA EMPRESARIAL, UNA REVISIÓN DE LITERATURA
SOBRE DETERMINANTES INTERNOS Y EXTERNOS

SOBREVIVÊNCIA EMPRESARIAL, UMA REVISÃO DE LITERATURA
SOBRE DETERMINANTES INTERNOS E EXTERNOS

SURVIE D'ENTREPRISE, UNE REVUE DE LITTÉRATURE SUR LES
DÉTERMINANTS INTERNES ET EXTERNES

YOUSELINE GARAVITO HERNÁNDEZ†
JAVIER FRANCISCO RUEDA GALVIS‡
JOHN WILLIAM VÁSQUEZ CAPACHO§

ABSTRACT

Numerous studies have analyzed the factors that influence the survival of companies, which is why the objective of this article is to review the internal and external determinants from the literature that most influence the permanence over time of companies in the market. Therefore, a descriptive literature review was carried out on the main findings on the positive effects of innovation, level of training in R&D employees, and collaboration between companies, proposing a moderating effect between these factors and business survival.

KEYWORDS:

external and internal determinants, business success, business survival.

JEL CLASSIFICATION:

M10; M14; L10; L25; M10.

* Artículo producto de investigación.

† Ingeniera industrial; doctora en Administración; docente investigadora, Universidad de Investigación y Desarrollo - UDI; Grupo de investigación Porter. ygaravito2@udi.edu.co

‡ Administrador de empresas; doctor en Administración; docente investigador, Universidad de Investigación y Desarrollo - UDI; Grupo de investigación Porter. jrueda31@udi.edu.co

§ Ingeniero electrónico; doctor en Ingeniería; docente investigador, Universidad de Investigación y Desarrollo - UDI; Grupo de investigación Gps. jvasquez@udi.edu.co

RESUMEN

Numerosos estudios han analizado los factores que influyen en la supervivencia de las empresas, razón por la cual el objetivo de este artículo es revisar desde la literatura disciplinar los determinantes internos y externos que más influyen en la permanencia de las empresas en el mercado a través del tiempo. Por tanto, se hizo una revisión descriptiva de literatura acerca de los principales hallazgos sobre los efectos positivos de la innovación, nivel de formación de los empleados de I+D y colaboración entre empresas, proponiendo un efecto moderador entre estos factores y la supervivencia empresarial.

Palabras clave: determinantes internos y externos; éxito empresarial; supervivencia empresarial.

Clasificación JEL: M10; M14; L10; L25; M10.

RESUMO

Muitos estudos analisaram os factores que influenciam a sobrevivência das empresas, razão pela qual o objetivo deste artigo é revisar desde a literatura disciplinar os determinantes internos e externos que mais influenciam a permanência das empresas no mercado através do tempo. Para o efeito, procedeu-se a uma revisão descritiva da literatura sobre as principais descobertas sobre os efeitos positivos da inovação, o nível de formação dos trabalhadores de I&D e a colaboração entre empresas, propondo um efeito moderador entre estes factores e a sobrevivência empresarial.

Palavras-chave: determinantes internos e externos; sobrevivência empresarial; sucesso empresarial.

Classificação JEL: M10; M14; L10; L25; M10.

RESUME

Nombreuses études ont analysé les facteurs qui influencent la survie des entreprises, C'est pourquoi le but de cet article est d'examiner dans la littérature disciplinaire les déterminants internes et externes qui influencent le plus la permanence des entreprises sur le marché au fil du temps. À cette fin, une étude descriptive de la littérature a été réalisée sur les principales conclusions concernant les effets positifs de l'innovation, le niveau de formation des employés de R&D et la

collaboration entre entreprises, en proposant un effet modérateur entre ces facteurs et la survie des entreprises.

Mots clés: déterminants internes et externes, succès des entreprises, survie des entreprises.

Classification JEL: M10; M14; L10; L25; M10.

INTRODUCTION

The present economic crisis facing many countries has led to increasing companies that have closed in recent years (Belda and Cabrer, 2018). In countries of the Organization for Economic Co-operation and Development (OECD) and Latin America, more than half of firms fail in the first five years of life and the first year between 20% and 30% on average of nascent firms to disappear. In the case of Colombia, Confecámaras (2017; 2018) affirms that the survival rate of a new venture is 29.7% and 70% of firms fail in the first five years.

Understanding survival as the situation in which companies have not closed their operations temporarily or permanently, the academic literature recognizes it through the work of Cefis and Marsili (2006); Shiferaw (2009); Cefis and Marsili (2012); Ejermo and Xiao (2014); Zhao and Burt (2018), which is due to the high productivity and efficiency of their processes. In this sense, it is necessary to study factors that may favor the probability of organizational survival in relation to factors such as human capital, company size, seniority, R&D activities, innovation, cooperation, among others in terms of internal and external determinants.

In this order of ideas, the objective of this review article is to expand the study of the determinants of business survival, to serve as research support for future research on this subject. For this, a descriptive literature review was carried out through a systematic and exhaustive analysis of 97 top-level academic articles between years 2000 to 2020, obtaining results and discussions on the impact of internal and external determining factors compared to the business survival.

1 . METHOD APPLIED IN THE RESEARCH

The type of article that was produced arises from a descriptive exploratory study, through which nearly 100 representative documents on the subject were selected in order to update the reader on the most relevant findings based on business survival. To do this, a systematic and exhaustive bibliographic search of original articles that transmit direct information about the research

of different authors was carried out, which serves as a basis for proposing future lines of research.

More than 97 articles from databases such as Scopus, Science Direct, Ebsco and Google Scholar were reviewed under the criterion of representative documents with scientific influence

in academic journals. The research approach focused on reviewing the literature on business survival issues, factors that influence survival internally and externally, as well as determining elements such as human capital, innovation, and R&D, among others. Then, the search equations used are shown in table 1.

Table 1. Search Equations used in literary review.

Search Equations
("SME survival" OR "Small business survival") AND (innovation OR "innovation activities" OR Patents)
("firm survival") AND (Location OR cluster)
(ALL ("business survival") AND NOT ALL (performance OR "competitive businesses"))
(ALL (Resources OR education OR "human capital" OR "resource-based view") AND ("business survival" OR "firm survival"))
("firm survival") AND ("firm growth" OR dynamics of organizational change)
(ALL ("business survival" OR "firm survival") AND ("Social capital" OR "social network" OR Alliances))
"survival factors" OR "business survival"

Source: our own elaboration.

2. RESULTS AND DISCUSSION: DETERMINANTS OF FIRM'S SURVIVAL

Next, the results obtained from different researches that have studied internal and external determinants that influence business survival will be announced. Figure 1 shows that individual-level and firm-level are part of the internal determinants, and on the other hand, location, market, industry, and environment are part of the external determinants.

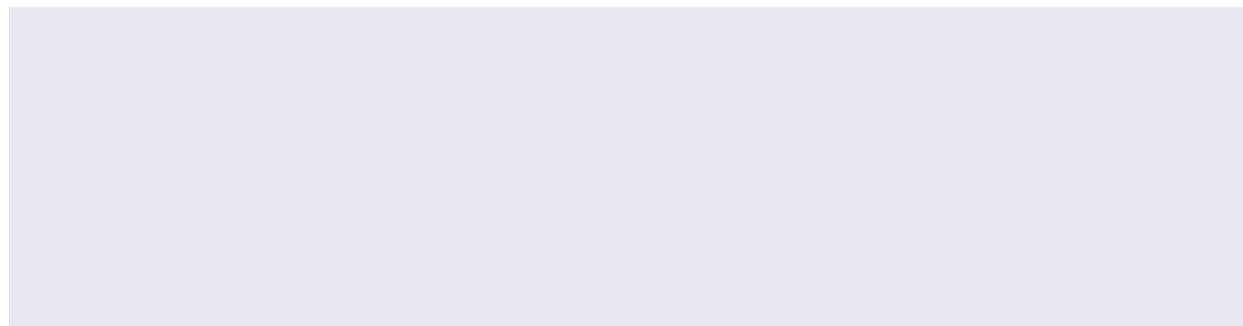
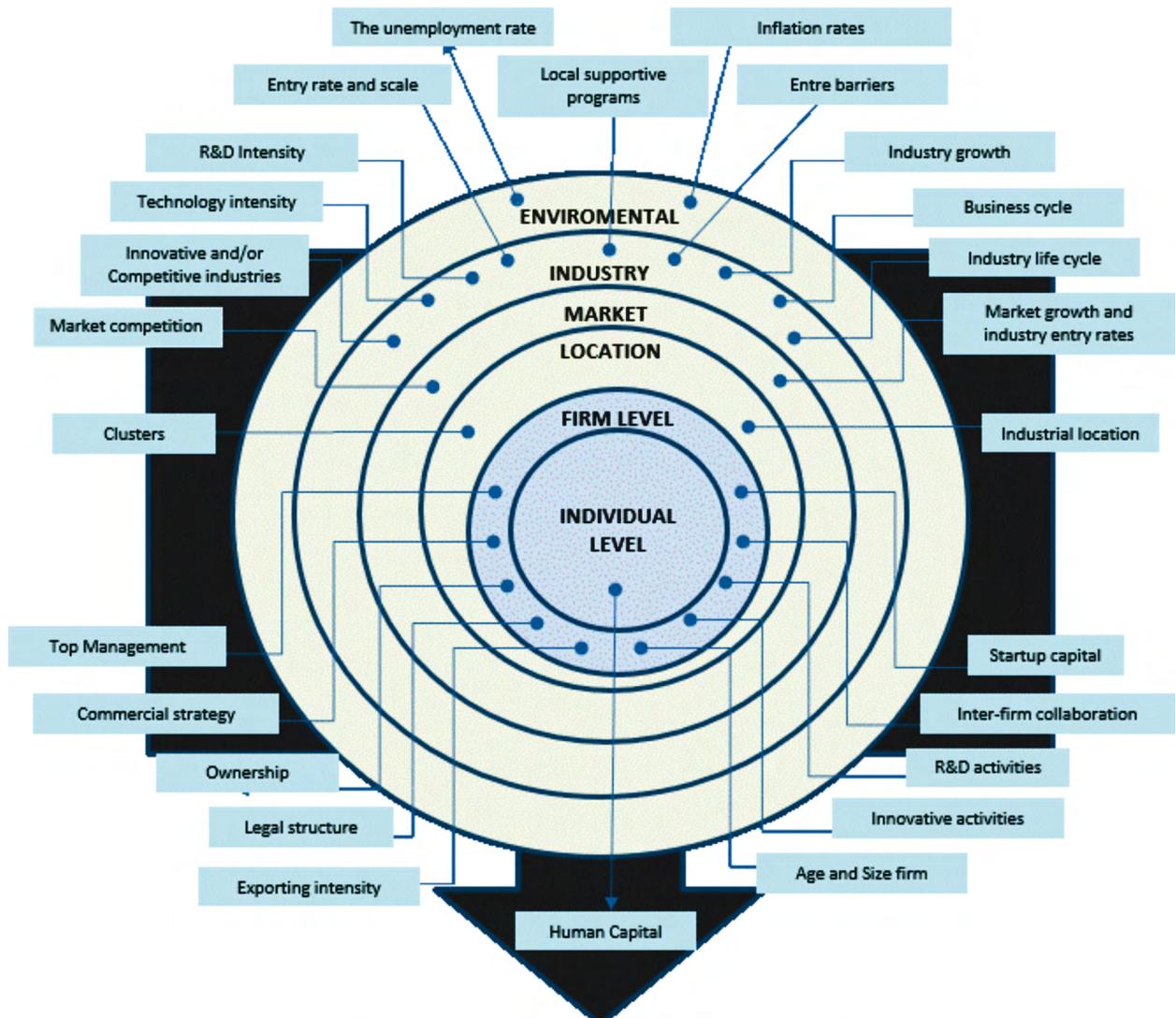


Figure 1. Determinants influencing firms' survival.



Source: our own elaboration.

2.1 INTERNAL DETERMINANTS OF FIRM'S SURVIVAL

In relation to internal determinants, the literature recognizes as the most important factor the level of human capital formation as an intangible asset essential for the survival of companies, because it directly affects their level of performance (Boden and Nucci, 2000; Coleman, *et al.*, 2013). According to the resource-based view (RBV), authors such as Van Praag (2003) and Koçak, *et al.* (2010) recognize that adding to human capital, business experience contributes

significantly to survival; so Bruderl, *et al.* (1992) argue that a greater experience noticeably improves the productivity of the organization, which results in a lower probability of failure, therefore the study by Belda and Cabrer (2018) document the strong relationship between previous experience and survival.

In relation to the variable of education, Coleman, *et al.* (2013) predicted a positive relationship between the highest levels of education and the probability of survival of the company. However, Acs *et al.* (2007) indicates that the independent

... some authors focused their studies on the importance of R&D activities to survival, they found that the performance of firms that make R&D is better than that of firms that neither make nor buy R&D, independently of the innovative intensity of the industry
.. Other studies (...) conclude that buying R&D can place the firm in a very disadvantageous position in a highly innovative industry in which developing firm-specific assets by making R&D seems to be a crucial factor for firm survival ...

entrepreneurs with high levels of training have high failure rates during periods of company growth and low failure rates in periods of recession. Other authors such as Irastorza (2006), Arribas and Vila (2007) consider that human capital contributes to survival when companies are created by two or more entrepreneurs, so the greater the number of founders, the greater the survival time. Likewise, studies conclude that female entrepreneurs have a lower survival rate than men, mainly associated with the level of academic training, especially when the company is developed in high-tech sectors (Boyer and Blazy, 2014; Kato and Honjo, 2015).

At the *firm level*, several authors have studied different determinants, some argue that despite the knowledge provided by *human capital* is relevant to firms' survival, knowledge coming through *inter-firm collaboration* equally influences on survival (Velu, 2015). So, defining the *inter-firm collaboration* as partnership agreements the firm has with different strategic partners such as customers, suppliers, competitors, companies in the same group, and research institutions (González, 2014; Yli-Renko, *et al.*, 2001), so that, inter-firm collaboration has become an important means by which businesses in many industries gain access to the capabilities needed to compete in changing markets.

Recently, some authors conclude that firms that have partnered with different skills and operating in complementary markets would help the focal firm to access new knowledge skills and capabilities, thus leading to superior performance and helping the firm to survive longer (Coad and Guenther, 2013; Acheampong and Hinson, 2019; Xia and Dimov, 2019). Along with its advantages, the collaboration also creates potential problems, including risks of losing proprietary information to a partner and adaptation difficulties imposed by high adjustment costs and the absorption of inter-organizational routine (Amburgey *et al.*, 1993).

Another factor of importance for survival is the *age and size* of organizations, the theoretical

models of firm and industry dynamics lead to failure rates that vary with firm age (Mata and Portugal, 1994; Ericson and Pakes, 1995). Some authors like Agarwal *et al.* (2002); He and Yang (2015) argue that exit rates are expected to decrease as *firms age*, because the learning process may take several years, leading to expect much higher exit rates for a particular cohort in the first few years of its life than for older cohorts also operating in the same market at the same time period, while other studies conclude that the relationship between firm failure and age is an inverted U-shaped relationship (Agarwal *et al.*, 2002; He and Yang, 2015). For example, Esteve and Mañez (2008) suggest that the risk of exit increases up to about 20 years of age, then declines up to 35 to later rise, accelerating beyond 75 years of age.

About *size*, Jovanovic (1982) claims that large firms endure better survival prospects, provides a theory of selection with information consistent with the findings that conclude that smaller firms grow faster and are more likely to fail than large firms. Lately, Gémar *et al.* (2016) support this idea and conclude in their studies that larger firm is more likely to survive than smaller in an example of the hotel industry in the Spanish economy from 1997 to 2009, and for example, Stocker (2019) concludes that the effect of size is not uniform and may be nonlinear.

Continuing with the review of the literature related to internal determinants at the firm level, *legal structure* is another factor associated with business survival, so that Harhoff *et al.* (1998) argue that limited liability corporations are more likely to go bankrupt than unlimited ones. On the other hand, Mata and Portugal (2002) find that unlimited liability firms are more likely to exit than a limited liability, evidencing a lack of unanimity in the literature.

Another determinant is *ownership*, the results in the literature are diverse. For example, Görg and Strobl (2003) conclude that foreign firms are more likely to exit than indigenous plants,

while Mata and Portugal (2002) and Kimura and Fujii (2003) do not report a significant impact of foreign ownership. On the other hand, Esteve and Mañez (2008) argue that the risk of getting out is more than 100% higher for firms whose capital is participated by foreign capital as compared to that faced by non-participated firms, while another group of studies concludes that multi-plant firms have more chances to live longer than single-plant firms and being foreign-owned reduces the propensity to get out (Helmers and Rogers, 2010; Tveterås and Eide, 2000).

In the case of firm survival is *startup capital*, previous studies based on firm survival often highlight the important role played by financial capital (Cooper *et al.*, 1994), so that in the case of new firms, one would anticipate higher levels of financial capital at startup would improve a firm's chances of survival because so they have more time to access additional sources of capital before their startup capital runs out (Liao *et al.*, 2008; Parker and Belghitar, 2006), while startups founded in crisis years use less bank debt and have a higher likelihood of bankruptcy (DeLoof and Vanacker, 2018).

Additionally, some authors focused their studies on the importance of *R&D activities* to survival, they found that the performance of firms that make R&D is better than that of firms that neither make nor buy R&D, independently of the innovative intensity of the industry (Kimura and Fujii, 2003; Pérez *et al.*, 2004; Rueda y Rueda, 2017). Other studies such as Esteve and Mañez (2008) conclude that buying R&D can place the firm in a very disadvantageous position in a highly innovative industry in which developing firm-specific assets by making R&D seems to be a crucial factor for firm survival, while Coleman *et al.* (2013) conclude that R&D activities did not significantly improve the chances of survival because firms are riskier and thus, subject to a higher failure rate.

Therefore, despite the lack of unanimity in the researches, it is recognized that R&D activities

are a fundamental resource to develop new products or processes necessary to firms' survival (Fontana and Nesta, 2009). In this order of ideas, some authors conclude that firms with substantial innovation are less likely to fail (Wagner and Cockburn, 2010). Cefis and Marsili (2005) show that innovation positively affects firm survival, stems mainly from firms investing in process innovation rather than from firms investing in product innovation. For example, Ortega *et al.* (2007) support these results, they find that the introduction of new machinery and/or organizational changes (process innovation) decreases the hazard rate of large firms but does not alter the risk of small firms' failure.

Recently, authors like Hyytinen *et al.* (2015) examined how innovative capabilities influence the decision of a manufacturing firm to get out. Their analysis distinguishes between different types of the get out of the firms: failure, merger, and acquisition (M&A), they find that process innovation reduces the probability of exit by radical restructuring, while product innovation increases the probability of getting out by M&A. In addition, Boring (2015) finds that product-innovative firms that introduce new products into their market, and not only new products for the firms, have a higher probability of merger and acquisition (M&A) than non-innovative firms. He also finds that process-innovative firms have a significantly higher M&A probability than non-innovative firms for the manufacturing sector, it seems that R&D and innovation activities are important for firms' exit through M&A, but have small effects on the exit route through firm closure.

Others studies have shown that radical innovation reduces the chances of firm survival as a result of the increased level of uncertainty (Buddelmeyer *et al.*, 2009) but others have shown that firms that adopt radical innovation are more likely to survive because of higher returns from adoption as a result of gaining a larger market share (Langerak *et al.*, 2009; Sinha and Noble, 2008). On the other hand, having patents or copyright shows

that a firm has a unique resource protected from potential competitors. Studies document a positive relationship between having a patent and the probability of survival (Audretsch and Lehmann, 2005; Wagner and Cockburn, 2010).

For example, Helmers and Rogers (2010) conclude that new firms with at least one patent experience a 13.9% lower probability of exit, while start-ups with at least one trade-mark exhibit a 15.5% lower probability of getting out. Also, when they disaggregate intellectual property (IP) activity into its four components, we find that all types of IP are significantly positively correlated with survival (Ortiz and Sotoca, 2018; Zhang *et al.*, 2018).

Finally, *exporting intensity* is other internal determinants that affect firms' survival, models of heterogeneous firms and international trade predict that exporters are less likely to fail than non-exporters (Bernard *et al.*, 2003; Melitz, 2003). For example, Esteve and Mañez (2008) conclude that export participation extends survival prospects only if exports represent an important proportion of the firm's sales. Also, in relation to other factors such as *Commercial Strategy* and *Top Management*, literature shows that firms that use (low) prices as a competitive strategy have higher hazard rates and management is an important dimension for survival (Manjón and Arauzo, 2008; Gémar *et al.*, 2016; Rueda and Rueda, 2017; Gemar *et al.*, 2019).

2.2 EXTERNAL DETERMINANTS OF FIRM'S SURVIVAL

In relation to *location determinants*, literature recognizes that *industry localization* has influenced to firm's survival, therefore Romer (1990) believes that the concentration of industry within geographical regions facilitates knowledge spillover across firms, and externality within geographical boundaries results in increasing returns. Similarly, Porter (1990) argues that knowledge spillovers in geographically concentrated industries stimulate growth so the

most important technological externalities occur within the industry and regional specialization (Glaeser *et al.*, 1992).

According to the firm's incubation theory, larger agglomerations tend to provide a more favorable breeding ground for a firm's success and this successful experience may spread to nearby locations (Leone and Struyk, 1976). Recently studies conclude that firms in local key industries are less likely to fail, the agglomeration benefits could improve the chance of firm survival (He and Yang, 2015; Renski, 2011), that is why other work shows that it is located near a university that reduces the propensity to exit (Helmers and Rogers, 2010). These studies are consistent with the seminal work of Jacobs (1969), he indicates that a variety of industries and knowledge transfer across geographically proximate industries promotes innovation and growth.

On the other hand, through social and spatial models of competition, Sorenson and Audia (2000) found that geographic concentration contributed to the firm failure, instead of success, for example, some works conclude that higher agglomeration is associated with a higher firm mortality rate (Honjo, 2000; Folta *et al.*, 2006;). Such as Strotmann (2007), who finds that firms located in rural areas have higher chances of survival than those located in urban areas, while Alike *et al.* (2012) find that greater firm density within 1 mile of firms in the same industry increases mortality rates.

Regarding *clusters*, some studies have found that clusters enhance the probability of entry, survival, and growth of new firms (Delgado *et al.*, 2010; Renski, 2011), while Dumais *et al.* (2002) investigated US manufacturing plants to conclude that new firms in strong clusters had higher survival probabilities. Similarly, Koçak, *et al.* (2010) assessed all Swedish firms started during a 10-year period in five different industry groups and found evidence that a high concentration of own cluster employment was related to better chances of survival, while

other studies indicate that location in a cluster decreases the survival chances of US biotech firms (Folta *et al.*, 2006).

Other external factors studied in the literature are *market growth, industry entry rates, and market competition*, where Mata *et al.* (1995) show that market growth was statistically significant when analyzing the survival patterns in different generations of firms founded during seven consecutive years. On the other way, Girma and Gong (2008) find that market competition from foreign firms in the same sector and foreign firms in downstream sectors have a deleterious impact on the survival probability of State-owned enterprises.

In relation to *industry determinants, innovative and/or competitive industries* are other factors that have an influence on the firm's survival, so that diverse authors concluded that firms ubicated in innovative industries are seen as more probable to grow, but also more likely to fail, in comparison with those founded or operating in less innovative business fields. In this order of idea, Audretsch and Mahmood (1995) study over 12,000 US manufacturing firms and find that operating in a highly innovative environment hurts survival prospects. These results are equal to other authors (Agarwal *et al.*, 2002; Cader and Leatherman, 2011).

On the other hand, Segarra and Callejón (2002) noted that technology is very important to the survival of small businesses, because in line with the Schumpeterian market theory, they concluded that SMEs which face the lowest exit probabilities are those that had better technologies (Acheampong and Hinson, 2019). In the case of Ejerimo and Xiao (2014), find that start-ups in high-tech manufacturing industries have lower hazard rates than those in other manufacturing industries.

R&D Intensity like an external determinant that influences the firm's survival, reason for Audretsch

(1995) finds that in industries characterized by a highly innovative environment, competition is higher, which for entrants leads to higher failure rates. However, if firms survive this initial shake-out period, their survival rates are higher than in other industries. Some studies using an output measure (e.g., patent count, trademarks, number of product or process innovations) reported interesting findings that demonstrated whereas patent applications as a measure of high-risk innovation are associated with lower survival rates, trademark applications as a measure of low-risk innovation lead to higher survival rates (Buddelmeyer *et al.*, 2009).

Regarding other industry determinants, like *entry rate and scale*, studies showed that high *entry rates* exert a positive effect on the likelihood of firm failure because it reflects competitiveness and market turbulence in the instance of new (Mata and Portugal, 2002; Segarra and Callejón, 2002). The main arguments in favor of the negative relation between early entry and failure rate are related to the barriers raised by the pioneer in terms of knowledge, scale economies, network structure, reputation, and brand loyalty (Agarwal and Bayus, 2004).

Concerning *entry scale*, literature shows that firms entering industries with a lower minimum efficient scale have higher chances of survival. However, this effect is not significant in high tech industries and for new branches and subsidiaries of existing firms (Strotmann, 2007). On the other hand, low entry barriers and low switching costs make entrepreneurial firms in service sectors more fragile to exit (Bates, 2005; Ejerimo and Xiao, 2014), while Mata and Portugal (1994) concluded that firms live longer in *growing industries* than in declining industries, even controlling for industry turbulence, size, scale, type of entrant, and concentration.

Another factor that affects a firm's survival is the *business cycle*, which is in general higher in the upswings and lower in the downswings,

according to industrial life cycle models, firm survival is also affected by the stage of development of an industry. In the early phases, firm entry and survival likelihood are high (Caves, 1998), but during the mature stages of an industry, shake-out mechanisms lower both entry and survival performance, while firms live longer in growing industries than in declining industries, this effect remains significant after controlling for industry turbulence, size, scale, type of entrant and concentration (Agarwal and Audretsch, 2001; Segarra and Callejón, 2002).

With respect to *environmental factors* such as *unemployment and inflation rates*, Everett and Watson (1998) arguments that a large share of small business failures in their study was associated with these determinants. Complementary, some studies demonstrated that the risk of death decreases in firms founded during times of economic crisis (Fotopoulos and Louri, 2000), and others concluded that firms born under favorable macroeconomic conditions have higher survival rates (Box, 2008).

Due to the lack of unanimity in the investigations, some authors emphasize that primary motivation to start a new venture is a predictor of post-entry profitability and growth. The literature suggests that the risk of unemployment and similar motivations for starting a new business are associated with higher death-risk and lower productivity (Andersson *et al.*, 2001; Andersson and Klepper, 2013).

Finally, consistent with the Organizational Ecology perspective, survival depends on finance, firms with subsidies and banking loans are more likely to survive the coming year, for that reason, local supportive policies can certainly enhance the survival chance of some firms, particularly, they can help older firms to mitigate the impact of competition effects (He and Yang, 2015; Smith *et al.*, 2018; Haynes *et al.*, 2019).

3. RESEARCH FINDINGS

From the review of the academic and disciplinary literature, Table 2 was elaborated, through which the main findings based on the authors and disciplinary approaches that can be considered like more relevant to this topic in the last years.

Table 2. Some academic articles used in the literature review.

Researcher	Sample	Determinants	Main findings
Mata and Portugal (2002)	613 new firms as foreign-owned 593 new domestic firms	Foreign and domestic firms	Being foreign does not decrease the chances of failure.
Cefis and Marsili (2006)	61,177 manufacturing firms	Size firms	The survival probability of young and small firms is comparable to that of old and large firms
Acs et al. (2007)	U.S. firms (Service sector)	Regional human capital, size and diversity	City size and diversity may be an important determinant of new-firm survival.
Arribas and Vila (2007)	237 Spanish firms (Service industry)	Human capital	Specific aspects of human capital that are determinants of a company's survival time are gender, previous work experience in the same activity or as the owner of a firm, and the number of partners. However, educational and training characteristics do not play a relevant role as regards a firm's survival time.
Box (2008)	2200 Swedish firms (Joint-stock firms)	Structural attributes, environmental factors, and market dynamics	Macroeconomic conditions at founding as well as over time-cohort and period effects, respectively-influenced the survival ability of firms.
Esteve and Mañez (2008)	2028 Spanish manufacturing firms	Advertising and R&D activities,	Firms that develop specific assets through advertising and making R&D (independently of the technological intensity of the industry) enjoy better survival prospects.
Fontana and Nesta (2009)	121 firms Local Area Networking (LAN) switch equipment industry (High-tech industry).	Product innovation, location, R&D efforts	Location near the technological frontier is an important determinant of firm survival. Greater R&D efforts increase the probability of surviving; in the event that the firm does exist, however, its R&D efforts do not significantly influence whether it exits via acquisition or exits via liquidation.
Helmers and Rogers (2010)	162,000 Britain firms (Limited companies)	Patents, trade-mark	New firms with at least one patent experience a 13.9% lower probability of exit. Start-ups with at least one trade-mark exhibit a 15.5% lower probability of exit.

Researcher	Sample	Determinants	Main findings
Colombelli and Von Tunzelmann (2011)	74,862 French manufacturing firms	Innovation, cognitive distance, knowledge	Innovation enhances the survival likelihood of firms. In addition, knowledge coherence and variety appear to be positively related to firms' survival, while cognitive distance exerts a negative effect.
Coad and Guenther (2013)	German machine tool manufacturers in the post-war era	'Minor diversification' and 'major diversification'.	Diversification activities reduce the risk of exit in general and to a varying degree at different ages.
Coleman et al. (2013)	Kauffman Firm Survey.	Education, work and life experience and adequate levels of startup financial.	The fundamental resources that contribute to a firm's survival are: education, work, and life experience and adequate levels of startup financial capital.
Boyer and Blazy (2014)	12 771 French start-ups	Personal characteristics, Professional characteristics	The likelihood of survival of innovative enterprises is 10% lower than that of non-innovators. Higher education level is shown to be an advantage (16.71%) to business survival. Likewise, female entrepreneurs have a survival rate lower than those of males
Ejerimo and Xiao (2014)	Swedish new technology-based firms (NTBFs)	Business cycle	NTBFs generally experience a lower hazard rate compared to other entrepreneurial firms. All entrepreneurial firms are sensitive to and follow a pro-cyclical pattern of survival likelihood over the business cycle.
Boring (2015)	985 Norwegian product-innovative firms	Product innovation, processes innovation, patents, registration of design patterns, trademarks, etc.	Product-innovative firms have a higher probability of exit due to merger and acquisition (MandA), but only if they introduce new products into their market.
He and Yang (2015)	Chinese industrial firms	Age, local supports	Older firms are more likely to fail, while firms with governmental supports have more chances to survive.
Hyytinen et al. (2015)	1165 New Finnish startups	Innovation	Innovations are not necessarily associated with survival during the early stages of firm development and entail a more complicated start-up.
Kato and Honjo (2015)	Manufacturing firms founded between 1997 and 2004 in Japan	Human capital	Human capital, measured as educational background, is important in reducing the probability of bankruptcy in high-tech sectors, although it does not help significantly in this regard in low-tech sectors.
Velu (2015)	129 US firms (New firms that launched electronic trading platforms)	Business model Innovation	Partnering with firms that offer complementary assets reduces the survival of new firms as the degree of business model innovation increases.
Gémar et al. (2016)	1033 Spanish firms (Hotel industry)	Location, size	The larger firm is more likely to survive than smaller in an example of the hotel industry in the Spanish economy from 1997 to 2009.

Researcher	Sample	Determinants	Main findings
Rueda y Rueda (2017)	Family business	Customer service	Family businesses recognize Customer Service strategies as one of the factors that contributes the most to achieve business survival and success
Belda and Cabrer-Borrás (2018)	One million workers and pensioners in Spain	Socio-economic factors	Women show a higher survival rate than men. In addition, a high educational level positively influences survival, whilst previous work experience increases the risk of not surviving.
Deloof and Vanacker (2018)	Belgian new business registrations between 2006 and 2009	Start-up financing (bank debt)	Start-ups founded in crisis years useless bank debt and have a higher likelihood of bankruptcy, even after controlling for their creditworthiness.
Ortiz-Villajos and Sotoca (2018)	Two hundred top British firms founded throughout the nineteenth and twentieth centuries.	Innovations, patents registered	The number of patent applications seems to increase the survival probability of the manufacturing firms, but not of the service ones.
Smith et al. (2018)	U.S. Small firms which applied to ATP in 1998 and 2000.	Federal subsidies	This paper's findings suggest that receiving the Advanced Technology Program (ATP) award can have a significant and positive causal effect on firm survival.
Zhang et al. (2018)	14,065 Chinese high-tech_ startups	Size firm, patents, innovation efficiency, and firms' import and export activities	Results suggest that innovation, as measured by patents, can increase the survival rate of Chinese high-tech firms.
Acheampong and Hinson (2019)	Small and medium scale enterprises (SMEs) in Ghana.	Markets and technological resources	Markets and technological resources are significant for the survival of SMEs. Market resource spillovers have a positive effect while technological resource variations have a negative effect.
Gemar et al. (2019)	Spain hotels	Executive management, financial structure	Good management practices are strategically important for resort hotels' survival. Survival is not affected by hotel type or financial
Haynes et al. (2019)	U.S. Small Business Survival after a Natural Disaster Project (SBSD)	Loan guarantees	Family businesses with loans were significantly more likely to survive.
Stocker (2019)	6,547 International Hungarian International New Ventures	Age, size	International New Ventures (INVs) recorded an exceptionally high survival rate after five business years. The effect of size is not uniform and maybe nonlinear.
Xia and Dimov (2019)	155 new biopharmaceutical ventures	Exploration and exploitation alliances	Exploration alliances –with a long-term orientation– make a firm more vulnerable to external shocks. In contrast, exploitation alliances –which underlie short-term performance– enable the firm to sustain external shocks.

Source: our own elaboration.

4. CONCLUSIONS AND IMPLICATIONS FOR FUTURE RESEARCH

Numerous studies in recent years have analyzed the different factors that influence the survival of a firm. In relation to these factors, some authors focus on individual-level such as human capital, another work focuses on firm-level factors such as firm age, size, R&D activities, innovation activities, legal structure, and cooperation partners, among others. Other studies center their views on location level, market level, and industry level factors. Finally, some focus on environmental levels such as the unemployment rate and inflation rates (Cefis and Marsili, 2012; Ejermo and Xiao, 2014; Zhao and Burt, 2018).

Among these factors, the innovation has special attention because the majority of literature argues that it is one of the most important determinants of firm (Slaper et al., 2011; Ganotakis, 2012). For that reason, since the literature recognizes that firms that develop more products further increase the probability of survival (Cefis and Marsili, 2012), this article proposes a research model to identify which factor can maximize the effect of innovation in firm survival.

According to Knowledge-based View (KBV), firms cannot innovate without knowledge, because innovation is the result of the exploitation of this knowledge (Colombelli and Von Tunzelmann, 2011), since human capital and inter-firm collaboration are the most important factors to acquire the knowledge necessary to innovate (Tavassoli and Karlsson, 2015); the objective of this job is to propose propositions to investigate how these factors affect the relationship between innovation and survival.

With respect to human capital, diverse authors show the need to deepen on the effect of high educational level of R&D employees on firm survival (Koçak et al., 2010; Coleman et al.,

2013; Xia and Dimov, 2019); and with respect to inter-firm collaboration, some research claims the need to study the effect of diversity inter-firm collaboration on firm survival (Velu, 2015; Acheampong and Hinson, 2019).

Therefore, this paper proposes research to demonstrate in future: firstly, the positive effect of the high educational level of R&D employees and diversity inter-firm collaboration on firm survival. Second, it shows the moderating effect of each of these factors in the relationship between innovation and firm survival. Thus, the contribution to the literature of this work is to build a new concept in the literature of determinant of firm survival based on the Knowledge-based View (KBV). However, the objective of the paper is theory construction rather than theory testing. So, much work remains to be done in terms of developing a suitable measure to contrast these propositions.

REFERENCES

- Acheampong, G., and Hinson, R. E. (2019). Benefitting from alter resources: network diffusion and SME survival. *Journal of Small Business and Entrepreneurship*, 31(2), 141–158. <https://doi.org/10.1080/08276331.2018.1462620>
- Acs, Z.; Armington, C., and Zhang, T. (2007). The determinants of new-firm survival across regional economies: The role of human capital stock and knowledge spillover. *Papers in Regional Science*, 86(3), 367-391.
- Agarwal, R., and Audretsch, D. (2001). Does entry size matter? The impact of the life cycle and technology on firm survival. *Journal of Industrial Economics*, 49(1), 21-43.
- Agarwal, R., and Bayus, B. (2004). Creating and surviving in new industries. *Business Strategy over the Industry Lifecycle*, 21 (2), 107-130.
- Agarwal, R.; Sarkar, M. B., and Echambadi, R. (2002). The conditioning effect of time on firm survival: An industry life cycle approach.

- Academy of Management Journal*, 45(5), 971-994. <https://doi.org/10.2307/3069325>
- Amburgey, T. L.; Kelly, D., and Barnett, W. P. (1993). Resetting the clock: The dynamics of organizational change and failure. *Administrative Science Quarterly*, 38(1), 51-73.
- Andersson, M., and Klepper, S. (2013). Characteristics and performance of new firms and spinoffs in Sweden. *Industrial and Corporate Change*, 22(1), 245-280.
- Andersson, U.; Forsgren, M., and Holm, U. (2001). Subsidiary embeddedness and competence development in MNCs - A multi-level analysis. *ORGANIZATION STUDIES*, 22(6), 1013-1034. <https://doi.org/10.1177/0170840601226005>
- Arribas, I., and Vila, J. E. (2007). Human capital determinants of the survival of entrepreneurial service firms in Spain. *International Entrepreneurship and Management Journal*, 3(3), 309-322. <https://doi.org/10.1007/s11365-007-0038-z>
- Audretsch, D. (1995). Innovation, growth and survival. *International Journal of Industrial Organization*, 13(4), 441-457.
- Audretsch, D., and Lehmann, E. E. (2005). Mansfield's missing link: The impact of knowledge spillovers on firm growth. In *Essays in Honor of Edwin Mansfield*. <https://doi.org/10.1007/0-387-25022-0>
- Audretsch, D. B., and Mahmood, T. (1995). New firm survival: new results using a hazard function. *The Review of Economics and Statistics*, 97-103.
- Bates, T. (2005). Analysis of young, small firms that have closed: delineating successful from unsuccessful closures. *Journal of Business Venturing*, 20(3), 343-358.
- Belda, P. R., and Cabrer-Borrás, B. (2018). Necessity and opportunity entrepreneurs: survival factors. *International Entrepreneurship and Management Journal*, 14(2), 249-264. <https://doi.org/10.1007/s11365-018-0504-9>
- Bernard, A. B.; Eaton, J.; Jensen, J. B., and Kortum, S. (2003). Plants and productivity in international trade. *American Economic Review*, 93(4), 1268-1290. <https://doi.org/10.1017/CBO9781107415324.004>
- Boden, R., and Nucci, A. (2000). On the survival prospects of men's and women's new business ventures. *Journal of Business Venturing*, 15(4), 347-362.
- 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.
- Box, M. (2008). The death of firms: exploring the effects of environment and birth cohort on firm survival in Sweden. *Small Business Economics*, 31(4), 379-393.
- Boyer, T., and Blazy, R. (2014). 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>
- Bruderl, J.; Preisendorfer, P., and Ziegler, R. (1992). Survival Chances of Newly Founded Business Organizations. *American Sociological Review*, 57(2), 227-242. <https://doi.org/10.2307/2096207>
- Buddelmeyer, H.; Jensen, P. H., and Webster, E. (2009). Innovation and the determinants of company survival. *Oxford Economic Papers*, 62(2), 261-285.
- Cader, H. A., and Leatherman, J. C. (2011). Small business survival and sample selection bias. *Small Business Economics*, 37(2), 155-165.
- Caves, R. E. (1998). Industrial New Organization and the of Findings on Mobility Firms. *Journal of Economic Literature*, 36(4), 1947-1982.
- Cefis, E., and Marsili, O. (2005). A matter of life and death: innovation and firm survival.

- Industrial and Corporate Change*, 14(6), 1167-1192.
- Cefis, E., and 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., and Marsili, O. (2012). Going, going, gone. Exit forms and the innovative capabilities of firms. *Research Policy*, 41(5), 795-807.
- Coad, A., and Guenther, C. (2013). Diversification patterns and survival as firms mature. *Small Business Economics*, 41(3), 633-649.
- Coleman, S.: Cotei, C., and Farhat, J. (2013). A resource-based view of new firm survival: New perspectives on the role of industry and exit route. *Journal of Developmental Entrepreneurship*, 18(1), 1-25. <https://doi.org/10.1142/S1084946713500027>
- Colombelli, A., and Von Tunzelmann, N. (2011). The persistence of innovation and path dependence. *Handbook on the Economic Complexity of Technological Change*, 105-119.
- Confecámaras: Red de Cámaras de Comercio (2017). Determinantes de la supervivencia empresarial en Colombia. In *Cuadernos de análisis económico*. Retrieved from http://www.confecamaras.org.co/phocadownload/Cuadernos_de_analisis_economico/Cuaderno_de_Analisis_Economico_N_14.pdf
- Confecámaras: Red de Cámaras de Comercio (2018). Nuevos Hallazgos de la Supervivencia y Crecimiento de las Empresas en Colombia. In *Reportes Económicos*. Retrieved from http://www.confecamaras.org.co/phocadownload/2018/Cuadernos_Analisis_Economico/Cuaderno_demografia_empresarial/Cartilla17.pdf
- Cooper, A. C.: Gimeno Gascon, F. J., and Woo, C. Y. (1994). Initial human and financial capital as predictors of new venture performance. *Journal of Business Venturing*, 9(5), 371-395.
- De Silva, D. G., and McComb, R. P. (2012). Geographic concentration and high-tech firm survival. *Regional Science and Urban Economics*, 42(4), 691-701.
- Delgado, M.: Porter, M. E., and Stern, S. (2010). Clusters and entrepreneurship. *Journal of Economic Geography*, 10(4), 495-518.
- Deloof, M., and Vanacker, T. (2018). The recent financial crisis, start-up financing and survival. *Journal of Business Finance and Accounting*, 45(7-8), 928-951. <https://doi.org/10.1111/jbfa.12319>
- Dumais, G. ; Ellison, G., and Glaeser, E. L. (2002). Geographic concentration as a dynamic process. *Review of Economics and Statistics*, 84(2), 193-204.
- Ejerimo, O., and Xiao, J. (2014). Entrepreneurship and survival over the business cycle: how do new technology-based firms differ? *Small Business Economics*, 43(2), 411-426.
- Ericson, R., and Pakes, A. (1995). Markov-Perfect Industry Dynamics: A Framework for Empirical Work. *The Review of Economic Studies*, 62(1), 53-82. <https://doi.org/10.2307/2297841>
- Esteve, S., and Mañez, J. A. (2008). The resource-based theory of the firm and firm survival. *Small Business Economics*, 30(3), 231-249.
- Everett, J., and Watson, J. (1998). Small Business Failure and External Risk Factors. *Small Business Economics*, 11(4), 371-390. <https://doi.org/10.1023/A:1008065527282>
- Folta, T. B.; Cooper, A. C., and Baik, Y. S. (2006). Geographic cluster size and firm performance. *Journal of Business Venturing*, 21(2), 217-242.
- Fontana, R., and Nesta, L. (2009). Product innovation and survival in a high-tech industry. *Review of Industrial Organization*, 34(4), 287-306.
- Fotopoulos, G., and Louri, H. (2000). Location and Survival of New Entry. *Small Business Economics*, 14(4), 311-321. <https://doi.org/10.1023/A:1008180522759>

- Ganotakis, P. (2012). Founders' human capital and the performance of UK new technology-based firms. *Small Business Economics*, 39(2), 495-515.
- Gémar, G.; Moniche, L., and Morales, A. J. (2016). Survival analysis of the Spanish hotel industry. *Tourism Management*, 54, 428-438.
- Gemar, G.; Soler, I. P., and Guzman Parra, V. F. (2019). Predicting bankruptcy in resort hotels: a survival analysis. *International Journal of Contemporary Hospitality Management*, 31(4), 1546-1566.
- Girma, S., and Gong, Y. (2008). Putting people first? Chinese state-owned enterprises' adjustment to globalisation. *International Journal of Industrial Organization*, 26(2), 573-585.
- Glaeser, E. L.; Kallal, H. D.; Scheinkman, J. A., and Shleifer, A. (1992). Growth in cities. *Journal of Political Economy*, 100(6), 1126-1152.
- González, G. (2014). Efectos de la cooperación sobre el desarrollo de innovaciones organizativas. *Economía Industrial*, (391), 77-86.
- Görg, H., and Strobl, E. (2003). Multinational companies, technology spillovers and plant survival. *Scandinavian Journal of Economics*, 105(4), 581-595.
- Harhoff, D.; Stahl, K., and Woywode, M. (1998). Legal form, growth and exit of West German firms —empirical results for manufacturing, construction, trade and service industries. *The Journal of Industrial Economics*, 46(4), 453-488.
- Haynes, G. W.; Danes, S. M.; Schrank, H. L., and Lee, Y. (2019). Survival and success of family-owned small businesses after hurricane Katrina: Impact of disaster assistance and adaptive capacity. *Journal of Contingencies and Crisis Management*, 27(2), 130-144.
- He, C., and Yang, R. (2015). Determinants of Firm Failure: Empirical Evidence from China. *Growth and Change*, 47(1), 72-92.
- Helmets, C., and Rogers, M. (2010). Innovation and the Survival of New Firms in the UK. *Review of Industrial Organization*, 36(3), 227-248.
- Honjo, Y. (2000). Business failure of new software firms. *Applied Economics Letters*, 7(9), 575-579. <https://doi.org/10.1080/13504850050059032>
- Hyytinen, A.; Pajarinen, M., and Rouvinen, P. (2015). Does innovativeness reduce startup survival rates? *Journal of Business Venturing*, 30(4), 564-581.
- Irastorza, N. (2006). *The liability of foreignness: Survival differences between foreign and native-owned firms in the Basque Country*. Vancouver Centre of Excellence.
- Jacobs, J. (1969). Strategies for helping cities. *The American Economic Review*, 59(4), 652-656.
- Jovanovic, B. (1982). Selection and Evolution of Industry. *Econometrica*, 50(1), 649-670.
- Kato, M., and Honjo, Y. (2015). Entrepreneurial human capital and the survival of new firms in high-and low-tech sectors. *Journal of Evolutionary Economics*, 25(5), 925-957.
- Kimura, F., and Fujii, T. (2003). Globalizing activities and the rate of survival: Panel data analysis on Japanese firms. *Journal of the Japanese and International Economies*, 17(4), 538-560.
- Klepper, S. (1996). Entry, Exit, Growth, and Innovation over the Product Life Cycle. *American Economic Review*, 86(3), 562-583. <https://doi.org/10.2307/2118212>
- Koçak, A.; Morris, M. H.; Buttar, H. M., and Cifci, S. (2010). Entrepreneurial exit and reentry: an exploratory study of Turkish entrepreneurs. *Journal of Developmental Entrepreneurship*, 15(04), 439-459.
- Langerak, F.; Rijdsdijk, S., and Ditttrich, K. (2009). Development time and new product sales: A contingency analysis of product innovativeness and price. *Marketing Letters*, 20(4), 399-413.

- Leone, R. A., and Struyk, R. (1976). The incubator hypothesis: evidence from five SMSAs. *Urban Studies*, 13(3), 325-331.
- Liao, J. J.; Welsch, H., and Moutray, C. (2008). Start-up resources and entrepreneurial discontinuance: The case of nascent entrepreneurs. *Journal of Small Business Strategy*, 19(2), 1-16.
- Manjón Antolín, M. C., and Arauzo Carod, J. M. (2008). Firm survival: methods and evidence. *Empirica*, 35(1), 1-24.
- Mata, J., and Portugal, P. (1994). Life duration of new firms. *The Journal of Industrial Economics*, 42, 227-245.
- Mata, J., and Portugal, P. (2002). The survival of new domestic and foreign-owned firms. *Strategic Management Journal*, 23(4), 323-343. <https://doi.org/10.1002/smj.217>
- Mata, J.; Portugal, P., and Guimaraes, P. (1995). The survival of new plants: Start-up conditions and post-entry evolution. *International Journal of Industrial Organization*, 13(4), 459-481.
- Melitz, M. J. (2003). The impact of trade on intra-industry reallocations and aggregate industry productivity. *Econometrica*, 71(6), 1695-1725.
- Ortega Argilés, R., and Moreno, R. (2007). *The survival chances of competitive businesses* (E. Elga, Cheltenham, and Forthcoming, Eds.)
- Ortiz-Villajos, J. M., and 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>
- Parker, S. C., and Belghitar, Y. (2006). What happens to nascent entrepreneurs? An econometric analysis of the PSED. *Small Business Economics*, 27(1), 81-101. <https://doi.org/10.1007/s11187-006-9003-4>
- Pérez, S. E.; Sanchis, A., and Sanchis, J. (2004). The determinants of survival of Spanish manufacturing firms. *Review of Industrial Organization*, 25(3), 251-273.
- Porter, M. E. (1990). *The competitive advantage of nations: with a new introduction*. New York: The Free Press.
- Renski, H. (2011). External economies of localization, urbanization and industrial diversity and new firm survival. *Papers in Regional Science*, 90(3), 473-502.
- Romer, P. M. (1990). Endogenous technological change. *Journal of Political Economy*, 98(5, Part 2), S71-S102.
- Rueda, J. F. y Rueda, M. A. (2017). Modelo econométrico de gestión exitosa para la empresa familiar colombiana. *Revista Finanzas y Política Económica*. 9(2), 319-344.
- Segarra, A., and Callejón, M. (2002). New firms' survival and market turbulence: New evidence from Spain. *Review of Industrial Organization*, 20(1), 1-14. <https://doi.org/10.1023/A:1013309928700>
- Shiferaw, A. (2009). Survival of Private Sector Manufacturing Establishments in Africa: The Role of Productivity and Ownership. In *World Development* (Vol. 37). <https://doi.org/10.1016/j.worlddev.2008.08.004>
- Sinha, R. K., and Noble, C. H. (2008). The adoption of radical manufacturing technologies and firm survival. *Strategic Management Journal*, 29(9), 943-962.
- Slaper, T. F.; Hart, N. R.; Hall, T. J., and Thompson, M. F. (2011). The index of innovation: A new tool for regional analysis. *Economic Development Quarterly*, 25(1), 36-53. <https://doi.org/10.1177/0891242410387592>
- Smith, D.; Feldman, M., and Anderson, G. (2018). The longer-term effects of federal subsidies on firm survival: evidence from the advanced technology program. *Journal of Technology Transfer*, 43(3), 593-614. <https://doi.org/10.1007/s10961-017-9633-5>
- Sorenson, O., and Audia, P. G. (2000). The social structure of entrepreneurial activity: Geographic concentration of footwear production in the

- United States, 1940-1989. *American Journal of Sociology*, 106(2), 424-462. <https://doi.org/10.1086/316962>
- Stocker, M. (2019). Survival, growth, and performance of Hungarian international new ventures. *Society and Economy*, 41(1), 47-64. <https://doi.org/10.1556/204.2019.41.1.4>
- Strotmann, H. (2007). Entrepreneurial survival. *Small Business Economics*, 28(1), 87-104. <https://doi.org/10.1007/s11187-005-8859-z>
- Tavassoli, S., and Karlsson, C. (2015). Persistence of various types of innovation analyzed and explained. *Research Policy*, 44(10), 1887-1901.
- Tveterås, R., and Eide, G. E. (2000). Survival of New Plants in Different Industry Environments in Norwegian Manufacturing: A Semi-Proportional Cox Model Approach. *Small Business Economics*, 14(1), 65-82.
- Van Praag, C. M. (2003). Business survival and success of young small business owners. *Small Business Economics*, 21(1), 1-17.
- Velu, C. (2015). Business model innovation and third-party alliance on the survival of new firms. *Technovation*, 35(0), 1-11.
- Wagner, S., and 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>
- Wennberg, K., and Lindqvist, G. (2010). The effect of clusters on the survival and performance of new firms. *Small Business Economics*, 34(3), 221-241.
- Xia, T., and Dimov, D. (2019). Alliances and Survival of New Biopharmaceutical Ventures in the Wake of the Global Financial Crisis. *Journal of Small Business Management*, 57(2), 362-385. <https://doi.org/10.1111/jsbm.12331>
- Yli-Renko, H.; Autio, E., and Sapienza, H. J. (2001). Social capital, knowledge acquisition, and knowledge exploitation in young technology-based firms. *Strategic Management Journal*, 22(6-7), 587-613. <https://doi.org/10.1002/smj.183>
- Zhang, D.; Zheng, W., and Ning, L. (2018). Does innovation facilitate firm survival? Evidence from Chinese high-tech firms. *Economic Modelling*, 75(1), 458-468.
- Zhao, C., and Burt, R. S. (2018). A note on business survival and social network. *Management and Organization Review*, 14(2), 377-394. <https://doi.org/10.1017/mor.2018.12>