

# How Entrepreneur Competency Impacted Startup Survival During the COVID-19 Pandemic: The Mediating Role of Business Performance

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## Abstract

The COVID-19 pandemic not only posed an enormous human crisis, but also had a profound impact on firms' survival. Social distancing and global lockdown measures designed to protect human lives have paradoxically impaired the business environment. As a result, firms that sought to gain competitive advantage by leveraging external resources were cut off from the external world and faced unexpected challenges.

Under these circumstances, researches were conducted in the early stage of the pandemic to explore how certain firms survived while others fell, but they were limited to re-examining business performance using traditional financial factors. However, this study aims to investigate the role of entrepreneurs' competency in crisis situations from the Resource-Based View (RBV), as such competency plays an important role in improving business performance and subsequently the probability of startups' survival. Specifically, we evaluated the performance as of end of 2019 of 1,127 startups evaluated by the Korea Technology Finance Corporation (KOTEC), which provides policy financing based on technology assessment, in 2016. We then conducted an empirical study to determine the mediating role of business performance in the relationship between entrepreneurial competencies and firm survival by verifying how many of the sample firms were still in operation at the end of June 2023, when the Korean government declared COVID-19 as an endemic. For this purpose, we defined technological, financial, and marketing competencies as the sub-factors of entrepreneurial competency, and sales growth rate and employment growth rate as the sub-factors of business performance.

The results of the empirical analysis showed that technological and financial competencies of the entrepreneur had a positive impact on both business performance and firm survival, and that sales growth rate and employment growth rate mediated the relationship between technological competence and firm survival. However, the positive influence of entrepreneurs' financial competence of the survival of startups was only evident through the growth of employment. This study is the first study in South Korea to define the survival factors of startups in the context of the COVID-19 pandemic, and is expected to contribute to the theoretical and practical discussions on the importance of entrepreneurs' competency as a firms' survival factor based on RBV.

*Keywords: Technological competence, Financial competence, Marketing competence, Business performance, Firm survival*

## 1. Introduction

SMEs are prone to failure and are most affected by

socioeconomic crises(Latham, 2009). This may be due to lack of financial resources(Domac & Ferri, 1999) or limited technological competence(Beck et al., 2005). Such deficiencies pose threats directly to the survival of startups, which were once considered

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a source of innovation, jobs, and new vitality(Ro et al., 2021). The COVID-19 pandemic created a survival crisis for startups facing financial challenges around the world(Wenzel et al., 2020), making survival their most critical goal, and created a unique context in which these companies have to rely on internal and external resources for their survival and growth(Benton et al., 2022; Klöckner et al., 2023). As a result, startups had to try harder than ever to efficiently utilize any available resources and secure competitive advantages in order to survive.

Historically, competitive firms tended to turn to the outside to replenish the insufficient internal resources(Day, 1999), and sought to acquire complementary and valuable core resources through business networks(Barney, 1991). However, due to social distancing or lockdown policies of respective countries to control the spread of the infectious disease, acquisition of resources through business networks has been disrupted, and firms were required to develop survival strategies based on their internal resources.

The survival rate of Korean startups as of 2020 was 64.8% after 1 year, 44.3% after 3 years, and 33.8% after 5 years (Statistics Korea, 2023), which was lower than the overall average survival rate of EU startups, which was 82.1%, 58.5%, 46.1%, respectively, after 1, 3 and 5 years(Eurostat, 2023). This underscores the need for multifaceted research efforts to enhance the survival rate of Korean startups to match their global counterparts.

Against such backdrop, this study focused on entrepreneurs' competency which is often considered as one of the core resources of a firm. The purpose of this study is to find out what internal resources are needed to overcome the rapidly changing external environment and the limited external resources, and whether entrepreneurial competency as a human resource is a factor that can improve business performance and ensure the survival of the firm.

To this end, we examined the relationship between entrepreneur competency and the survival of startups during the COVID-19 pandemic, by applying the Resource-Based View (RBV), and its relationship with business performance.

The probability of a firm's survival increases in proportion to the amount of resources it possesses(Dutta et al., 1999). The resource-based view, which asserts that a firm's distinctive resources form the cornerstone of its competitive advantage, has empirically substantiated the positive impact of these resources on organizational performance and survival(Hunt & Morgan, 1995; Cefis & Marsili, 2005; Esteve-Pérez & Mañez-Castillejo, 2008; Geroski et al., 2010; Yang et al., 2017). However, most researches on firm performance from a resource-based view were centered on surviving firms(Hitt & Ireland, 1984; Chandler &

Hanks, 1994; Barney et al., 2001; Andreou et al., 2017; Kim et al., 2023), leading to such limitations as survival bias in objective performance measures. Similarly, studies on firm survival have primarily concentrated on the simple relationship between firm resources and survival(Westhead et al., 2001; Coleman et al., 2013; Yang et al., 2017; Kim & Kim, 2022). In addition, while most previous studies have identified a positive relationship between entrepreneurs' competency and business performance(Zahra, 1991; Chandler & Jansen, 1992; Smith & Morse, 2005; Lee et al., 2020), they have largely been limited to cross-sectional analyses and have not been extended to demonstrate conclusively whether business performance actually leads to startup survival.

Numerous previous researches have established the direct causal relationship between business performance and firm survival; this study aims to expand on those researches and demonstrate the mediating role of business performance between entrepreneurial competencies and firm survival. In addition, in line with the recent trend of studies focusing on firm survival under the pandemic environment, we hope that this study will contribute to expanding the theoretical base and providing valuable insights to startups from a resource-based view. Specifically, the study focused on 1,127 Korean startups with five or less years of history that were evaluated in 2016 by the Korea Technology Finance Corporation (KOTEC). KOTEC is a government agency in South Korea that supports small and medium-sized enterprises (SMEs) and venture companies with technological expertise. KOTEC provides financial guarantees and investments to these companies to help them develop and commercialize their technologies.

After examining the relationship between entrepreneur competency and business performance of these firms as of the end of 2019, we explored which of those firms were still in operation as of the end of June 2023, when the pandemic ended in South Korea, in order to confirm the relationship between the entrepreneur's competency, business performance, and startup's survival. The data from the KOTEC utilized in this study adds distinctive value to this work, as it is public data that has been collected and evaluated objectively by technology evaluation experts, and this is the first study in South Korea to research the relationship between entrepreneur competency and firm survival in the context of COVID-19 in a multi-dimensional manner.

## II. Theoretical background and hypotheses development

### 2.1. Resource-Based View (RBV) and entrepreneur competency

Originating from Penrose(1959), the RBV posits that a firm's competitive edge is intrinsically tied to its resource endowment. This paradigm has fostered extensive researches into the nexus between a firm's resources and its growth, survival, and innovation capabilities.

The resources possessed by entrepreneurs are often internalized as valuable organizational resources(Neher, 1999). Because they enable the firm to change and respond to new opportunities or threats(Penrose, 1959; Barney, 1991), entrepreneur's competency can contribute to improving business performance(Chandler & Jansen, 1992) and function as an important resource for the firm's survival(Chang, 2006).

Tehseen & Ramayah(2015) underscored entrepreneurs' knowledge and skills as pivotal and scarce resources in nascent firms. Dollinger(1995) identified borrowing capacity as a key financial resource. Theodosiou et al.(2012) posited that early-stage firms disproportionately rely on entrepreneurs' marketing competence, attributed to nascent marketing structures and limited organizational resources. Consequently, many researchers have focused on entrepreneur competency, and have defined and studied them from different perspectives. Based on this evidence, this study endeavors to elucidate the relationship between startups' performance and survival by breaking down entrepreneurs' competencies into three categories: technological, financial, and marketing.

### 2.2. Business performance

Financial indicators are effective means to present management performance in quantifiable numbers(Venkatraman & Ramanujam, 1986), and they are the most common and objective indicators used in many fields that study business performance(Hofer, 1983). On the other hand, Govindarajan & Fisher(1990) argued that financial performance indicators do not fully reflect corporate performance and are not the best indicators to evaluate management strategies. As a result, Baum et al.(2001) utilized employee growth rate as a non-financial performance indicators other than sales and profits, and Vincent & Zakkariya(2021) broke down startup performance into financial and non-financial performance.

Therefore, referring to Peng et al.(2018), who emphasized that firm growth is essential for long-term survival, this study uses sales growth and employment growth, which are most frequently used to quantify how much a firm has grown, as measures of business performance.

### 2.3. Firm survival studies

A firm's stakeholders are the owners of its resources, and the firm may rely on its stakeholders' resources to survive(Derry, 2012). Therefore, the failure of a firm may incur huge direct and indirect social costs due to its association with multiple stakeholders(Carter & Auker, 2006), and this is one of the reasons many researchers are devoted to find out what helps firms survive.

As such, the study of firm survival has been an ongoing area of interest for researchers, who have viewed survival as an indicator of a firm's success(Cochran, 1981; Ibrahim & Goodwin, 1986). The dominant view is that firm survival research began to be applied to the field of business administration in the 1980s by Carroll & Delacroix(1982), and in Korea, it has been in full swing since the late 1990s, when attention was focused on SME failures in the wake of the financial crisis in 1997(Kang & Han, 2019).

Researches on firm survival are categorized into three types according to the research method: first, research on firm survival factors(Mata et al., 1995; Korunka et al., 2010; Bhimani et al., 2014; Hutami & Sari, 2022); second, research on survival analysis that estimates the probability of survival using duration of survival as a time variable(Audretsch & Mahmood, 1995; Chen, 2002; Fuertes-Callén et al., 2022; Honoré, 2022); and third, research on survival or failure using models(Martin, 1977; Ohlson, 1980; Alfaro et al., 2008; Li, 2012; Orabi, 2014).

On the other hand, we can categorize firm survival studies according to phases of evolution differentiated by research variables. Early firm survival studies recognized financial distress as one of the predictors of firm survival, and quantitative factor-based studies(Martin, 1977; Ohlson, 1980; Alfaro et al., 2008; Li, 2012; Fuertes-Callén et al., 2022) utilized relatively easily accessible financial data as research variables. However, since then, due to the emergence of innovative firms, such as venture firms whose survival cannot be fully explained by financial data alone, researchers have been actively attempting to identify survival factors through qualitative factors(Dunne et al., 1989; Mata et al., 1995; Altman et al., 2010; Bhimani et al., 2014; Honoré, 2022) to complement quantitative factor research.

In addition, some researchers categorized firm survival studies

into two groups, depending on the use of external or internal factors(Del Sarto et al., 2021). The first group deals with external factors, mainly environmental factors(Highfield & Smiley, 1987; Tavassoli & Carbonara, 2014). Highfield & Smiley(1987) were the first researchers who tried to explain firm survival through external factors such as slow macroeconomic growth, low interest rates, and high unemployment. The second group dealt with internal factors, mainly the personal characteristics of the founder and the founding team(Cooper et al., 1994; Sarasvathy et al., 2013; Del Sarto et al., 2021).

Likewise, studies on firm survival have been theoretically extended by previous researchers. However, as mentioned above, most of the models used in such studies have limitations as they deal with the direct causal relationship between study variables and firm survival. Therefore, multidimensional studies that deploy moderating variables or mediators are required as well as studies that identify structural relationships. Against this backdrop, this study aims to determine whether business performance (sales growth rate, employment growth rate), which has been proved to be important through previous studies, affects firm survival through the mediation of the antecedent factor; entrepreneur competence. The endeavor to identify the causal relationship between these variables is a clear distinction from previous studies, and we intend to add depth to the researches on firm survival.

### 2.3.1. Firm survival studies in the COVID-19 pandemic crisis

The COVID-19 pandemic was a global health crisis that began in China in late 2019(WHO, 2020), and South Korea officially announced it as an endemic disease on May 31, 2023, after the first case was confirmed in January 2020(Korea Disease Control and Prevention Agency, 2023).

While the pandemic caused a massive loss of lives and health crisis, it has also had a significant impact on economies and businesses around the world. In particular, the response measures taken by governments to overcome the health crisis, such as social distancing and lockdown policies, have paradoxically curtailed the production, operations, and sales of businesses, as well as their global supply chains, threatening their survival(Hasanat et al., 2020; Li et al., 2022).

Prior to the pandemic, researches suggested that SMEs were most affected by the economic crisis(Robbins & Pearce II, 1993; Latham, 2009) and are more prone to failure(Michael & Robbins, 1998). Researchers have attributed this failure to a lack of financial resources and high operational capital costs(Domac & Ferri, 1999). In response to the COVID-19 pandemic,

governments have adopted supportive policies(Ahmed et al., 2020) to address the crisis to help SMEs cope with the crisis(Song et al., 2020).

The threat of the pandemic has been relieved, but more researches need to be proactively conducted to understand and improve the probabilities of firm survival in the face of another potential crisis. Although the study of firm survival under the conditions of the COVID-19 pandemic is still in its infancy, a variety of factors drive the need to explore it(Salunkhe et al., 2023). Initial studies conducted in the midst of the COVID-19 pandemic have focused on utilizing theoretically validated financial data to quickly diagnose the extent of the contraction in business performance(Li, 2021; Hu & Zhang, 2021; Cho & Saki, 2022). However, they are not immune to survivorship bias as they only targeted surviving firms.

In this context, Miyakawa et al.(2021) attempted to investigate the traditional view that an increase in sales growth is significant for firm survival in the COVID-19 pandemic crisis. Bartlett & Morse(2020) and Didier et al.(2021), respectively, emphasized the relationship with the firm's external environment by finding that coordinated payments to stakeholders and government subsidies to SMEs are important for firms' survival, while other studies have also emphasized the importance of SMEs' innovation practice(Adam & Alarifi, 2021), business strategy(Islam & Fatema, 2023), innovation(Utomo, 2020; Salunkhe et al., 2023), entrepreneurial resilience(Purnomo et al., 2021), and digital technology utilization(Guo et al., 2020; Winarsih et al., 2020; Lau, 2020), improvisational behavior(Shan et al., 2023), and a variety of other firm-specific factors.

On the other hand, the progress in South Korea has been somewhat slow. Similar to the initial flow of international research, research on the factors affecting business performance(Kwak et al., 2021; Moon & Koh, 2022; Choi & Lee, 2023) continues, but apart from Kwon & Park(2022) who analyzed the traditional financial indicators and Yoon(2023) who explored why CEOs decide to discontinue their businesses, not many studies have been conducted pertaining to firm survival.

Therefore, we expect this study to be an important contribution to the growing literature on the survivability of startups in crisis situations such as the COVID-19 pandemic.

### 2.4. Entrepreneur competency and firm survival

Entrepreneur's characteristics have been recognized to be important in terms of startup survival and growth, and subsequent researches have been conducted to explore their

relationship. However, these studies are not based on specific entrepreneur characteristics and competency, but rather on demographic characteristics such as education, experience, and gender of the entrepreneur (Dunne et al., 1989; McCloughan & Stone, 1998; Korunka et al., 2010; Eggers & Song, 2015; Honoré, 2022). This is likely due to the difficulty in obtaining data on entrepreneurs for startups that failed to survive.

Researches on qualitative factors are moving away from the initial consideration of simple entrepreneur characteristics to dissect entrepreneurial capabilities to a granular level. Kim & Kim (2013) examined 1,212 U.S. startups to identify the causes of failure of startups by looking at entrepreneurs' external financing and marketing competency, and whether they had mentors. Their study found that entrepreneurs' external financing capability and marketing competence show a significant negative relationship with their firms' failure. Antretter et al. (2018) demonstrated that individual entrepreneurial characteristics and experiences, such as management experience, startup experience, technology experience, formal education, and personal networks, contribute to survival using a sample of 542 firms with publicly available corporate information such as Twitter. Honoré (2022) utilized data from the U.S. Census Bureau for 6,000 startups in the manufacturing industry to identify the survival factors of startups using the theme of experience, such as cumulative experiences of founders and co-founders in various industries, and sharing thereof.

This study differs from previous studies in that it utilizes the actual objective evaluation of entrepreneurs by Korea's leading policy financing institution after breaking it down into technological competence, financial competence, and marketing competence. In this context, we made the following hypotheses:

**H1: The entrepreneur's competency will positively impact the startups' survival.**

- H1.1: The entrepreneur's technological competence will positively impact the startups' survival.
- H1.2: The entrepreneur's financial competence will positively impact the startups' survival.
- H1.3: The entrepreneur's marketing competence will positively impact the startups' survival.

## **2.5. Entrepreneur competency and business performance**

Competence is defined as the knowledge, skills, and abilities to produce effective and superior business performance in a specific job in the founding sector (Klemp, 1980). Furthermore, because

early stage startups do not have a clear organizational structure, their performance may be reliant on the competency of the entrepreneur or the startup team (Chandler & Jansen, 1992). As such, competence can be used to predict behaviors associated with good performance, and its causal relationship with firm performance has been verified in several empirical studies of entrepreneurs.

Early research on entrepreneur competency centered on entrepreneurship and leadership (Sexton & Bowman, 1986; Zahra, 1991; Lumpkin & Dess, 1996), but the concept has been gradually expanded to include technological, financial, and marketing competence.

Chandler & Jansen (1992) proposed entrepreneurial, managerial, and technical-functional competencies as the core competency of business founders and explored their relationship with the performance of startups in manufacturing and service sectors, and reported that these factors influence the performance of startups. Smith & Morse (2005) also segmented functional competence into marketing and financial competencies, and defined their relationship with business performance. Lee et al. (2020) analyzed the impact of entrepreneurs' experience and technological competence on firm performance using 201 startups (manufacturing). The results showed that entrepreneurs' experience and technological competence have a positive effect on financial performance, such as increased sales and operating income, and on non-financial performance, such as increased employment rate and increased intellectual property rights.

In this study, we refer to Baum et al. (2001) and selected sales growth and employment growth as proxy variables for business performance, which are used by the Petersen & Ahmad (2007) to define high-growth firms. Considering the above trends in prior researches, we formulated the following hypotheses:

**H2: The entrepreneur's competency will positively impact business performance.**

- H2.1.1: The entrepreneur's technological competence will positively impact startups' sales growth rate.
- H2.1.2: The entrepreneur's financial competence will positively impact startups' sales growth rate.
- H2.1.3: The entrepreneur's marketing competence will positively impact startups' sales growth rate.
- H2.2.1: The entrepreneur's technological competence will positively impact startups' employment growth rate.
- H2.2.2: The entrepreneur's financial competence will positively impact startups' employment growth rate.
- H2.2.3: The entrepreneur's marketing competence will positively impact startups' employment growth rate.

## 2.6. Business performance and firm survival

As mentioned above, business performance is most commonly measured through financial indicators(Hofer, 1983; Park & Kim, 2023), and many researchers have sought to identify corporate survival factors based on financial data(Kim et al., 2021; Fuertes-Callén et al., 2022). In addition, studies have attempted to explore firm survival through the growth of workforce, a non-financial indicator that is often utilized as a proxy for firm size(Altman et al., 2010).

This study refers to Baum et al.(2001), and used sales growth rate and employment growth rate, which are used by Petersen & Ahmad(2007) and Kim(2023) as proxy variables for high-growth companies, as discriminant index for corporate performance. Based on the above studies, this study formulated the following hypotheses:

### H3: Business performance of startups will positively impact firm survival.

H3.1: The sales growth rate of startups will positively impact firm survival.

H3.2: The employment growth rate of startups will positively impact firm survival.

## 2.7. Entrepreneur competency, business performance, and firm survival relationship

Previous researches on firm survival primarily focused on single-dimensional functional relationships, examining internal or external factors, entrepreneur competency, and financial characteristics as independent factors. Recently, there has been a shift towards more multi-dimensional approach in identifying the determinants of a firm's survival.

Kim(2009) demonstrated the mediating role of sales growth rate between firms' technological innovation activities and firms' survival. Lee & Yang(2017) published that the entrepreneur's ability to commercialize a technology has direct impact on the firm's survival, but that such impact is evidenced indirectly through business performance. An & Cho(2018) structured entrepreneurs' education, founding motivation, previous founding experience, and entrepreneurial education and training to directly affect firms' survival, and indirectly affect firms' survival through intrinsic job satisfaction, extrinsic job satisfaction, and job fit. Intakhan(2021) verified the mediating role of resource

allocation and cost efficiency in the relationship between strategic costing and firm survival, and stated that they all have a significant effect.

This study also aims to make a theoretical contribution by identifying the mediating role of entrepreneur competency on business performance from a multi-dimensional perspective. To this end, the following hypotheses were developed:

### H4: Business performance will positively mediate the relationship between entrepreneur competency and firm survival.

H4.1.1: The sales growth rate will positively mediate the relationship between entrepreneur's technological competence and firm survival.

H4.1.2: The employment growth rate will positively mediate the relationship between entrepreneur's technological competence and firm survival.

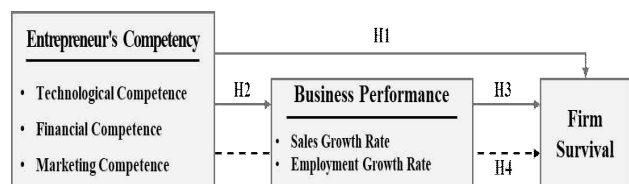
H4.2.1: The sales growth rate will positively mediate the relationship between entrepreneur's financial competence and firm survival.

H4.2.2: The employment growth rate will positively mediate the relationship between entrepreneur's financial competence and firm survival.

H4.3.1: The sales growth rate will positively mediate the relationship between entrepreneur's marketing competence and firm survival.

H4.3.2: The employment growth rate will positively mediate the relationship between entrepreneur's marketing competence and firm survival.

The research model formulated by reflecting the above hypotheses is shown in <Figure 1>.



※ Control Variables : Entrepreneur age, Gender, Experience in the same industry, Firm age, Firm size

<Figure 1> Research Model

### III. Methods

#### 3.1. Data and samples

This study endeavors to elucidate the nexus between entrepreneur competency, business performance, and firm survival. Utilizing the dataset provided by Korea Technology Finance Corporation (KOTEC)- an institution established by the Korean government to facilitate financing for SMEs, venture firms, and startups, this study rigorously validates the formulated hypotheses. The dataset comprises 1,127 startups, all within their initial five years of inception, and guaranteed by KOTEC in 2016. Entrepreneur competency utilized founder information acquired by KOTEC during their evaluation. We used the business performance data compiled by KOTEC, encompassing financial results and employment statistics as of end of 2019, after three years following their initial assessment in 2016. Furthermore, we verified the survival of these startups, as of end of June 2023 when the Korean government announced the end of the COVID-19 pandemic, so that there would be no right-censored data. Through this process, a sample of 983 surviving and 144 failed firms was obtained.

#### 3.2. Measures

##### 3.2.1. Entrepreneur competency

We present technological, financial, and marketing competence among the various competencies that illustrate an entrepreneur's competency. First, technological competence stands as a pivotal research variable and is frequently employed in academic inquiries. In this vein, our study adopted the average value of entrepreneur' technological understanding and knowledge, as appraised by KOTEC, in reference to previous studies by Man et al.(2002) and Jeon & Kim(2018). The assessment of technological understanding utilizes a 5-point Likert scale to gauge the entrepreneur's knowledge of commercialized technology. Furthermore, the level of technological knowledge is categorized into five tiers, reflecting the entrepreneur's academic specialization and experiential breadth in the domain of the commercialized technology.

Timely funding is an important competency for startups to support their growth potential, which has been consistently emphasized by various researchers(Dollinger, 1995; Freeman, 1999; Lee & Choi, 2014). We utilized the results of KOTEC's assessment of entrepreneurs' financing ability on a 5-point scale. It is an indicator that evaluates the ability of the entrepreneur to raise the necessary funds in a timely manner, considering the firm's financial status or revenue generation ability.

For early-stage startups, the marketing competence of the entrepreneur is crucial, especially given their typically weak marketing structures and limited internal resources. This reliance on the entrepreneur's marketing prowess compared to established startups has been highlighted by Theodosiou et al.(2012). Correspondingly and with reference to the research approach of Jeon & Kim(2018), our study adopts KOTEC's evaluation of marketing competence. KOTEC assesses marketing competence, encompassing market analysis, competitor analysis, marketing strategy formulation, feasibility assessment, and securing a dedicated organization, using a 5-point scale, with scores reflecting the extent of these competencies demonstrated by the entrepreneur.

##### 3.2.2. Business performance

Based on the financial data of the sample firms, sales growth rate from 2016 to the end of 2019 was calculated using the compound annual growth rate (CAGR) method. The formula is as follows:

$$SG = \frac{Sales_{2019}}{Sales_{2016}}, \overline{SG} = (\sqrt[3]{SG} - 1) \times 100 \quad (1)$$

The employment growth rate as per the financial data of the sample firms was used for the study. The employment growth rate from 2016 to the end of 2019 was calculated using the CAGR method. The formula is as follows:

$$EG = \frac{Employment_{2019}}{Employment_{2016}}, \overline{EG} = (\sqrt[3]{EG} - 1) \times 100 \quad (2)$$

##### 3.2.3. Firm survival

The dependent variable, firm survival, was measured as of the end of June 2023, when South Korea announced that COVID-19 is an endemic disease (June 1, 2023). Firm survival was determined by utilizing credit information and guaranteed default data including loan delinquency, national tax arrears, credit regulation, corporate rehabilitation, bankruptcy, and business closure data held by KOTEC. In this study, we dummy-coded surviving firms as 1 and insolvent firms as 0 to facilitate the analysis.

##### 3.2.4. Control variables

To effectively control the potential factors that may affect firm survival and business performance, this study utilizes a number of control variables, including entrepreneur age, gender, experience in the same industry, firm age and firm size. Among

these, number of employees was used as a proxy for firm size. Among the entrepreneur's personal characteristics, founder's age and gender are the main variables that have been used in previous researches(Kwak et al., 2016; Korunka et al., 2010; Honoré, 2022), and have been identified as factors that affect firm survival. In this study, we controlled these factors to minimize their impact on the outcome. Similarly, we controlled founder's industry experience, since it contributes to the founder's experience and has been reported to influence firm survival by Chang(2006) and Choi et al.(2021). On the other hand, firm age and firm size, which are basic

characteristics of a firm, are factors that have been treated as causal variables in many organizational ecology-based studies. Persson(2004) argued that firm age and size affect firm survival in organizational ecology, and various previous studies(Mata et al., 1995; Chen, 2002; Nunes & Sarmento, 2010; Hutami & Sari, 2022) have used them in their researches. So we controlled firm age and firm size in this study; Number of employees as of 2016 was used as the proxy for firm size instead.

<Table 1> summarizes the operational definitions of the variables utilized in this study.

<Table 1> Measurement for the variables

Variable	Measurement	References
Technological Competence(TC)	The average value of the entrepreneur's technological understanding and technological knowledge level as evaluated by KOTEC on a 5-point Likert scale.	Man et al.(2002), Jeon & Kim(2018)
Financial Competence(FC)	Entrepreneur's ability to fundraise, as evaluated by KOTEC on a 5-point Likert scale.	Dollinger(1995), Hong(2002), Lee & Choi(2014)
Marketing Competence(MC)	Entrepreneur's ability to marketing, as evaluated by KOTEC on a 5-point Likert scale.	Theodosiou et al.(2012), Jeon & Kim(2018)
Sales Growth Rate(SGR)	The growth rate of sales from 2016 to the end of 2019(CAGR)	Shrader et al.(1984), Shi et al.(2022)
Employment Growth Rate(EGR)	The growth rate of employment from 2016 to the end of 2019(CAGR)	Stuart & Abetti(1987), Shi et al.(2022)
Founder Age(AGE)	Birthdates of entrepreneurs researched by KOTEC	Korunka et al.(2010)
Founder Gender(FG)	Gender of entrepreneurs researched by KOTEC	Honoré(2022)
Industry Experience(IE)	Experience in the same industry prior to founding, as researched by KOTEC.	Chang(2006), Choi et al.(2021)
Firm Age(FA)	Calculated based on the founding date of the research firm	Honoré(2022)
Firm Size(SIZE)	Number of employees at the end of 2016	Mata et al.(1995), Hutami & Sari(2022)
Firm Survival(FS)	Firm survival information as of June 2023	Jeon & Kim(2018)

#### IV. Results

To analyze the relationship between entrepreneurs' competency and firm survival, and the mediating effect of business

performance on this relationship, we studied 1,127 startups. For this purpose, we first performed a descriptive statistics and correlation analysis, and summarized the results in <Table 2>.

<Table 2> Descriptive statistics and correlation matrix.

Variable	Min	Max	Mean	SD	1	2	3	4	5	6	7	8	9	10
1. TC	2	5	3.89	.844	1									
2. FC	2	5	3.24	.463	-.251***	1								
3. MC	1	5	3.34	.636	-.190**	.141**	1							
4. SGR	-100.00	1,055.05	30.44	59.20	.077**	.038	-.073*	1						
5. EGR	-100.00	102.06	-3.64	39.02	.075*	.063*	-.003	.165**	1					
6. AGE	28	72	45.03	6.91	.273**	-.034	-.133**	.031	-.024	1				
7. IE	.17	41.00	14.01	7.86	.644**	-.211**	-.144**	.052	.027	.353**	1			
8. FA	1	6	3.44	1.43	-.003	.022	.115**	-.325**	-.050	.019	.094**	1		
9. SIZE	0	309	8.88	16.05	.029	.168**	.169**	-.105**	-.001	.060*	.129**	.204**	1	
10. FS	-	-	-	-	.163**	.052	-.040	.079**	.212**	.025	.158**	.076*	.073*	1

\*p<.05, \*\*p<.01, \*\*\*p<.001



<Table 3> summarizes the results of logistic regression analysis using SPSS aiming to examine the effect of entrepreneur competency on firm survival. The result shows that TC ( $p=.002^{**}$ ,  $\text{Exp(B)}=1.546$ ) and FC ( $p=.003^{**}$ ,  $\text{Exp(B)}=1.974$ ) have a significant effect on firm survival. MC ( $p=.214$ ,  $\text{Exp(B)}=.826$ ) was not found to be a significant factor in firm survival. To

check for possible multicollinearity of the variables, we calculated the variance inflation factor (VIF), and the highest VIF value was 1.891, which is considered suitable for hypothesis testing. For the control variable ‘gender,’ male is the reference category, and we used the same reference in this paper.

<Table 3> Entrepreneur competency → Firm survival (Logistic regression)

Variable		FS							
		B	S.E.	Wald	p	Exp(B)	95% CI for Exp(B)		VIF
							LLCI	ULCI	
(Constant)		-1.789	1.240	2.083	.149	.167	-	-	-
Control Variables	AGE	-.017	.013	1.626	.202	.983	.957	1.009	1.160
	FG	.267	.305	.766	.382	1.305	.719	2.372	1.005
	IE	.040	.017	5.315	.021*	1.040	1.006	1.076	1.891
	FA	.106	.071	2.258	.133	1.112	.968	1.277	1.063
	SIZE	.031	.015	4.205	.040*	1.032	1.001	1.063	1.127
Independent Variables	TC	.435	.142	9.463	.002**	1.546	1.171	2.040	1.788
	FC	.680	.225	9.094	.003**	1.974	1.269	3.070	1.122
	MC	-.191	.154	1.541	.214	.826	.610	1.117	1.097
<b>-2Log Likelihood</b>		799.923							
<b>Nagelkerke R<sup>2</sup></b>		.099							
<b>x<sup>2</sup>(p)</b>		9.295							
<b>Hosmer-Lemeshow test</b>		.318							

\* $p<.05$ , \*\* $p<.01$ , \*\*\* $p<.001$

Next, we conducted a multiple regression analysis to examine the impact of entrepreneur competency on business performance. The result shows that TC ( $\beta=.160$ ,  $p=.000^{***}$ ,  $\beta=.113$ ,  $p=.004^{**}$ ) and FC ( $\beta=.071$ ,  $p=.017^*$ ,  $\beta=.091$ ,  $p=.004^{**}$ ) have a

significant impact on SGR and EGR, respectively. However, MC ( $\beta=-.023$ ,  $p=.434$ ,  $\beta=.006$ ,  $p=.843$ ) did not have a noticeable effect and the highest VIF value was 1.891. The results of this analysis are summarized in <Table 4>.

<Table 4> Entrepreneur competency → Business performance (Multiple regression)

Variable		SGR					EGR				
		B	S.E.	$\beta$	p	VIF	B	S.E.	$\beta$	p	VIF
(Constant)		6.578	22.650	-	.290	-	-19.714	15.783	-	.212	-
Control Variables	AGE	.332	.258	.039	.198	1.160	-.281	.180	-.050	.119	1.160
	FG	.595	6.084	.003	.922	1.005	-11.470	4.239	-.080	.007**	1.005
	IE	-.925	.289	-.123	.001**	1.891	-.040	.202	-.008	.842	1.891
	FA	-12.557	1.190	-.304	.000***	1.063	-1.356	.829	-.050	.102	1.063
	SIZE	-.155	.109	-.042	.157	1.127	-.017	.076	-.007	.821	1.127
Independent Variables	TC	11.195	2.621	.160	.000***	1.788	5.236	1.826	.113	.004**	1.788
	FC	9.046	3.784	.071	.017*	1.122	7.667	2.637	.091	.004**	1.122
	MC	-2.131	2.723	-.023	.434	1.097	.376	1.898	.006	.843	1.097
<b>R<sup>2</sup></b>		.127					.024				
<b>Adjusted R<sup>2</sup></b>		.121					.017				
<b>F(p)</b>		20.411(.000)					3.501(.001)				
<b>Durbin-Watson</b>		1.959					1.926				

\* $p<.05$ , \*\* $p<.01$ , \*\*\* $p<.001$

Furthermore, logistic regression analysis was conducted to determine the effect of business performance on firm survival, and the results are summarized in <Table 5>. The results show

that both SGR ( $p=.000^{***}$ ,  $\text{Exp(B)}=1.011$ ) and EGR ( $p=.000^{***}$ ,  $\text{Exp(B)}=1.012$ ) have a significant effect on firm survival. The VIF value was 1.171.

<Table 5> Business performance → Firm survival (Logistic regression)

Variable	FS								
	B	S.E.	Wald	p	Exp(B)	95% CI for Exp(B)		VIF	
						LLCI	ULCI		
(Constant)	.508	.710	.511	.475	1.662	-	-	-	
Control Variables	AGE	-.012	.014	.701	.402	.988	.962	1.016	1.012
	FG	.162	.314	.266	.606	1.176	.636	2.175	1.171
	IE	.066	.014	23.193	.000 <sup>***</sup>	1.068	1.040	1.097	1.160
	FA	.177	.076	5.408	.020 <sup>*</sup>	1.193	1.028	1.385	1.059
	SIZE	.036	.016	5.410	.020 <sup>*</sup>	1.037	1.006	1.069	1.153
Mediator Variables	SGR	.011	.003	14.218	.000 <sup>***</sup>	1.011	1.005	1.016	1.039
	EGR	.012	.002	33.891	.000 <sup>***</sup>	1.012	1.008	1.016	1.012
<b>-2Log Likelihood</b>				761.139					
<b>Nagelkerke R<sup>2</sup></b>				.159					
<b>x<sup>2</sup>(p)</b>				4.006					
<b>Hosmer-Lemeshow test</b>				.857					

\* $p<.05$ , \*\* $p<.01$ , \*\*\* $p<.001$

Before presenting the outcome of the mediating effect of business performance, the outcome of testing hypotheses 1~3 based on the above analyses is summarized in <Table 6>, which attests that all hypotheses related to MC are not significant.

EGR showed statistically significant mediating effects between TC and FS, and EGR between FC and FS. All other hypotheses (H4.2.1, H4.3.1, and H4.3.2) whose confidence intervals do not include zero were not adopted.

<Table 6> Summary of hypotheses test results(H1~H3)

Hypothesis	S.E	$\beta$	Wald	p	Exp(B)	Result
H 1.1 : TC → FS	.142		9.463	.002 <sup>**</sup>	1.546	Adopted
H 1.2 : FC → FS	.225		9.094	.003 <sup>**</sup>	1.974	Adopted
H 1.3 : MC → FS	.154		1.541	.214	.826	Not adopted
H 2.1 : TC → SGR	2.621	.160		.000 <sup>***</sup>		Adopted
H 2.2 : FC → SGR	3.784	.071		.017 <sup>*</sup>		Adopted
H 2.3 : MC → SGR	2.723	-.023		.434		Not adopted
H 2.4 : TC → EGR	1.826	.113		.004 <sup>**</sup>		Adopted
H 2.5 : FC → EGR	2.637	.091		.004 <sup>**</sup>		Adopted
H 2.6 : MC → EGR	1.898	.006		.843		Not adopted
H 3.1 : SGR → FS	.003		14.218	.000 <sup>***</sup>	1.011	Adopted
H 3.2 : EGR → FS	.002		33.891	.000 <sup>***</sup>	1.012	Adopted

\* $p<.05$ , \*\* $p<.01$ , \*\*\* $p<.001$

Finally, we conducted bootstrapping using SPSS 27.0 and Hayes' PROCESS MACRO v4.2 to test the statistical significance of the mediating effect of business performance between entrepreneur competency and firm survival. Number of bootstrap samples were set to 5,000.

<Table 7> summarizes the results of the hypothesis testing along with the mediating effect coefficients, standard errors, and lower and upper limits of the confidence intervals. SGR and

<Table 7> Mediation effect significance tested by bootstrapping

Hypothesis	Effect	Boot SE	Boot LLCI	Boot ULCI	Result
H 4.1.1 : TC → SGR → FS	.1221	.0450	.0565	.2289	Adopted
H 4.1.2 : TC → EGR → FS	.0567	.0262	.0096	.1125	Adopted
H 4.1.1 : FC → SGR → FS	.0802	.0547	-.0102	.2080	Not adopted
H 4.2.2 : FC → EGR → FS	.0832	.0329	.0235	.1536	Adopted
H 4.3.1 : MC → SGR → FS	-.0351	.0310	-.1032	.0220	Adopted
H 4.3.2 : MC → EGR → FS	.0034	.0258	-.0460	.0560	Not adopted

## V. Discussion

This study analyzed the mediating role of business performance between entrepreneurs' competency and firm survival to understand what makes startups viable under such stressed environments as the COVID-19 pandemic. Therefore, this study contributes to the debate on the importance of internal resources for firms' performance and sustainability.

As previously mentioned, early researches on firm survival mainly explored the financial aspects to identify what prevents firms from falling into financial distress, but the focus has been shifting to non-financial factors recently, and we paid attention

on the entrepreneurs who play a pivotal role in starting a business. The entrepreneur also plays an important role in terms of the company's business performance and survival, and this motivated us to investigate which competencies of entrepreneurs are actually conducive to firms' survival under the survival-threatening pandemic. We hereby present our findings in response to the aforementioned research questions as below.

### 5.1. Theoretical implications

This study aims to make a significant contribution to the debate on the non-financial factors that affect the survival of startup firms. We note that venture capitalists search beyond the financial statements to consider non-financial factors such as the competency of entrepreneurs and CEOs in their investment decision-making process (Miloud et al., 2012). Such is the outcome of a strategic approach driven by the perception that the quality of SMEs' financial statements is relatively low (Hope et al., 2013). Altman et al. (2010) contributed to this method by developing the failure prediction model that includes non-financial factors such as credit information in addition to the financial data of privately held SMEs, and Fuertes-Callén et al. (2022) emphasized the need for the mathematical survival prediction model based on the financial analysis of early-stage firms. Against this backdrop, this study aims to contribute to the construction of a more robust survival prediction model that incorporates entrepreneurs' competency, and we hope that entrepreneurs' TC and FC will be utilized as key variables in this process.

Second, this study contributes to expanding the theoretical discussion of RBV by examining the influence of entrepreneurs' competency, which is a critical resource for new startups, on business performance and its role in enhancing the possibility of firm survival during the pandemic. Specifically, this study supports existing research findings that resources play an important role in the survival and the performance of SMEs when the external environment is dynamic, diverse, complex, and hostile (Mahrous & Genedy, 2019), and that internal resources are crucial for SMEs as they develop their own experience, skills, knowledge, and strategies (Makadok, 2001). Our results confirm that entrepreneur competency was one of the most important strategic resources for startups during the COVID-19 pandemic.

Third, in the field of business administration studies, prior researches on proportional effects mainly utilized number of employees, total assets, total sales, profits or market value as proxies for firm size (Fiala & Hedija, 2015). SGR and EGR, deployed as parameters in this study, were considered to

represent the growth of firm size in previous researches. This implies that entrepreneurs' TC and FC can be construed to contribute to the expansion of firm size, which reinforces the chance of firm's survival.

This contributes to strengthening the theoretical basis of size dependence in organizational ecology by supporting the Liability of Smallness theory (Aldrich & Auster, 1986; Audretsch & Mahmood, 1995), which states that small organizations face high mortality rates due to the difficulty in securing resources to survive under uncertain environments.

Fourth, understanding why some firms survive and others fail has long been considered a key challenge in the field of strategic management research (Suárez & Utterback, 1995). Various studies have been performed to this end, but most of them focused on the direct causal relationship between independent variables and firm survival. This study, on the other hand, is distinguished from previous studies as it uses entrepreneurial competency as an independent variable to establish the relationship between business performance and firm survival, which had been conceptually accepted by many researchers, and as it demonstrates the mediating role of entrepreneurial competency.

Finally, this study provides theoretical implications for firm survival by demonstrating that TC and FC were the internal resources that helped startup firms to survive during the COVID-19 pandemic, while the progress of domestic research on what enabled firms to survive during the pandemic had been rather slow.

### 5.2. Practical implications

This study has practical implications in terms of providing empirical results for startups in South Korea. It is hoped that many Korean founders will be able to successfully cultivate their capabilities to survive in a pandemic-like situation beyond the valley of death that lies ahead of them. In this context, the insights gleaned from our study serve as valuable guidance for both policy-making entities and founders.

Entrepreneurs make a wide range of decisions in the early stages of starting a business, when the environment is structurally unfavorable and resources are scarce (Gibb & Ritchie, 1982). Personal competency of the entrepreneur is crucial in this stage, and any wrong decision can hinder the survival of the firm (Baron & Markman, 2018). This study suggests that good understanding of technology as well as technology-related educational background and experience in the relevant field are the essential competencies for entrepreneurs, as they serve as the

backbone of their decision-making. In addition, we found that the entrepreneur's competency to procure financing to allow the firm to engage in corporate activities is also an essential resource for the firm's survival. Conversely, if the entrepreneur has poor understanding of the commercialized technology or is unable to secure necessary and timely funding, our study suggests that the growth and the survival of the firm cannot be guaranteed.

Accordingly, the policy implication of this study is that the performance of SMEs is critical for the SME ecosystem to be sustainable, particularly under harsh external conditions such as the recent pandemic. Diverse policy support must be provided, in addition to firms' internal efforts, to strengthen the competency of the entrepreneurs.

First of all, entrepreneurship support organizations should develop entrepreneurship education programs to improve entrepreneurs' TC and MC. While programs focusing on attracting investment are increasing, programs that aim to build TC is still insufficient. The government needs to offer incentives to entrepreneurs that deal with innovative technologies and create an environment where entrepreneurs are motivated to take on challenges.

Policymakers should also promote capital markets to enable startups to raise funds through various financing channels such as government subsidies, debt financing and equity financing, and adopt various support measures so that startups can procure skilled workforce and ensure their long-term survival.

In addition, founders should take note of the following implications. Founders must primary focus on cultivating precise understanding and knowledge of the subject technology. Furthermore, we find that higher FC increases the likelihood of FS and significantly mediates the relationship between EGR and FS, whereas SGR does not have such effect. This implies that FC does not directly ramp up sales, but that sales increase driven by FC happens as the consequence of other antecedent factors such as securing competitive advantage through cost reduction or technology development. It also suggests that entrepreneurs should focus directly on building FC to enhance the viability of the company. Hence, acquiring skilled talents, rather than boosting sales, should be the priority of entrepreneurs.

Second, our study found that MC was not a significant factor. During the pandemic, strong measures were implemented across the globe such as movement restrictions and mandatory social distancing. Accordingly, the survival of the firms was threatened by various business issues such as cash flow shortages and outdated marketing strategies(Adam et al., 2021). As the value of 'Place' as per McCarthy(1964)'s 'Marketing mix of 4Ps' became

weaker during the pandemic, founders were required to be more flexible so as to rapidly transform their existing marketing strategies, such as deploying non-contact marketing.

Finally, it is important for the founder to ensure his/her own success by becoming fully knowledgeable of the technology and making thorough preparations to procure capital; he/she should not be swept away by the trend that encourages starting new innovative technology firms or simply follow the rapidly changing technological changes and launch a startup without sufficient preparation. We hope this study will contribute to this process.

### 5.3. Limitations and future research

This study makes several theoretical and practical contributions to prior researches, but has some limitations. Entrepreneurs' competency used in this study were measured by KOTEC in 2016. Given the dynamic characteristics of these competencies, long-term causal validation using longitudinal data should be entailed. In addition, environmental factors external to the firm should be included in the research model to better understand the complex relationship between business performance and firm survival.

Finally, it is necessary to diversify the research variables beyond the already proven business performance to include variables that mediate the relationship between entrepreneurial competence and business performance, and variables that take into account special circumstances such as the COVID-19 pandemic. We expect that these limitations will be addressed in future studies.

## VI. Conclusion

Entrepreneurs' competency is an important internal resource for startups as; they have significant potential to drive the firm's competitive advantage. This study aimed to identify the complex relationship between entrepreneurs' competency and their firms' survival by focusing on the mediating effect of business performance during the COVID-19 pandemic. The empirical analysis indicated that TC and FC, but not MC, contribute to business performance and firm survival. SGR and EGR are identified as key factors in firm survival, and are found to have a significant positive mediating effect between TC and FS. However, only EGR mediates the relationship between FC and FS, demonstrating a selective mediating effect.

MC did not display any significant effect. This suggests that firm marketing activities based on MC are not sufficient to

contribute to short-term performance due to the time lag effect. These results support the findings of Jung et al.(2012) who found that advertising campaigns have a positive effect on business performance after a certain period of time, and of Bae et al.(2018) who found that MC does not have a significant effect on financial performance. Our findings support the understanding that entrepreneurs' TC functions as an important internal resource for firm survival, acting as a buffer against external shocks such as the COVID-19 pandemic.

This study is one of the few studies to explore the relationship between entrepreneurs' competency, business performance and firm survival under the harsh external environment of the pandemic, and will provide insights into which competencies of how entrepreneurs need to be developed in Korean startups. We hope that our findings will stimulate further research on the startup ecosystem.

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## 코로나19 팬데믹 기간 창업자 역량이 창업기업의 생존에 미치는 영향: 경영 성과의 매개 역할

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### 국 문 요 약

COVID-19 팬데믹은 인류에게 막대한 위기를 안겨준 것은 물론, 기업 생존에 중대한 영향을 미쳤다. 인간 생명을 보호하기 위한 사회적 거리두기와 글로벌 봉쇄 정책이 역설적으로 기업 생존 환경을 악화시킨 것이다. 이에 따라 외부 자원을 통해 경쟁 우위를 확보하려던 기업들은 외부와의 단절로 예기치 못한 도전에 직면하게 되었다.

이러한 상황에서 COVID-19 팬데믹 초기의 선행연구들은 전통적인 재무 요인을 통해 경영 성과를 재차 진단하는 데 그쳤다. 이에 본 연구는 자원기반관점에서 위기 상황에서 창업자의 역량이 경영 성과를 향상하고 이를 통해 창업기업의 생존 가능성을 높이는 중요한 요인임을 규명하고자 하였다. 구체적으로, 기술평가를 통해 정책금융을 제공하는 기술보증기금(KOTEC)이 2016년에 평가한 1,127개 창업기업을 대상으로 2019년 말의 경영 성과를 측정하였다. 그 이후 엔데믹을 선언한 시점인 2023년 6월 말 연구 대상 기업의 생존 상태를 확인하여 창업자 역량과 기업생존과의 관계에서 경영 성과의 매개 역할을 규명하는 실증 연구를 수행하였다. 이를 위해 창업자 역량의 하위요인으로 는 기술적, 재무적, 마케팅 역량으로 정의하였고, 매출액 증가율과 고용 증가율을 경영 성과의 하위요인으로 보았다.

실증분석 결과, 창업자의 기술적, 재무적 역량이 창업기업의 경영 성과와 생존에 모두 긍정적인 영향을 미쳤으며, 매출액 증가율과 고용 증가율이 기술적 역량과 기업 생존 사이를 매개하였다. 하지만, 창업자의 재무적 역량은 고용 증가율을 통해서만 창업기업의 생존에 긍정적인 영향을 미치는 것으로 나타났다. 본 연구는 COVID-19 팬데믹 상황에서 창업기업의 생존요인을 규명한 국내 최초의 연구로서, 자원기반관점에서 창업자의 역량이 중요한 생존요인이라는 이론적, 실무적 논의 확대에 기여할 것으로 기대한다.

핵심주제어: 기술적 역량, 재무적 역량, 마케팅 역량, 경영 성과, 기업 생존

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