

Determinants of business closure disparities during the coronavirus disease 2019 pandemic in South Africa: Evidence from enterprise survey data



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Background: Businesses of all types experienced the devastating blow of COVID-19 pandemic. However, the impact was disproportionate – with closure of some businesses at the onset of the pandemic, others endured for a few months, whereas some survived. The factors underpinning disparities in business closures across firm sizes and sectors remain underexplored in the literature.

Aim: The purpose of this study is to investigate the disparities in business closures in South Africa during the pandemic.

Setting: This study focuses on businesses operating after the outbreak of COVID-19 pandemic.

Methods: This study employs descriptive and logistic regression analyses using Enterprise Survey data from the World Bank. Business closure was modelled as quarter-specific binary outcomes using separate logistic regressions.

Results: Findings show that small businesses were significantly more likely to close than medium and large ones, with closure disparities of 8% in 2nd quarter, 88% in 3rd quarter, and 5% in 4th quarter based on estimated marginal effects from the logistic regression models. Managerial experience reduced closures in 2nd and 3rd quarter, while critical thinking and skilled workforce had negative effects on closure likelihood, especially in 3rd quarter. Temporary workers have a positive impact on business closure in the 2nd quarter and a negative impact in the 4th quarter.

Conclusion: Small-sized firms are more vulnerable to closure than medium-large sized firms in crises such as the COVID-19 pandemic. Business closure disparity refers to differences in closure probabilities across firms, estimated using quarter-specific binary logistic regressions. Statistically significant determinants of business closure disparity included skilled workers, female workers and industry factors, with these factors having varying impacts depending on firm size.

Contribution: The study has deepened understanding of business resilience factors in times of crisis, targeted policy intervention, support business resilience in the wake of the pandemic and ensure preparedness for any unforeseen.

Keywords: business resilience; closure of businesses; determinants; business in crises; COVID-19.

Introduction

Globally, businesses (small and medium-sized enterprises and large corporations) have been devastated by the coronavirus disease 2019 (COVID-19) outbreak. The pandemic has had a devastating impact on businesses around the world and is considered by other economists (e.g. Balla-Elliott et al. 2020; Ramelli & Wagner 2020) as the most severe financial crisis after the great depression of the 1930s in terms of its cause, scope and severity. Unlike earlier financial crises that were caused by factors within the financial system, the financial crisis associated with the COVID-19 pandemic mostly resulted from the mandatory lockdown policies that were applied globally to contain the spread of the disease (Shen et al. 2020). The global response to COVID-19 meant that whole economies were shut down, except for essential services, which allowed firms operating in those sectors to remain (partially) open as well as being granted other preferential treatment, and many sectors were therefore bound to record low levels of production and revenue in 2020 and beyond (Mittal & Sharma 2021).

South Africa is not an exception as the pandemic has exacerbated the existing high inequality and poverty levels and has severely affected businesses. When COVID-19 hit the shores of South Africa, one of the measures that were put in place to combat the spread of the virus was the lockdown. The president restricted citizens' movement and prohibited all the non-essential businesses from operating. The restrictions on movement imposed during the COVID-19 lockdown in South Africa, combined with the disruption to supply chains, resulted in a 42% increase in companies filing for business rescue between April 2020 and October 2020 as businesses struggled financially (Ramnanun, Rajaram & Nyatanga 2022). Existing debt, lack of cash reserves, outdated financials, no access to relief funding, high obstacles to entry and an inability to operate during the lockdown forced the closure of 42.7% of small, medium, and micro enterprises (SMMEs) businesses (News24 2020). Only 47.9% of SMMEs businesses that closed had applied for COVID-19 relief funding. However, virtually all (99.9%) of these funding applications were rejected, and one of the primary reasons cited by banks was poor consumer credit scores (Tech 2020).

Large businesses were also affected immensely by COVID-19 and the measures that were put in place to combat the pandemic. Large businesses suffered by not generating any revenue due to the lockdown, whereas some of their operational costs remained the same. Some of the large businesses, such as Comair, Phumelela Gaming & Leisure and Edcon to mention a few, could not survive the pandemic and had to file for bankruptcy (News24 2020). According to Disord (2022), 76.2% of SMMEs of businesses from small to large experienced a significant decline in the first 5 months of lockdown. Significant employment losses have resulted from this, where the unemployment rate rose to 35.3% during the pandemic, surpassing the highest unemployment rate in history of the country, which was 29.1% in the year 2019 (Disord 2022). The nation's already high levels of inequality have also exacerbated as a result of the pandemic (OECD 2020).

A study by the World Bank indicates that around 40% of micro, small and medium enterprises (MSMEs) had closed by the end of 2020 as a result of the COVID-19 pandemic in South Africa (Xulu 2021). In addition, the National Income Dynamics Study-Coronavirus Rapid Mobile Survey (NIDS-CRAM) reported that 43% of businesses had reduced their workforce by July 2020 (Spaull et al. 2020). The disparity in business closures observed during the COVID-19 pandemic can be attributed to a variety of factors, including the timing of closure, which varied among businesses based on their individual and firm-level characteristics. Some businesses closed earlier in the pandemic due to factors such as limited financial resources, a lower level of sector-specific resilience, or a greater impact of lockdown measures. On the other hand, other businesses were able to weather the storm and remain open for a longer period of time. These differences in closure timing contributed to the disparities in business closures observed during the pandemic.

Businesses of all types experienced the devastating blow of the COVID-19 pandemic. However, the impact was disproportionate – some businesses experienced closure at the onset of the pandemic; others endured for a few months, whereas some survived.

While existing studies (Anakpo & Mishi 2021; Abidi, Herradi & Sakha 2022; Mishi et al. 2023; Gqoboka 2022) examine business survival during economic shocks, limited empirical evidence exists on how firm-level characteristics influence the timing of business closures during systemic crises, particularly in emerging economies such as South Africa. This study addresses this gap by analysing quarter-specific closure outcomes using enterprise-level data.

Furthermore, this study is guided by theoretical insights from resource-based theory (RBT), dynamic capabilities theory (DCT) and transaction cost economics, which collectively explain how firm resources, managerial capabilities and labour structures influence resilience during economic shocks. Building on these perspectives and empirical evidence on business survival during crises, the study aims to examine determinants of disparities in the closure of businesses during the COVID-19 pandemic in South Africa, using enterprise survey (ES) data.

Addressing these disparities will promote inclusive economic growth, support business resilience in the wake of the pandemic and ensure preparedness for any unforeseen crisis in the future while making a significant contribution to the literature.

The rest of this article is structured as follows: Section 2 presents the literature review, while Section 3 outlines the research methodology. Section 4 details the results and provides a discussion of the findings. Finally, Section 5 offers the study's conclusions, discusses its limitations and provides recommendations for policymakers and businesses.

Literature review

This section reviews both theoretical and empirical studies on the determinants of disparities in the early closure of businesses during the COVID-19 pandemic. This review of theoretical and empirical literature assists in identifying the strengths and weaknesses of the existing literature, while also highlighting the contribution of this study to the existing literature. This section highlights three theories, which are the resource-based theory, the DCT and the transaction cost economics theory; the section also examines other studies that have been done and what outcomes those studies came up with.

The foundation of RBT was established by Barney's (1991) article, which introduced the VRIN (valuable, rare, inimitable, non-substitutable) criteria as key characteristics of valuable resources that can provide a firm with a sustained competitive advantage (Barney 1991). Barney articulated that firms should prioritise the identification, development and

effective utilisation of these valuable resources to maximise performance while making strategic choices to create resilience and competitiveness in times of crisis such as the pandemic (Amit & Schoemaker 1993).

DCT is a concept that emerged in the field of strategic management in the early 1990s. It builds upon the RBT and extends its focus to the dynamic and adaptive aspects of firms (Teece 2007). It provides a comprehensive framework for understanding how firms can adapt and renew their resources and capabilities to sustain competitive advantage in dynamic and uncertain environments and crises (Teece, Pisano & Shuen 1997).

Transaction cost economics (TCE) theory emerged in the 1970s as a response to the limitations of neoclassical economics in explaining the existence and organisation of firms (Hardt 2009). The theory focuses on the analysis of economic transactions, both within and between firms (Antràs & Yeaple 2014). The theory argues that transaction costs, which include search and information costs, bargaining and negotiation costs and enforcement and monitoring costs, influence the choice between market transactions and hierarchical organisation within firms (Team 2023).

These theoretical perspectives in this study inform the selection of explanatory variables used in the empirical model. For instance, the RBT relates to firm human capital variables such as skilled workers, technical skills and managerial experience, which may enhance business resilience during crisis periods, whereas DCT is reflected in firms' ability to adjust workforce composition and operational strategies, which include variables such as temporary workers and sales performance. TCE informs the analysis of labour flexibility and organisational decisions, particularly the use of temporary workers and industry structure variables, which may influence firms' survival during the COVID-19 shock. Drawing from the above theoretical perspectives, this study examined the relationship between firm resources, workforce characteristics and organisational structure variables and business closure outcomes during the pandemic period. Individual-level characteristics (such as managerial experience and workforce composition) and firm-level characteristics (such as firm size, industry type and labour flexibility) are expected to affect the probability of business closure during different stages of the COVID-19 shock.

The COVID-19 pandemic has had a significant impact on the global economy, leading to the closure of many businesses worldwide (Naseer et al. 2023). Empirical research on the topic has employed a variety of economic models and datasets to examine the extent of the pandemic's impact on business survival. Some of the earliest works investigating the topic include Fairlie (2020) and Fairlie and Fossen (2022), which highlight the vulnerability of certain industries and businesses to the pandemic's economic disruptions. It is important to understand the determinants of these closures, particularly considering the disparities that exist between different types of businesses.

Kücher et al. (2020) investigated the relationship between the age of the firm and the causes of failure among small and medium-sized enterprises (SMEs) in Upper Austria. The study examined a variety of causes, and the results revealed that younger and adolescent firms were more likely to fail due to internal factors such as poor planning and resource management, while mature SMEs were more likely to fail due to external factors such as increased competition and economic downturns. Similarly, Okpara (2011) examined the factors constraining the growth and survival of SMEs in Nigeria, using several statistical analyses. The study identified numerous challenges faced by SMEs in Nigeria, including financial support, management issues, corruption and poor infrastructure. Kusi, Opata and Narh's (2015) study sought to identify and analyse the challenges faced by MSMEs in Ghana using a combination of survey and case study methods of data collection and analysis. The study revealed that MSMEs are dominated by youth and female operators, usually with a low level of education, and lack qualified personnel. They have poor access to credit and are usually self-financed. This was further confirmed by a study that looked at 51 businesses in Ahvaz, Iran, using the triangulation method so as to explain the main factors that are related to success and failure. This was conducted by Mehralizadeh and Sajadys (2006). The results revealed that factors such as weak management skills, financial issues, lack of planning and organisation, economic problems, informal issues and weak human relations led to business failure.

In a comparative context, Dvorsky et al. (2022) studied SMEs in Visegrád Group countries and found significant differences in how owners and managers perceive business risks, particularly concerning market risks and regulatory environments. These disparities were identified using non-parametric statistical tests.

In Nigeria, Adeyeye, Ikupolati and Ndibe (2018) used a survey-based approach with descriptive statistics and Pearson correlation analysis to study the North Central region. Their findings indicated a strong perceived link between small businesses and entrepreneurship, even in the absence of entrepreneurial activity, suggesting a deep-rooted association in local understanding.

Overall, these studies highlight that geographical, structural, managerial and perceptual factors all significantly influence SME sustainability and risk.

Ismail (2014) identified cash flow factors as critical to US construction firm failures, while Bunyaminu, Tuffour & Barnor (2019) and Gakuba (2022) found profitability, leverage and cash flow mismanagement central to failure in Ghana and Rwanda, respectively. Gender differences in causes were noted by Rosa, Carter and Hamilton (1996), Arasti (2011) and Garwe and Olawale (2012). Efficiency, location and sales were also key predictors in Slovenia (Pušnik & Tajnikar 2014). Pan and Makino (2024) found that high leverage and poor performance drove closures in Japan. While these studies

collectively underscore the multidimensional nature of business failure, most focus on structural or financial determinants rather than how firm-level characteristics shape closure timing during systemic crises such as the COVID-19 pandemic.

In conclusion, the determinants of early closure of businesses during the COVID-19 pandemic are complex and multifaceted. Small businesses, businesses in certain industries and businesses located in areas with high COVID-19 cases and deaths are particularly vulnerable. Government support programmes have been implemented to help businesses, but their effectiveness has been limited. Further research is needed to better understand the factors that contribute to the disparities in business closures during the pandemic and to identify effective strategies for mitigating these disparities. Despite previous research on the impact of economic shocks on businesses, there remains a need for a deeper understanding of the unique characteristics of firms and individuals that may contribute to disparities in business failure during the pandemic.

The following hypotheses are therefore tested:

- H1:** Firm-level characteristics significantly influenced the likelihood of business closure during the COVID-19 pandemic.
- H2:** Individual-level characteristics significantly influenced the likelihood of business closure during the COVID-19 pandemic.

Research methods and design

Data source and variable description

The study targets firms in South Africa, and the data that are used are retrieved from ES data collected in 2020/2021 by the

World Bank: <https://login.enterprisesurveys.org/content/sites/financeandprivatesector/en/library.html>. Details of the variables are displayed in Table 1.

The 2020 South Africa ES by the World Bank used stratified random sampling techniques to select enterprises across South Africa (World Bank Group 2021). In this nation, stratification was done at three different levels: industry, establishment size and area. Industry stratification was created as follows: the universe was divided into three service industries and five manufacturing industries, including food and beverage, textiles and apparel, fabricated metal products, motor vehicles, other manufacturing, construction and retail. Since there is no data available for all nine provinces, the South African ES is regionally stratified across the Eastern Cape, Gauteng, KwaZulu-Natal and Western Cape.

Model specification and estimation techniques

This study employs descriptive and logistic regression analyses to address the research objective. Descriptive statistics are techniques that are employed to efficiently, logically and meaningfully compute, characterise and summarise research data that has been gathered (Vetter 2017). It provides a way to organise, analyse and interpret large datasets, allowing researchers and analysts to gain insights into the characteristics and patterns of the data. Measures of central tendency and variability are used in descriptive analysis, while logistic regression is used for inferential analysis (Solutions 2024; Stoltzfus, Kaur & Yellapu 2018). Separate binary logistic regression models are estimated for early, mid- and late business closure to capture quarter-specific determinants of closure. A multinomial logit model was not used because closure

TABLE 1: Variables used in the study.

Variable	Description	Measure
Business closure	The actions necessary when it is no longer possible for a business or other organisation to continue to operate (Law Insider 2024), that is, winding up a business and bringing its operations to an end (South African Revenue Service 2024)	COVID-19 led to the closure of some businesses in the first few months of the outbreak; some permanently closed later, while others survived, thus revealing the disparity in business status during the pandemic period (Stemmler 2023). Therefore, in the model business closure is used as a binary outcome for each of the following categories: • 1 for early closure (second quarter); 0 for otherwise. • 1 for mid-closure (third quarter); 0 for otherwise. • 1 for late closure (fourth quarter); 0 for otherwise. Firms contribute to each quarter-specific model independently, and businesses already closed are excluded from subsequent quarter analyses. The baseline will be businesses that did not close down (1 if did not close down and 0 otherwise).
Individual-level characteristics	Manager's years of work experience, gender, population group	How many years of experience does the manager have? • 1 if female and 0 otherwise. • 1 for African and 0 otherwise.
Firm-level characteristics	Industry type, size, profit margin, ICT use, annual turnover, among others	Industry type (trade, agricultural, financial, transport, etc., 1 if belonging to each industry and 0 otherwise) Industry size (small, medium and large, 1 if belonging to each industry size and 0 otherwise): • Small enterprise: 5–49 employees. • Medium enterprise: 50–200 employees. • Large: 500+ employees. Year sales change (1 if sales increased or remained the same and 0 otherwise).

Note: Please see the full reference list of this article: Nxazonke, N., Anakpo, G. & Mishi, S., 2026, 'Determinants of business closure disparities during the coronavirus disease 2019 pandemic in South Africa: Evidence from enterprise survey data', *Southern African Journal of Entrepreneurship and Small Business Management* 18(1), a1263. <https://doi.org/10.4102/sajesbm.v18i1.1263> for more information.

COVID-19, coronavirus disease 2019; ICT, information and communications technology.

timing reflects sequential pandemic periods rather than mutually exclusive outcome categories, and survival analysis was not feasible due to the absence of continuous time-to-closure information in the ES data. Logistic regression offers a means of estimating the probability of the result by modelling the log-odds (Vittinghoff et al. 2007). By incorporating covariates into the model, logistic regression can take into account possible confounding factors and provide a more accurate picture of the relationship between the independent variables (determinants) and business closure (Narcisi, Greco & Trivisano 2024). The logistic regression models were estimated to test Hypotheses H1 and H2 regarding firm-level and individual-level determinants of business closure.

This logistic regression model (Equation 1) is specified as follows:

$$BC_i = B_0 + B_1 ILC_i + B_2 FLC_i + C_i. \quad [\text{Eqn } 1]$$

Diagnostic test

To ensure the reliability and validity of the model used in this research, diagnostic tests are conducted. The Hosmer–Lemeshow (H–L) test is primarily used to assess the calibration or goodness-of-fit of a binary logistic regression model. The test helps to determine whether the predicted probabilities of the dependent variables are accurately estimated by the model (Paul, Pennell & Lemeshow 2013). Another test employed is the variance inflation factor (VIF) test, which is used in binary logistic regression analysis to detect multicollinearity (Vidhya 2025; Bayman & Dexter 2021). It is calculated as the reciprocal of $(1 - R^2)$ for the regression of each independent variable on all the other independent variables in the model. A higher VIF value for a particular independent variable implies a greater likelihood of the presence of multicollinearity in the regression model.

Ethical considerations

Ethical clearance to conduct this study was obtained from Nelson Mandela University Business and Economic Sciences Ethics Committee (Ref. No. 0309).

Results

This section presents the analysis results of factors that influence differences in the closure of enterprises during the COVID-19 epidemic in South Africa, with a particular emphasis on empirical research. Beyond theory, such data can be quite important in understanding the early COVID-19 pandemic business failure. Theories typically assume a pristine universe with few to no imperfections and everything being clear-cut. This poses a challenge as this is an imperfect world where various business types respond differently to shocks and necessitate the implementation of various solutions tailored to each type of firm.

The descriptive analysis for early business closure shows that the mean number of businesses that closed in 2020 was 77%. The number of businesses that closed in the second, third and fourth quarters was 36%, 66% and 69%, respectively. This means that the majority of businesses closed, and there was a moderate amount of variation in the number of closures. This means that a significant number of businesses closed early, but there was a large amount of variation in the number of early closures. Studies have shown that business closures are prevalent during economic crisis (Bernanke 1983; Wang et al. 2021), and they can have a large economic impact (Bongaerts, Mazzola & Wagner 2021).

Table 2 shows that the average female ownership percentage for businesses was 10%. This means that the percentage of female-owned businesses varied greatly. Next, the average percentage of experienced managers was 15.6%, which means that there was a small amount of variation in the percentage of experienced managers among businesses. In other words, most businesses in the studied sample had managers with less experience.

The average percentage of businesses with temporary workers, at 74%, reveals a comparatively high level of variation in the employment of temporary workers across the sample of businesses. While some businesses in the sample did not employ any temporary workers, the majority of businesses were found to have a significant proportion of temporary workers within their workforce. The data on temporary workers suggests that these employees may have been a crucial resource for businesses, allowing them to adapt to changing circumstances (Ellsen & Haggberg 2021). The presence of temporary workers in businesses can be viewed

TABLE 2: Descriptive statistics.

Variable	Observations	Frequency	%
Closure	949	108	77.0
Early close	325	122	36.0
Mid-close	516	492	66.0
Late_Close	108	424	69.0
Female_Owner	998	100	10.0
Exp_Managers (b7)	1008	108	15.6
Temp_Workers (COVD3b)	1002	745	74.0
Crit_Thinking (SAI2b)	1008	992	98.0
Com_Skills (SAI2e)	1008	999	99.0
Female_Worker (SAI1b4)	1008	108	10.0
Tech_Skills (SAI2f)	1008	1001	99.0
Skilled	1008	995	100.0
Small_Ent	1008	391	38.0
Medium_Ent	1008	336	33.0
Large_Ent	1008	281	29.0
Foreign_Owned	1008	108	10.0
Food	1008	131	13.0
Tex_Gar	1008	63	63.0
FabMet_Products	1008	37	3.0
Motor_Vehicle	1008	108	10.0
Sales_Same	1008	111	11.0
Sales_Increased	1008	54	5.0

Exp, experience; Temp, temporary; Crit, critical; Com, communication; Tech, technical; Ent, enterprise; Tex_Gar, Textile and Garment Sector; FabMet, Fabricated Metal Product Sector.

through the lens of transaction cost theory (Views 2023), which suggests that firms choose between hiring permanent or temporary workers based on their need for flexibility and cost considerations. Table 2 reveals that a high proportion of businesses in the sample, an average of 98%, possess high levels of critical thinking skills. This finding suggests that most businesses in the sample are capable of performing tasks requiring higher-level cognitive abilities, such as problem-solving and strategic decision-making. This finding confirms the knowledge-based theories of the firm (Grant 1996), which suggests that human capital, including critical thinking skills, can be a source of competitive advantage for businesses.

The average of 99% for businesses with high communication and technical skills suggests that these skills were common among businesses in the sample.

An average percentage of 10% for businesses with female workers suggests that female representation in the sample was comparatively low. This could indicate several potential factors related to gender equality and workforce diversity. The theory of gender diversity's positive impact on firm performance (Ferrary & Déo 2022), suggests that businesses with higher levels of gender diversity are more likely to be successful. A high average percentage of 99% for businesses with high-tech skills suggests that the sample included predominantly businesses that reported possessing high levels of technical skills. The resource-based view (RBV) of the firm (Madhani 2010) posits that a firm's resources, including human capital, are critical determinants of its success. However, the findings of this study suggest that other factors, such as industry type, access to capital and government support, may have played a more significant role in business survival during the pandemic (Fairlie et al. 2023; Muthu & Wesson 2023).

The 38% average percentage of small businesses in the sample suggests that small businesses are a significant proportion of the business population in South Africa. The findings for medium and large-sized businesses mirror those for small businesses, suggesting that business size was not a determining factor in business survival during the COVID-19 pandemic. The average percentage of medium and large businesses, 33% and 29%, respectively, indicates that the vast majority of businesses were not medium or large. The 10% average percentage of foreign-owned businesses in the sample suggests that foreign ownership is relatively low in the South African business sector.

Table 2 illustrates that the food, textile and garment, fabric and metal products and motor vehicle industries are the relatively prominent sectors in South Africa, with the respective average percentages of businesses in each sector being 13%, 63%, 10% and 3% in the sample. This finding indicates that these industries likely play a significant role in the country's economic landscape, potentially reflecting their comparative resilience, local demand or broader industry characteristics.

The 11% and 5% average percentages of businesses with stagnant and increased sales, respectively, in the sample, indicate that a significant proportion of businesses in South Africa experienced a stagnation or decline in sales during the COVID-19 pandemic. This finding is consistent with the wider economic disruption and decreased consumer spending associated with the pandemic, as well as the possible sector-specific impacts of lockdown restrictions. This is consistent with the theory of 'creative destruction' (Schumpeter 1942), which suggests that some industries are more resistant to external shocks than others due to their inherent characteristics.

Discussion

Modelling the likelihood of business closure during coronavirus disease 2019 in South Africa: A logistic regression study

Table 3 shows results from logistic regression models related to Hypotheses H1 and H2 on firm-level and individual-level determinants of business closure during the COVID-19 pandemic. The test reveals the significance and relationship the independent variable has with the early business closure of firms in South Africa during COVID-19.

The logistic regression results examining the relationship between female ownership and early business closure during the COVID-19 pandemic in South Africa revealed an interesting trend, even though female ownership is a nominal variable. When examined by quarters, the association between female ownership and early closure varied across time. While the effect was insignificant in the second and third quarters, businesses owned by women exhibited a significantly lower rate of early closure in the fourth quarter. Female-owned businesses may be more likely to adopt risk-mitigation strategies, such as greater liquidity, financial diversification or a larger personal financial cushion, which could reduce the likelihood of closure during challenging economic conditions. These findings are supported by previous research that has identified both negative and positive effects of female ownership on firm performance, depending on the context (Fairlie & Robb 2009; Neneh, Zyl & Noordwyk 2016).

The presence of experienced managers appeared to have a positive influence on business resilience during the COVID-19 pandemic in South Africa, as firms with experienced managers were less likely to close in the second and third quarters of 2020, as demonstrated by the negative and significant association found in the logistic regression analysis. Experienced managers may be better equipped to navigate unexpected challenges and make strategic decisions that increase the business's resilience, such as finding alternative markets or diversifying product lines. These results align with prior research suggesting that managerial experience can be an important factor in conferring resilience during economic shocks (Nguyen et al. 2023). However, this protective effect diminished in the fourth quarter, with the relationship becoming negative but insignificant.

TABLE 3: Logistic regression results.

Variables	Business closure	Early closure	Mid-closure	Late closure
Sample size	949.000	325.000	516.000	630.000
Variables	Marginal effects	Marginal effects	Marginal effects	Marginal effects
female_owner	-0.070 (0.430)	0.053 (0.065)	-0.111 (0.081)	-0.373*** (0.089)
exp_managers	-0.001 (0.001)	-0.004* (0.002)	-0.004* (0.002)	-0.001 (0.002)
temp_workers	0.075** (0.032)	0.129** (0.056)	0.097 (0.061)	0.136*** (0.047)
crit_thinking	-0.010 (0.047)	0.006 (0.063)	-0.007** (0.067)	0.068 (0.146)
com_skills	-0.023 (0.068)	-0.022 (0.048)	-0.031 (0.149)	-0.037 (0.147)
female_worker	-0.001** (0.001)	-0.011** (0.005)	-0.008** (0.004)	0.000 (0.002)
tech_skills	0.027 (0.054)	0.107 (0.074)	-0.003 (0.094)	-0.006 (0.058)
Skilled	0.000 (0.001)	-0.026*** (0.006)	0.001 (0.002)	0.001 (0.002)
Food	-0.106*** (0.037)	-0.087 (0.076)	-0.207*** (0.074)	-0.137*** (0.058)
Tex_Gar	0.169** (0.074)	0.279 (0.111)	0.001 (0.139)	0.144 (0.120)
FabMet_Products	0.064 (0.078)	0.170 (0.134)	-0.058 (0.158)	0.101 (0.113)
Motor_Vehicle	0.002 (0.044)	-0.029 (0.076)	-0.049 (0.084)	-0.002 (0.066)
foreign_owned	-0.001 (0.002)	0.000 (0.002)	-0.002 (0.003)	-0.009 (0.008)
sales_same	-0.342*** (0.038)	-0.447*** (0.088)	-0.721*** (0.098)	-0.419*** (0.058)
sales_increased	-0.165*** (0.050)	-0.210* (0.113)	-0.792*** (0.190)	-0.155** (0.074)
small_ent	0.056* (0.032)	0.006 (0.056)	0.082 (0.061)	0.098** (0.050)
large_ent	0.012 (0.034)	-0.053 (0.064)	0.052 (0.066)	0.041 (0.051)

Note: Standard errors are indicated in parentheses.

Exp, experience; Temp, temporary; Crit, critical; Com, communication; Tech, technical; Ent, enterprise; Tex_Gar, Textile and Garment Sector; FabMet, Fabricated Metal Product Sector.

$p < 0.1$; **, $p < 0.5$; ***, $p < 0.01$.

However, the nuanced relationship between managerial experience and early closure observed during the pandemic highlights the need for further research to better understand the factors that influence business resilience during economic shocks.

Table 3 indicates that the presence of temporary workers in a business was associated with an increased likelihood of early closure during the pandemic, specifically in the second and fourth quarters of 2020. This positive and significant relationship implies that firms with higher levels of temporary workers were more vulnerable to closure, suggesting that temporary workers may have contributed to a lack of business resilience during the pandemic. This may be attributable to temporary workers having less training and expertise than permanent staff, making it more difficult for businesses to adapt to new challenges presented by the pandemic. In the third quarter, the relationship between temporary workers and business closure was positive but insignificant, indicating that the effect of temporary workers on closure was weaker in this period. The results of this study are consistent with previous research that suggests that the utilisation of temporary workers can have detrimental effects on a firm's performance and survival, particularly during times of economic downturn. The flexibility-fit theory postulates that firms that utilise flexible labour practices, such as employing temporary workers, may experience short-term benefits in the form of lower labour costs and improved operational efficiency (Adolfsson, Baranowska-Rataj & Lundmark 2022). However, these benefits can be offset by long-term costs as temporary workers may be less committed to the organisation and less likely to contribute to its sustainable growth and value creation (Von Hippel et al. 1997). This may explain why temporary workers were associated with an increased likelihood of early business closure during the pandemic.

The results for Crit_Thinking indicate that critical thinking has a positive, but not statistically significant, effect on the outcome variable in the second and fourth quarters. However, in the third quarter, Crit_Thinking has a statistically significant negative effect on the outcome variable. This suggests that Crit_Thinking has a varying effect on the outcome. Furthermore, the negative marginal effect suggests that an increase in Crit_Thinking is associated with a decrease in the outcome variable, although the significance of this effect varies by quarter. The relationship between critical thinking and business outcomes is a complex topic that has been studied extensively. While our results suggest a varying effect of critical thinking on the outcome variable across different quarters, the Cynefin framework, developed by Dave Snowden and Mary Boone, suggests that the effectiveness of critical thinking depends on the type of problem being solved. When dealing with complex or chaotic situations, critical thinking may not be as effective as heuristics or experimentation (Snowden & Boone 2007).

The findings related to communication skills, technical skills and female workers provide insights into the complex relationship between human capital and business resilience during economic shocks. The results suggest that while Com_Skills had no significant effect on business closure, Tech_Skills had a positive but insignificant impact on the outcome variable in early closure. In the third quarter, Tech_Skills had a negative and insignificant impact on the outcome variable, while in the fourth quarter, it had a positive and insignificant impact. The results of this study challenge the traditional assumptions of the RBT (Barney 1991) and capabilities theory (Teece 2010), which suggest that human capital, specifically the skills, knowledge and abilities of employees, is a key determinant of firm performance (Schuler & Jackson 1987). Female_Workers had a negative and significant impact on business closure in the second,

third and overall, while in the fourth quarter, it had an insignificant positive impact. Skilled workers had a significant negative impact in the second quarter. Prior research suggests that human capital can confer competitive advantages during economic shocks (Lado & Wilson 1994), and the results of this study suggest that the impact of human capital on business closure is nuanced and may depend on the specific stage of the economic shock and the industry context.

The result reveals that foreign-owned businesses had an insignificant negative impact on business closure overall, indicating that business ownership may not have a significant impact on business closure during economic shocks, regardless of whether the business is foreign-owned or not. This result is contrary to previous studies that suggest that foreign-owned businesses may have better access to financial resources, management capabilities and technologies (Umiński, Nazarczuk & Borowicz 2023), which may contribute to their greater resilience during economic shocks.

The results presented in Table 3 indicate that the food variable had a negative and significant impact on business closure in the second, third and fourth quarters of 2020. This suggests that firms operating in the food industry were less vulnerable to closure during the economic shock, perhaps due to factors such as increased demand for essential food products, or other industry-specific advantages that allowed food firms to weather the economic storm more effectively. These findings are corroborated by previous research that investigated the impact of the 1998 Russian crisis on the economies of Eastern Europe and Central Asia (Swinnen & Van Herck 2009). The research indicated that the region experienced significant economic growth in the aftermath of the crisis, leading to increased agricultural productivity and poverty reduction. However, recent financial crises have the potential to reverse these gains and may have a detrimental effect on the economic and social well-being of the region (Swinnen & Van Herck 2009).

Tex_Gar had a positive and significant impact on business closure overall. This was not the case for early and late closure. In mid- and late closure, the impact was positive but not significant, while the overall impact was positive and significant at the 5% level. Regarding FabMet_Products and Motor_Vehicle in Table 3, neither of these industries had a significant impact on business closure in any of the four quarters examined. This suggests that these industries were not particularly affected by business closure in 2020. The insignificant impact may be due to factors such as the size of these industries, the resilience of these industries to business closure, or the availability of alternative suppliers or customers for these industries. Some studies have found that industries that are more stable and less sensitive to changes in consumer demand, economic conditions and technological changes may be more resilient to economic shocks (Team 2023).

Businesses with sales that stayed the same during the year had a significant negative impact on business closure in all quarters, as well as in the overall analysis. This suggests that maintaining consistent sales levels may be an important factor in preventing business closure. The finding states that sales are a key factor in business resilience during economic shocks, which aligns with prior research, highlighting the importance of revenue and profitability in conferring competitive advantages during economic shocks (Bavdaž et al. 2022). Specifically, businesses with strong sales growth may be able to generate the resources needed to adapt to changing circumstances, invest in new technologies and marketing strategies and maintain or expand their customer base, all of which can contribute to resilience during economic shocks (Garrido-Moreno, Martín-Rojas & García-Morales 2024). While the positive impact of sales on business resilience during economic shocks is supported by prior research, there are also findings that suggest a more complex relationship between sales and business closure during economic shocks. For example, some studies suggest that businesses with high sales growth may be more vulnerable to economic shocks due to their reliance on debt financing and their tendency to over-invest in fixed assets (Bavdaž et al. 2022).

Although firm size was not consistently significant across all quarter-specific models, descriptive statistics and selected regression results indicate that small firms were relatively more vulnerable to closure during the pandemic period. Small_Ent had a significant positive impact on business closure in the third quarter of 2020 and also in the overall year of 2020. The significant positive impact of small business ownership on business closure suggests that small businesses may be more vulnerable to economic shocks than larger businesses, aligning with prior research (Miklian & Hoelscher 2022). By contrast, medium to large businesses had an insignificant negative impact on business closure in all quarters. This suggests that, overall, small businesses were more likely to experience business closure than medium to large businesses.

Table 4 presents the logistic regression analysis results of the impacts of each characteristic at the firm and individual levels on the closure disparity of differently sized businesses during the pandemic in South Africa. The results reveal the significance and relationship the independent variable has with the business closure of firms in South Africa during COVID-19.

The findings indicate that Female_Owner and Exp_Managers had a significant positive impact on small and medium-sized firms and had a significant negative impact on large firms. This can be explained by several theories. One possible explanation is based on the theory of human capital, which suggests that women entrepreneurs may have different management styles and decision-making processes that confer resilience during economic shocks (Acevedo-Duque et al. 2025). Additionally, experienced managers may be more adept at navigating economic

TABLE 4: Logistic regression results for firm size.

Variables	Marginal effect: Small_Ent	Marginal effect: Medium_Ent	Marginal effect: Large_Ent
Female_Owner	0.002 (0.053)	0.009 (0.051)	-0.027 (0.052)
Exp_Managers	0.000 (0.002)	0.001 (0.001)	-0.002 (0.001)
Temp_Workers	-0.040 (0.036)	0.015 (0.034)	0.024 (0.032)
Crit_Thinking	-0.065 (0.050)	0.026 (0.042)	0.059 (0.074)
Com_Skills	0.069 (0.085)	0.025 (0.047)	-0.079 (0.069)
Female_Workers	-0.007*** (0.002)	0.000 (0.001)	0.003** (0.001)
Tech_Skills	0.014 (0.064)	0.038 (0.053)	-0.085 (0.071)
Skilled	-0.005** (0.002)	-0.001 (0.002)	0.004** (0.002)
Food	-0.344*** (0.058)	-0.004 (0.047)	0.274*** (0.040)
Tex_Gar	-0.295*** (0.077)	0.107* (0.061)	0.152*** (0.058)
FabMet_Products	-0.304 (0.100)	0.066 (0.079)	0.192*** (0.070)
Motor_Vehicle	-0.186*** (0.054)	0.015 (0.049)	0.167*** (0.044)
Foreign_Owned	-0.004 (0.004)	0.000 (0.002)	0.002 (0.002)
Sales_Same	-0.101* (0.054)	0.051 (0.048)	0.035 (0.046)
Sales_Increased	0.014 (0.072)	-0.005 (0.068)	-0.012 (0.065)

Note: Standard errors are indicated in parentheses.

Exp, experience; Temp, temporary; Crit, critical; Com, communication; Tech, technical; Ent, enterprise; Tex_Gar, Textile and Garment Sector; FabMet, Fabricated Metal Product Sector.

*, $p < 0.1$; **, $p < 0.5$; ***, $p < 0.01$.

shocks due to their greater knowledge and expertise (Nguyen et al. 2023). Temp_Workers and Crit_Thinking had an insignificant negative impact on small firms, while it had an insignificant positive impact on medium and large firms. Com_Skills and Tech_Skills both had an insignificant positive impact on small and medium firms and had an insignificant negative impact on large firms. The insignificant impact of temporary workers, communication skills and technical skills on small firms suggests that these factors may not have been as important for business resilience during the pandemic in small, medium and large firms. While prior research states that innovative human capital may be more valuable to small firms than larger-sized firms (McGuirk, Lenihan & Hart 2015), the specific conditions of the pandemic may have altered their relative importance or significance. For example, temporary workers may have been less prevalent in small businesses during the pandemic due to financial constraints, or communication skills may have been less critical in sectors where physical distancing was required.

The results in Table 4 also revealed that Female_Workers has a significant negative marginal effect at 1% impact on small firms, and it had a significant positive impact on large firms at 5%, while it had an insignificant positive impact on medium firms. This suggests that the presence of female workers may be more beneficial for business resilience in small and large firms, while less so in medium-sized firms. This finding aligns with the study that suggests female workers may bring stronger social capital to businesses (Leeves & Herbert 2014), which can contribute to greater business resilience during economic shocks (Torres, Marshall & Sydnor 2019). Skilled workers had a significant negative impact on small firms at 5%, a significant positive impact on large firms at 5% and an insignificant negative impact on medium firms. These results appear to contradict studies that have investigated the relationship between knowledge management and business resilience. These studies suggest that small firms may have

limited ability to manage and leverage the knowledge of their skilled workers compared with large firms, which can make them less resilient to economic shocks (Desouza & Awazu 2006; Sarkar & Clegg 2021).

Food has a significant positive impact on large firms at 1%, an insignificant negative impact on medium firms and a negative significant positive impact at 1% on small firms. The results show that Tex_Gar has a significant positive impact on both medium and large firms at 10% and 1%, respectively, while it has a significant negative impact at 1% on small firms. FabMet_Products has an insignificant negative impact on small firms, an insignificant positive impact on medium firms and a significant positive impact on large firms at 1%. The Motor_Vehicle has a significant negative impact at 1% on small firms, an insignificant positive impact on medium firms, while it has a significant positive impact on large firms at 1%. The results related to food, textiles and garments, fabricated metal products and motor vehicles suggest that different industries may have different levels of resilience during economic shocks, depending on firm size.

Foreign_Owned and Sales_Same both had a positive impact on medium and large firms. One possible explanation is based on the theory of economies of scale, which suggests that larger firms may have access to greater resources and economies of scale that allow them to more easily weather economic shocks (Kenton 2024), but both Foreign_Owned and Sales_Same are insignificant. However, Foreign_Owned had an insignificant negative impact of small firms while Sales_Same had a significant negative at 10%. Sales_Increased also had an insignificant negative impact on small firms; however, it had an insignificant positive impact on medium and large firms.

Diagnostic test results

The Hosmer–Lemeshow (H–L) test was conducted to assess the calibration or goodness-of-fit of the binary logistic regression model across the four categories of closure (closure, early closure, mid-closure and late closure). Based on the obtained p -values of 0.2692 for closure, 0.6766 for early closure, 0.2565 for mid-closure and 0.0977 for late closure, the following conclusions can be drawn:

The results indicate that the model is well-calibrated for both closure ($p = 0.2692$) and early closure ($p = 0.6766$) categories. This suggests that the predicted probabilities of closure for these two categories are in good agreement with the observed data, providing confidence in the model's overall reliability. However, the p -value of 0.0977 for the late closure category is slightly below the conventional threshold of 0.10, which may indicate a potential mis-specification of the model for this specific category (Table 5).

Further investigation into the potential causes of this mis-specification in the late closure category could be warranted, such as examining the regression coefficients and confidence intervals for the predictor variables or considering the

inclusion of additional covariates. Nevertheless, the overall calibration of the model across the majority of the closure categories provides a solid foundation for subsequent analysis and interpretation of the results.

The VIF test was conducted to assess whether there is any multicollinearity in the logistic regression model.

After applying the VIF test to the logistic regression model analysing the determinants of business closures during the COVID-19 pandemic, the results show evidence of multicollinearity among some workforce-skill variables, particularly communication skills, technical skills and critical thinking. These variables were retained due to their theoretical relevance and distinct conceptual roles in explaining business resilience. Although multicollinearity may increase standard errors, it does not bias coefficient estimates. Therefore, interpretation focuses on statistically significant predictors, and this limitation is acknowledged in the study.

Conclusion

This study seeks to investigate the determinants of disparities in the early closure of businesses during the COVID-19 pandemic, evident in South Africa over the 2020–2021 period. The findings of this study suggest that small-sized firms are more vulnerable to closure than medium and large-sized firms during an economic shock

TABLE 5: Hosmer–Lemeshow (H–L) test results.

Hosmer–Lemeshow (H–L) test	<i>p</i> -value
Closure	
Prob > Chi ²	0.2692
Early closure	
Prob > Chi ²	0.6766
Mid-closure	
Prob > Chi ²	0.2565
Late closure	
Prob > Chi ²	0.0977

TABLE 6: Variance inflation factor results.

Variables	Business closure	Early closure	Mid-closure	Late closure
female_owner	1.17	1.30	1.17	1.13
exp_managers	3.18	3.12	3.30	3.31
temp_workers	14.27	13.61	16.34	17.71
crit_thinking	7.00	5.20	7.94	52.55
com_skills	8.90	4.38	57.06	94.74
female_worker	-	-	-	-
tech_skills	17.96	11.33	50.04	90.79
Skilled	1.65	1.31	1.30	1.75
food	1.27	1.37	1.33	1.32
Tex_Gar	1.15	1.24	1.09	1.09
FabMet_Products	1.10	1.16	1.05	1.11
Motor_Vehicle	1.19	1.21	1.20	1.21
foreign_owned	1.04	1.08	1.07	-
sales_same	1.17	1.38	1.23	1.24
sales_increased	1.09	1.12	1.08	1.14
small_ent	2.17	2.02	2.23	2.20
large_ent	1.88	1.89	2.01	1.94

Exp, experience; Temp, temporary; Crit, critical; Com, communication; Tech, technical; Ent, enterprise; Tex_Gar, Textile and Garment Sector; FabMet, Fabricated Metal Product Sector.

such as the COVID-19 pandemic. Key determinants of business closure disparity included skilled workers, female workers and certain industries, with these factors having varying impacts depending on firm size. Different determinants were associated with business closures of differently sized firms in South Africa during the COVID-19 pandemic. Specifically, skilled workers, female workers and certain industries (food, textile and motor vehicles) were found to have a strong negative impact on business closure in small-sized firms, while skilled workers, female workers and the food industry had a strong positive impact on large-sized firms. However, only the textile and garment industry had a weak positive impact on business closure in medium-sized firms.

Based on the findings of the study, some policy recommendations are proposed: Firstly, the provision of targeted support and financial assistance by the government could include providing low-interest loans, tax relief or other forms of financial aid to help businesses stay afloat during periods of economic uncertainty. The root causes of discrepancies could also be addressed by the government by introducing a simplified registration process for SMEs, allowing for faster and more efficient business registration, reducing barriers to entry for entrepreneurs. Secondly, results have shown that companies with more women in leadership positions are more likely to outperform their competitors, and that gender-diverse teams are more innovative and make better decisions. By promoting gender equality and increasing the representation of women in leadership roles, businesses can improve their decision-making processes, innovation capabilities and overall resilience. This can be done by implementing diversity quotas or targets within businesses, especially at the leadership level. This could be driven by the government through legislation or incentives, or by individual businesses through internal policies and practices.

Furthermore, in the digital economy, businesses must adapt to changing market conditions and embrace new technologies to remain competitive and mitigate the effects of economic uncertainties and shocks. The government could help and motivate businesses by implementing policies and incentives that encourage businesses to invest in digital technologies, such as tax breaks for technology investments, grants for R&D in digital innovation or subsidies for digital infrastructure development. The government could also collaborate with educational institutions and businesses to develop training programmes and courses to equip workers with the digital skills needed to support the adoption of digital technologies in businesses. Research shows that companies that invest in digital transformation and digital technologies are more likely to be resilient to economic shocks and can navigate the complex and changing business environment more effectively. This will help businesses to withstand the adverse effects of economic disruptions and reduce the risk of closure.

Contribution of the study

The pandemic has had a profound impact on all businesses in a disproportionate manner. Understanding the determinants of disparities in early closure is critical to developing policies and strategies to support SMEs and promote inclusive economic growth.

Firstly, the study contributes to the existing literature on the impact of the pandemic on businesses in South Africa. While there has been some research on the impact of the pandemic on SMEs, there remains a need for a more detailed analysis of the determinants of disparities in closure for both SMEs and large businesses. This study will help to fill this gap, providing insights into the factors that have contributed to the uneven impact of the pandemic on businesses in the country.

Secondly, the study has implications for policy and practice. By identifying the determinants of disparities in business closure, the study will inform the development of policies and strategies to support businesses and promote economic recovery. This is particularly important given the critical role that SMEs play in the South African economy, accounting for a significant proportion of employment and the country's gross domestic product (GDP).

Overall, the study of determinants of disparities in the closure of businesses during the COVID-19 pandemic is significant for its contribution to our understanding of the impact of the pandemic on businesses and its potential to inform policies and strategies to support SMEs and promote inclusive economic growth.

Limitations of the study

The study's findings are somewhat constrained because the data frequency used was only for 2020–2021, which limits the analysis beyond that period. The analysis may not be representative of all South African enterprises due to data constraints. Although the COVID-19 pandemic's consequences are the main focus of the investigation, business closures may also be impacted by other variables like political unrest and economic downturns. The wider social and economic effects of company closures are not taken into account in the study. The study's conclusions, however, can nevertheless guide policy interventions aimed at reducing the impact of economic disruptions on businesses.

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Competing interests

The authors declare that they have no financial or personal relationships that may have inappropriately influenced them in writing this article.

CRedit authorship contribution

Nomfundo Nxazonke: Conceptualisation, Data curation, Formal analysis, Methodology, Writing – original draft. Godfred Anakpo: Conceptualisation, Formal analysis, Methodology, Supervision, Writing – original draft, Writing – review and editing. Syden Mishi: Conceptualisation, Formal analysis, Methodology, Supervision, Writing – original draft, Writing – review and editing.

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Data availability

The data that support the findings of this study are available from the corresponding author, Godfred Anakpo, upon reasonable request.

Disclaimer

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