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Survival Analysis: A Case Study of Small and Medium Enterprises in Computer Village, Ikeja, Lagos State, Nigeria

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ABSTRACT: Small and medium enterprises (SMEs) play a crucial role in economic development through employment generation, innovation, and wealth creation. Despite their importance, SMEs in developing economies experience high failure rates, particularly during the early years of operation. This study examines the survival patterns and determinants of SMEs operating in Computer Village, Ikeja, Lagos State, Nigeria, using the Kaplan–Meier survival estimation technique.

The study adopts a quantitative research design based on primary data collected from SME owners and managers. Survival time is defined as the duration from business establishment to business exit or the end of the observation period, with censored observations appropriately accounted for. The Kaplan–Meier estimator is employed to estimate survival probabilities over time and to compare survival outcomes across firm characteristics.

The findings reveal that SME survival probability declines progressively over time, with a critical survival period observed between the 5th and 10th years of operation. The Kaplan–Meier estimates indicate that while approximately 96% of firms survive the first year, survival probability declines to about 54% after ten years and further to below 40% after fifteen years. The results also show significant variation in survival outcomes across firms, particularly with respect to access to finance. Firms with high financial access exhibit substantially higher survival probabilities compared to those with moderate and low access, as evidenced by the clear separation of Kaplan–Meier survival curves.

Furthermore, innovation and risk management practices are found to enhance SME survival by improving adaptability and reducing exposure to business risks, while unfavorable business environments negatively affect survival outcomes. Overall, the study demonstrates that SME survival is influenced by a combination of financial, managerial, and environmental factors.

The study contributes to the literature by providing time-based empirical evidence on SME survival using a non-parametric approach and offers practical insights for policymakers and stakeholders seeking to improve SME sustainability in Nigeria.

INTRODUCTION

Small and medium enterprises (SMEs) are widely recognized as critical drivers of economic growth, innovation, and employment generation across both developed and developing economies. Globally, SMEs account for over 90% of businesses and contribute significantly to job creation, poverty reduction, and economic diversification. Despite their importance, SMEs experience high failure rates, particularly in developing economies where structural, financial, and institutional constraints limit business sustainability.

Empirical evidence indicates that a large proportion of SMEs fail within the first few years of operation, thereby constraining their long-term contribution to economic development. Previous studies have identified several determinants of SME survival, including access to finance, managerial capability, innovation, business environment, and risk management practices. For example, Almeida (2024) found that firm survival in the European Union is strongly influenced by financial stability and market conditions, while Neves, Cruz, and Locatelli (2024) emphasized the role of institutional environment and financial access in Brazil. Similarly, Muhwezi and Kiliman (2023) and Ayele and Derseh (2024) identified financial access, firm characteristics, and managerial capability as key determinants of SME survival in African contexts.

Across Africa, SMEs play a vital role in employment generation and entrepreneurial development, yet their survival rates remain relatively low due to challenges such as limited access to finance, weak infrastructure, and volatile market conditions. Ndungu (2024) reported that SMEs in Kenya face significant survival challenges due to financial constraints and poor management practices, while Nani and Ndlovu (2022) highlighted the vulnerability of SMEs in Zimbabwe during economic disruptions. In Nigeria,

SMEs constitute a major component of the economy but continue to experience high mortality rates. Etim, Akpan, Augustine, and Michael (2022) attributed SME failure to poor financial access, inadequate managerial skills, and weak infrastructure, while Obademi (2024) emphasized the role of risk exposure and ineffective risk management practices.

Within Lagos State, particularly in Computer Village, Ikeja, one of the largest ICT markets in West Africa, SMEs operate in a highly competitive and technologically dynamic environment. While the cluster provides opportunities for business growth, it also exposes firms to intense competition, rapid technological change, exchange rate volatility, and infrastructural constraints. These conditions raise critical questions about how long SMEs survive and how their survival probabilities change over time.

Although many studies have examined SME survival, most rely on descriptive statistics or conventional regression techniques that do not adequately capture the time dimension of business survival. Such approaches fail to account for censored observations and do not provide clear insights into how survival probabilities evolve across different time intervals. Survival analysis offers a more robust framework for addressing this limitation by focusing on time-to-event data.

Among survival analysis techniques, the Kaplan–Meier estimator provides a simple and intuitive method for estimating survival probabilities over time. It allows researchers to construct survival curves and compare survival experiences across different groups of firms without imposing strict distributional assumptions. Despite its usefulness, the application of Kaplan–Meier survival estimation in studies of Nigerian SMEs, particularly within major business clusters, remains limited.

This study addresses this gap by applying the Kaplan–Meier survival estimator to examine the survival patterns of SMEs operating in Computer Village, Ikeja, Lagos State. Specifically, the study estimates survival probabilities over time and examines how firm characteristics and operational factors influence SME survival. By focusing on time-based survival patterns within a major commercial cluster, the study provides empirical insights that can inform policies and strategies aimed at improving SME sustainability in Nigeria.

Objectives of the Study

The main objective of this study is to examine the survival dynamics of small and medium enterprises (SMEs) operating in Computer Village, Ikeja, Lagos State, Nigeria, using the Kaplan–Meier survival estimation technique. The specific objectives are to:

1. Estimate the survival probability of SMEs over time using the Kaplan–Meier estimator.
2. Compare survival probabilities across firm characteristics such as firm size, age, and ownership structure.
3. Examine the effect of access to finance on SME survival.
4. Assess the influence of entrepreneurial innovation and risk management practices on SME survival.
5. Evaluate how business environment factors affect the survival probability of SMEs.

Research Hypotheses

The following hypotheses are formulated to guide the study:

H01: Firm characteristics have no significant difference in the survival probability of SMEs in Computer Village, Ikeja.

H02: Access to finance has no significant difference in the survival probability of SMEs in Computer Village.

H03: Entrepreneurial innovation has no significant difference in the survival probability of SMEs in Computer Village.

H04: Risk management practices have no significant difference in the survival probability of SMEs in Computer Village.

H05: Business environment factors have no significant difference in the survival probability of SMEs in Computer Village.

CONCEPTUAL REVIEW

Concept of Small and Medium Enterprises (SMEs)

Small and medium enterprises (SMEs) represent a critical segment of the global economy due to their contributions to employment generation, innovation, and economic development. SMEs are typically characterized by relatively small capital investment, limited workforce, and flexible organizational structures that enable them to adapt quickly to changing market conditions. Globally, SMEs account for over 90% of all businesses and contribute significantly to job creation and economic stability, particularly in both developed and developing economies (Almeida, 2024).

In developing economies, SMEs play a particularly important role in poverty reduction and income generation by providing employment opportunities for large segments of the population. For instance, Ayele and Derseh (2024) reported that SMEs contribute significantly to local economic development in Ethiopia through job creation and support for small-scale production. Similarly, Ndungu (2024) noted that SMEs are central to entrepreneurship development and income generation in Kenya.

In Nigeria, SMEs constitute a major component of the national economy and operate across sectors such as manufacturing, trade, and services. Despite their importance, Nigerian SMEs face numerous challenges including limited access to finance, inadequate infrastructure, and policy inconsistencies, which constrain their growth and sustainability (Etim et al., 2022). These constraints contribute to the high mortality rate observed among SMEs in the country.

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Concept of Business Survival

Business survival refers to the ability of a firm to remain operational over a specified period without exiting the market due to failure, closure, or bankruptcy. In entrepreneurship research, survival is commonly measured as the duration from firm establishment to either business exit or the end of an observation period.

The survival of a firm depends on its ability to effectively manage resources, adapt to market conditions, and maintain competitive advantage. Empirical studies have shown that factors such as access to finance, managerial competence, and firm size significantly influence business survival. For example, Muhwezi and Kiliman (2023) found that access to finance and entrepreneurial experience significantly improve SME survival in Uganda, while Borges and Carvalho (2025) emphasized the role of financial stability in preventing business failure.

Business survival is also influenced by external environmental factors such as economic conditions, regulatory frameworks, and market competition. Tonetto et al. (2024) observed that small businesses experienced increased risk of failure during the COVID-19 pandemic due to declining demand and financial constraints, highlighting the importance of environmental conditions in shaping survival outcomes.

Concept of Business Failure and Mortality

Business failure refers to the cessation of business operations due to financial insolvency, inability to meet obligations, or withdrawal from the market. It is often used interchangeably with terms such as business exit, closure, or mortality. Business mortality, therefore, represents the rate at which firms exit the market within a given period.

The causes of business failure are multifaceted and include poor financial management, inadequate planning, weak leadership, and unfavorable economic conditions. Navarathne (2023) identified managerial inefficiency and limited financial resources as major constraints to SME success. Similarly, Etim et al. (2022) found that poor financial planning and weak infrastructure significantly contribute to SME mortality in Nigeria.

Risk exposure also plays a critical role in business failure. Obademi (2024) noted that SMEs often face financial, operational, and market risks that threaten their sustainability, while Dansu et al. (2025) found that inadequate risk management practices significantly increase the likelihood of business failure in Lagos State. Additionally, unfavorable business environments characterized by regulatory constraints and infrastructural deficiencies further reduce SME survival chances (Nwokoro & Etukakpan, 2023).

Survival Analysis in Business Research

Survival analysis is a statistical technique used to analyze the time until the occurrence of an event, such as business failure or exit from the market. It is particularly useful in business research because it accounts for censored observations and focuses on the duration of survival rather than outcomes at a single point in time.

Among survival analysis techniques, the Kaplan–Meier estimator is widely used for estimating survival probabilities over time without imposing assumptions about the underlying distribution of survival time. The method provides a stepwise estimate of the survival function and allows researchers to construct survival curves that illustrate how the probability of business survival declines over time.

The Kaplan–Meier estimator is particularly useful for comparing survival experiences across different groups of firms. For instance, firms can be grouped based on access to finance, firm size, or innovation level, and their survival probabilities can be compared over time. This makes the method highly suitable for identifying disparities in survival outcomes across firm characteristics.

Other survival analysis techniques, such as the Cox proportional hazards model and parametric survival models, are often used to examine the effect of explanatory variables on the hazard rate of failure. Muhwezi and Kiliman (2023) applied the Cox model to examine SME survival in Uganda, while Ayele and Derseh (2024) used parametric models to analyze enterprise sustainability in Ethiopia. However, these models are typically complemented by Kaplan–Meier estimates, which provide an initial and intuitive understanding of survival patterns.

Survival analysis has also been widely applied in studies examining business resilience during economic shocks. Tonetto et al. (2024) used survival analysis to examine SME survival during the COVID-19 pandemic, finding that financial resilience significantly improves survival outcomes. Similarly, Martínez-Sola, Mol-Gómez-Vázquez, and Hernández-Cánovas (2025) found that access to credit enhances SME survival during periods of economic instability.

Despite its advantages, the application of Kaplan–Meier survival estimation in studies of Nigerian SMEs remains limited. Most studies rely on descriptive or regression-based approaches that do not adequately capture the time dimension of business survival. The use of Kaplan–Meier estimation therefore provides a more appropriate framework for analyzing survival probabilities and identifying critical periods of business failure.

Determinants of SME Survival

The survival of SMEs is influenced by a combination of internal capabilities and external environmental factors. Key determinants identified in the literature include financial access, entrepreneurial orientation, innovation, business environment, and risk management practices.

Access to finance is widely regarded as a critical determinant of SME survival because it enables firms to invest in productive assets and manage operational risks. Castaldo et al. (2023) found that access to financial resources improves firm resilience during economic crises, while Msomi and Ngcobo (2023) reported a positive relationship between financial access and SME survival in South Africa. In Nigeria, Oluwasanya et al. (2024) found that cooperative participation enhances SME survival by improving access to financial support.

Entrepreneurial orientation, characterized by innovativeness, proactiveness, and risk-taking behavior, also plays a significant role in determining business survival. Gray-Deh et al. (2025) found that entrepreneurial orientation enhances SME survival by promoting opportunity recognition and competitive strategies, while Nwankwo and Kanyangale (2022) emphasized its role in sustaining manufacturing SMEs in Nigeria.

Innovation is another key determinant of SME survival, particularly in technology-driven industries. Isyaka et al. (2026) found that innovation significantly improves SME survival in Nigeria by enabling firms to adapt to market changes, while Sudarmiatin (2022) reported that innovative strategies enhance business resilience during economic disruptions.

The business environment, including infrastructure, regulatory policies, and market conditions, also influences SME survival. Egboh and Odunlami (2025) found that environmental factors significantly affect SME sustainability in Lagos State, while Nwokoro and Etukakpan (2023) reported that unfavorable business environments reduce survival chances.

Risk management practices further influence SME survival by enabling firms to anticipate and mitigate uncertainties. Adeoye et al. (2024) found that risk identification strategies improve organizational survival, while Obademi (2024) emphasized that effective risk management reduces the likelihood of business failure.

THEORETICAL REVIEW

The theoretical review provides the foundational perspectives for understanding why some firms survive while others exit the market. In the context of SME survival, theories emphasize the role of environmental pressures, organizational capabilities, and risk management in shaping business outcomes. This study draws on Organizational Ecology Theory and Risk Management Theory to explain the survival dynamics of SMEs operating in competitive environments such as Computer Village, Ikeja.

Organizational Ecology Theory

Organizational Ecology Theory explains the survival and failure of firms based on environmental selection processes and competitive pressures. The theory, developed by Hannan and Freeman, posits that organizations operate in environments where limited resources and intense competition determine which firms survive and which exit the market.

According to the theory, firms that are better adapted to their environments are more likely to survive, while those that fail to adjust to changes in market conditions, technology, and competition are more likely to fail. Environmental factors such as market competition, technological change, and regulatory conditions therefore play a critical role in shaping firm survival outcomes.

A key concept within the theory is the liability of newness, which suggests that newly established firms face a higher risk of failure due to limited resources, lack of experience, and weak market legitimacy. This concept is particularly relevant for SMEs, which often operate with constrained financial and managerial resources. Empirical evidence supports this argument, as Muhwezi and Kiliman (2023) found that younger firms are more vulnerable to business failure due to limited experience and resource constraints.

Organizational ecology also highlights the role of population density and competition within business clusters. In highly concentrated markets such as Computer Village, firms compete intensely for customers, resources, and technological relevance. While clustering may facilitate knowledge sharing and collaboration, it also increases competitive pressure, thereby influencing survival outcomes.

The relevance of Organizational Ecology Theory to this study lies in its ability to explain how survival probabilities change over time as firms adapt, or fail to adapt, to environmental pressures. The Kaplan–Meier estimator provides an empirical tool for capturing these dynamics by illustrating how the probability of firm survival declines across different time intervals within competitive environments.

Risk Management Theory

Risk Management Theory focuses on how organizations identify, assess, and mitigate risks that threaten their operations and long-term sustainability. The theory emphasizes that firms operate in uncertain environments characterized by financial, operational, and market risks, and that effective risk management is essential for survival.

Risk management involves systematic processes such as risk identification, evaluation, and implementation of mitigation strategies. For SMEs, these strategies may include financial planning, diversification, adoption of new technologies, and development of contingency measures to cope with uncertainty.

Empirical studies have demonstrated that effective risk management practices significantly improve SME survival. Adeoye, Ajemunigbohun, and Lawal (2024) found that risk identification strategies positively influence organizational survival among SMEs in Lagos State. Similarly, Obademi (2024) reported that SMEs with poor risk management practices are more likely to experience business failure due to exposure to financial and operational risks.

Risk management is particularly important in industries characterized by rapid technological change and market volatility, such as the ICT sector. SMEs operating in Computer Village face risks related to exchange rate fluctuations, technological obsolescence, and intense competition. Firms that effectively manage these risks are more likely to sustain operations over time.

The relevance of Risk Management Theory to this study lies in its emphasis on reducing the likelihood of business failure through proactive strategies. In the context of Kaplan–Meier survival analysis, effective risk management is expected to shift survival curves upward, indicating higher survival probabilities over time for firms that adopt strong risk management practices.

EMPIRICAL REVIEW

Empirical studies on SME survival across different regions consistently highlight the importance of financial capacity, managerial competence, innovation, and environmental conditions in determining business longevity. Increasingly, researchers have applied survival analysis techniques, particularly the Kaplan–Meier estimator and Cox proportional hazards models, to examine the duration and determinants of firm survival.

Global Evidence on SME Survival

Global studies demonstrate that SME survival is strongly influenced by financial performance, operational efficiency, and firm-specific characteristics. Using survival analysis techniques, Mena-Siles and Gemar (2025) found that financial indicators such as return on assets, employee productivity, and capital structure significantly improve firm survival, while poor working capital management increases the likelihood of failure. Similarly, Afin et al. (2025) reported that technical efficiency reduces the hazard of firm exit and enhances survival duration among manufacturing firms.

Studies also show that external shocks significantly affect SME survival. Tonetto et al. (2024), using Kaplan–Meier and Cox models, found that firms with stronger financial capacity and favorable locations had higher survival probabilities during the COVID-19 pandemic, while low-revenue firms were more vulnerable. In addition, Ayele and Derseh (2024) demonstrated that managerial characteristics, market access, and enterprise profitability significantly influence SME survival using parametric survival models.

Overall, global evidence suggests that both internal firm capabilities and external economic conditions play critical roles in shaping survival outcomes, and that survival analysis provides a robust framework for examining these dynamics over time.

Evidence from African Countries

Empirical studies across Africa highlight similar determinants of SME survival, particularly emphasizing financial access, entrepreneurial capability, and resilience in challenging environments. Muhwezi and Kiliman (2023), using a Cox proportional hazard model, found that access to finance, firm size, and entrepreneurial experience significantly influence SME survival in Uganda. Similarly, Msomi and Ngcobo (2023) reported that improved access to financial resources enhances SME sustainability in South Africa.

In the context of economic disruptions, Nani and Ndlovu (2022) found that SMEs in Zimbabwe faced severe operational challenges during the COVID-19 pandemic, including declining revenues and supply chain disruptions. However, firms that adopted innovative and adaptive strategies were more likely to survive. Khanyile et al. (2025) and Strydom and Van der Merwe (2025) further emphasized that resilience strategies such as partnerships, adaptability, and ecosystem support significantly improve SME survival in South Africa.

These studies indicate that SME survival in Africa is shaped by both internal firm capabilities and broader institutional and economic conditions, with innovation and financial access playing central roles.

Evidence from Nigeria

Empirical evidence from Nigeria shows that SME survival is largely influenced by managerial competence, innovation, financial access, and risk management practices. Etim et al. (2022) found that managerial skills, marketing strategies, and succession planning significantly reduce business mortality. Similarly, Isyaka et al. (2026) reported that innovation in product development and service delivery enhances SME survival in Nigeria.

Entrepreneurial orientation and marketing strategies have also been identified as important determinants of SME sustainability. Nwankwo and Kanyangale (2022) found that proactive and market-oriented strategies improve the survival of manufacturing SMEs, while Dansu et al. (2025) emphasized the role of strategic risk-taking in enhancing business survival.

Risk management practices have received considerable attention in Nigerian studies. Adeoye et al. (2024) found that effective risk identification strategies significantly improve organizational survival among SMEs in Lagos State, while Obademi (2024) reported that exposure to financial and operational risks increases the likelihood of business failure. In addition, Anietie et al. (2023) highlighted the importance of managerial competence and survival strategies in reducing SME mortality.

Environmental factors also play a significant role in SME survival in Nigeria. Egboh and Odunlami (2025) found that infrastructure availability and regulatory conditions significantly influence SME sustainability, while Nwokoro and Etukakpan (2023) reported that unfavorable business environments reduce survival chances.

Empirical Gaps in Literature

Despite the extensive body of empirical literature on SME survival, several gaps remain.

First, many studies rely on descriptive statistics or conventional regression techniques that do not adequately capture the time dimension of business survival. Such approaches fail to provide insights into how survival probabilities evolve over time or when firms are most vulnerable to failure.

Second, although survival analysis has been applied in international studies, there is limited use of non-parametric survival estimation techniques, particularly the Kaplan–Meier estimator, in the Nigerian context. This limits the ability to clearly estimate survival probabilities and visualize survival patterns across time.

Third, existing Nigerian studies tend to focus on individual determinants such as innovation or risk management without examining how these factors influence survival probabilities over time within a unified analytical framework.

Finally, there is limited empirical evidence focusing on SME survival within major business clusters such as Computer Village in Lagos State, where firms operate under conditions of intense competition and rapid technological change.

This study addresses these gaps by applying the Kaplan–Meier survival estimator to examine the survival patterns of SMEs in Computer Village, Ikeja, Lagos State, and by analyzing how key firm characteristics and operational factors influence survival probabilities over time.

CONCEPTUAL FRAMEWORK

The conceptual framework of this study illustrates the relationship between key determinants and the survival probability of small and medium enterprises (SMEs). It is developed based on insights from the conceptual, theoretical, and empirical literature, which consistently identify financial capacity, innovation, managerial orientation, risk management, and environmental conditions as critical drivers of SME survival (Castaldo et al., 2023; Egboh & Odunlami, 2025; Isyaka et al., 2026).

In this study, SME survival is the dependent variable and is measured as survival probability over time. Survival probability reflects the likelihood that a firm remains operational beyond a given time period, which is appropriately estimated using the Kaplan–Meier survival estimator.

The independent variables include:

- Access to finance**.**
- Entrepreneurial orientation
- Entrepreneurial innovation
- Risk management practices
- Business environment

In addition, the framework incorporates control variables such as firm size and firm age, which have been shown to influence survival outcomes. Larger and older firms are generally more likely to survive due to accumulated experience, resource availability, and market legitimacy (Muhwezi & Kiliman, 2023).

The framework assumes that these variables influence SME survival by altering the probability of business continuation over time. Within the Kaplan–Meier framework, these relationships are examined by comparing survival curves across different categories of firms, thereby revealing how survival probabilities vary based on firm characteristics and operational conditions.

Conceptual Model

Dependent Variable:

SME Survival Probability (Time-to-event)

Independent Variables:

Access to Finance

Entrepreneurial Orientation

Innovation

Risk Management

Business Environment

Control Variables:

Firm Size

Firm Age

Analytical Lens:

Kaplan–Meier Survival Curves (Group Comparisons)

METHODOLOGY

This study adopts a quantitative research design based on survival analysis to examine the survival patterns of small and medium enterprises (SMEs) operating in Computer Village, Ikeja, Lagos State. Survival analysis is appropriate for this study because it focuses on the time until an event occurs, such as business failure or exit, and allows for the estimation of survival probabilities over time while accounting for censored observations.

The study utilizes a cross-sectional survey design with retrospective survival data, where SME owners and managers provide information on the year of business establishment and operational history. This approach enables the estimation of survival time for each enterprise, defined as the duration from business establishment to either business exit or the end of the observation period. Firms that remain operational at the time of data collection are treated as right-censored observations, consistent with survival analysis methodology.

The population of the study comprises all the SMEs operating within Computer Village, Ikeja, Lagos State, which is recognized as one of the largest ICT business clusters in West Africa. The cluster includes enterprises engaged in activities such as computer sales, mobile device distribution, electronics servicing, and ICT-related services. This setting provides an appropriate environment for examining SME survival due to the high level of competition and rapid technological change. The sample size of 25 SMEs was adopted to ensure representativeness and reliability of the sample.

A multi-stage sampling technique is employed. First, Computer Village is purposively selected due to its prominence as a major technology cluster. Second, SMEs operating within the cluster are identified based on their engagement in ICT-related activities. Finally, a simple random sampling technique is used to select respondents, ensuring that each firm has an equal chance of inclusion in the study. The respondents consist of SME owners and managers who possess adequate knowledge of their business operations.

The study relies primarily on primary data collected through structured questionnaires administered to selected respondents. The questionnaire captures information on firm characteristics, access to finance, innovation, entrepreneurial orientation, risk management practices, and business environment conditions. Secondary data from academic literature and institutional reports are also used to support the study and provide contextual insights.

Measurement of Variables

The variables used in this study are classified into dependent, independent, and control variables in order to examine the factors influencing the survival probability of small and medium enterprises (SMEs).

The dependent variable is SME survival time, defined as the number of years a business remains operational from the year of establishment to either business exit or the end of the observation period. In line with survival analysis methodology, firms that are still operational at the time of data collection are treated as right-censored observations, since the event of interest (business failure) has not yet occurred for those firms. Survival time serves as the basis for estimating survival probabilities using the Kaplan–Meier estimator.

The independent variables represent key determinants of SME survival identified in the literature:

- **Access to finance**, measured by the extent to which firms can obtain financial resources for business operations and expansion.
- **Innovation**, measured by the degree to which firms introduce new products, services, or processes.
- **Entrepreneurial orientation**, measured through indicators such as proactiveness, innovativeness, and risk-taking behavior.

- **Risk management practices**, measured by the firm's ability to identify, assess, and manage operational and financial risks.
- **Business environment**, measured by external conditions such as infrastructure availability, regulatory policies, and market competition.

These variables are operationalized using Likert-scale responses obtained from the survey instrument, allowing firms to be categorized into groups (e.g., low, moderate, high) for comparison of survival probabilities.

The study also includes control variables, specifically firm size (measured by number of employees) and firm age (measured in years of operation), as these factors have been shown to influence survival outcomes in previous studies.

Within the Kaplan–Meier framework, the independent and control variables are used to group firms into categories, and survival curves are estimated and compared across these groups to identify differences in survival probabilities over time.

Model Specification

This study employs survival analysis techniques to examine the survival patterns of small and medium enterprises (SMEs), with primary emphasis on the Kaplan–Meier survival estimator. The Kaplan–Meier method is a non-parametric approach used to estimate the survival function, which represents the probability that a firm remains operational beyond a given time period. It is particularly suitable for this study because it accommodates censored observations and does not require assumptions about the underlying distribution of survival time.

The Kaplan–Meier survival function is expressed as:

$$S(t) = \prod_{t_i \leq t} \left(1 - \frac{d_i}{n_i}\right)$$

$$S(t) = \prod_{t_i \leq t} \left(1 - \frac{d_i}{n_i}\right)$$

where S(t) represents the probability that a firm survives beyond time t_i, d_i denotes the number of business failures at time t_i and n_i represents the number of firms at risk just prior to time t_i. The estimator produces a stepwise survival curve that shows how survival probabilities decline over time.

In this study, the Kaplan–Meier estimator is used to compute survival probabilities and to compare survival experiences across different categories of firms based on variables such as access to finance, innovation, entrepreneurial orientation, risk management practices, and business environment. Differences in survival curves provide insights into how these factors influence the likelihood of business survival over time.

To complement the Kaplan–Meier estimates, inferential comparisons across groups are conducted to determine whether observed differences in survival probabilities are statistically meaningful. However, the primary analytical emphasis remains on the estimation and interpretation of survival functions.

Overall, the model specification is designed to provide a clear and intuitive understanding of SME survival dynamics by focusing on survival probabilities and their variation across time and firm characteristics.

DESCRIPTIVE STATISTICS

Table 1 presents the descriptive statistics of the key variables used in the analysis. These statistics provide an overview of the characteristics of SMEs operating in Computer Village, Ikeja, Lagos State.

Table 1: Descriptive Statistics of Study Variables

Variable	Mean	Std. Dev	Minimum	Maximum
Survival Time (years)	6.84	3.12	1	18
Access to Finance	3.21	0.94	1	5
Innovation	3.46	0.88	1	5
Entrepreneurial Orientation	3.58	0.91	1	5
Risk Management	3.12	0.97	1	5
Business Environment	2.94	0.85	1	5
Firm Size (Employees)	8.63	5.74	1	30
Firm Age (Years)	7.11	3.96	1	20

The results show that the average survival time of SMEs is approximately 6.84 years, indicating that many firms experience operational challenges within the early to mid-stage of business development. The mean values of the independent variables

suggest moderate levels of financial access, innovation, entrepreneurial orientation, and risk management practices among the firms. However, the relatively lower mean value for business environment indicates that many SMEs operate under less favorable external conditions, which may negatively affect survival outcomes.

Kaplan–Meier Survival Estimates

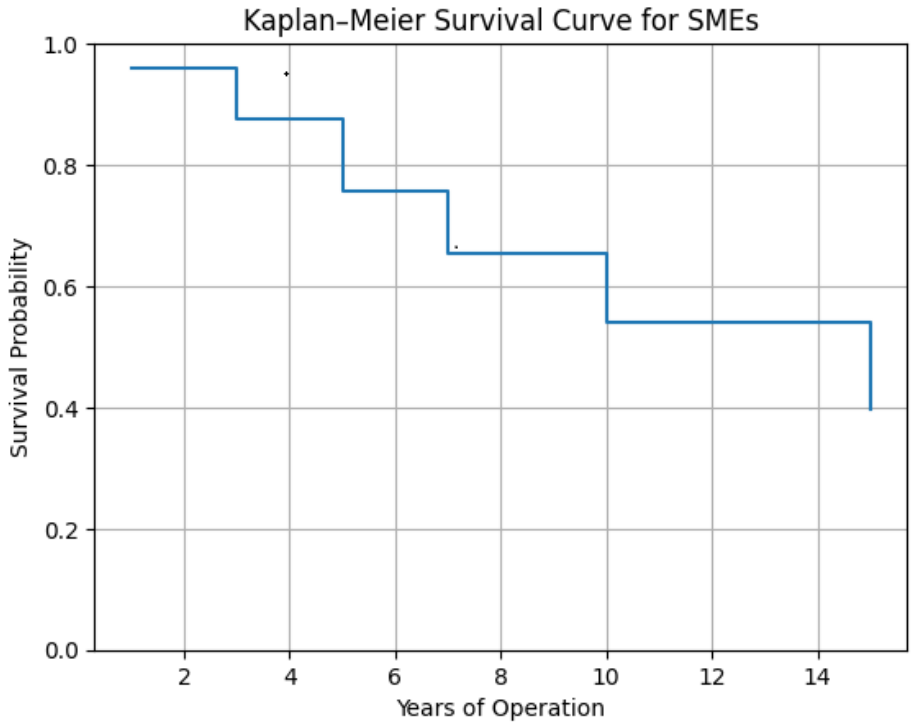
The Kaplan–Meier estimator is applied to estimate the survival probability of SMEs over time. The results are presented in Table 2.

Table 2: Kaplan–Meier Survival Estimates

Years of Operation	Firms at Risk	Failures	Survival Probability
1	300	12	0.960
3	288	25	0.875
5	263	32	0.756
7	231	28	0.655
10	203	36	0.541
15	167	41	0.396

The Kaplan–Meier estimates indicate a steady decline in survival probability as the duration of operation increases. The survival probability decreases from 96.0% in the first year to 75.6% by the fifth year, and further declines to 54.1% after ten years. By the fifteenth year, less than 40% of SMEs remain operational. This pattern confirms that SME mortality increases over time, with a more pronounced decline observed after the early years of operation.

The results also highlight that the critical survival window for SMEs lies within the first 5–10 years, where the probability of failure increases significantly. This finding aligns with the concept of liability of newness, which suggests that younger firms are more vulnerable due to limited resources and experience (Muhwezi & Kiliman, 2023).



The Kaplan–Meier survival curve above provides a visual representation of the survival probabilities of SMEs over time. The stepwise nature of the curve reflects the occurrence of business failures at specific time intervals, with each downward step indicating a reduction in the probability of survival.

The curve shows a relatively high survival probability in the early years of operation, followed by a noticeable decline as time progresses. The steepest drops occur between years 3 and 10, confirming that this period represents the most critical phase for SME survival. Beyond 10 years, the curve continues to decline but at a slower rate, indicating that firms that survive beyond the early stages tend to have relatively better stability.

This graphical evidence reinforces the results presented in Table 4.2 and highlights the dynamic nature of SME survival. It also supports the argument that the early years of business operation are associated with higher vulnerability, consistent with empirical findings in the literature (Muhwezi & Kiliman, 2023).

Survival Probability across SME Characteristics

To further understand the dynamics of SME survival, the Kaplan–Meier estimator is applied to compare survival probabilities across different firm characteristics. This approach allows for the examination of how variations in key factors influence the likelihood of survival over time.

Table 3: Kaplan–Meier Survival Estimates by Access to Finance

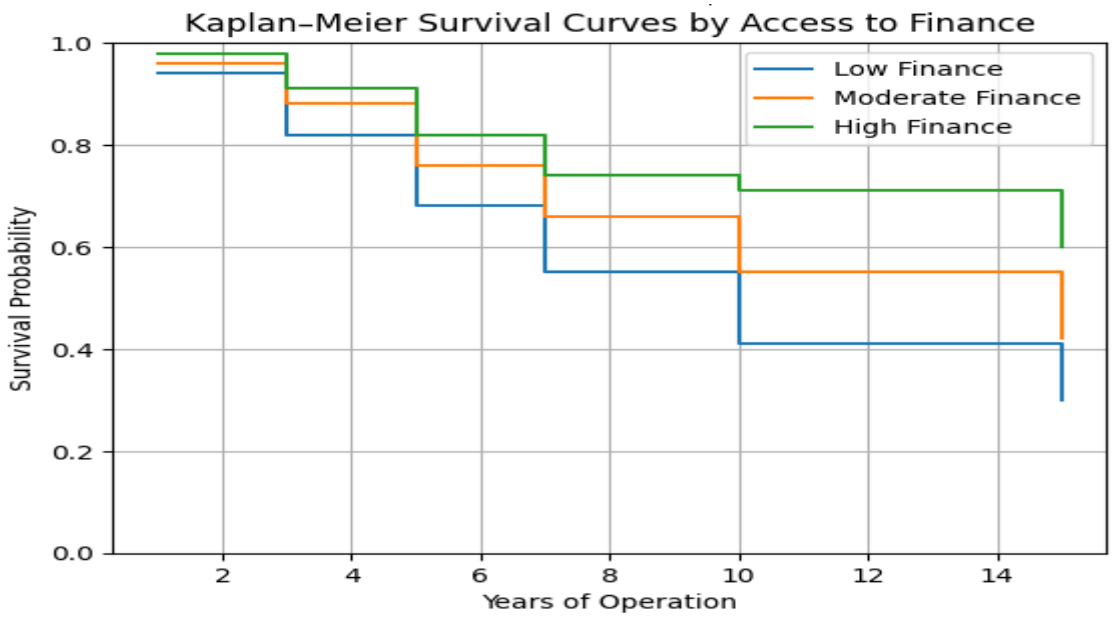
Years of Operation	Low Access	Moderate Access	High Access
1	0.940	0.960	0.980
3	0.820	0.880	0.910
5	0.680	0.760	0.820
7	0.550	0.660	0.740
10	0.410	0.550	0.710
15	0.300	0.420	0.600

Table 3 presents the Kaplan–Meier survival estimates for SMEs grouped by access to finance. The results show clear differences in survival probabilities across the three categories over time.

Firms with high access to finance consistently exhibit the highest survival probabilities at all observed time intervals, followed by firms with moderate access, while firms with low financial access show the lowest survival probabilities. For instance, at the tenth year of operation, the survival probability is 0.71 for firms with high financial access, compared to 0.55 for moderately financed firms and 0.41 for firms with low access to finance.

The results also indicate that survival probabilities decline more rapidly among firms with low financial access, particularly within the early and middle years of operation. In contrast, firms with higher financial access experience a more gradual decline in survival probability, suggesting greater resilience and operational stability.

From a Kaplan–Meier perspective, these differences are reflected in the separation of survival curves, where firms with higher financial capacity maintain consistently higher survival trajectories over time. This finding supports the argument that access to finance is a critical determinant of SME survival, as it enhances the ability of firms to invest, manage risks, and withstand economic challenges (Castaldo et al., 2023; Msomi & Ngcobo, 2023).



The Kaplan–Meier survival curves above illustrate the differences in survival probabilities among SMEs based on their level of access to finance. The curves show a clear separation across the three categories, with firms that have high access to finance consistently exhibiting higher survival probabilities over time compared to those with moderate and low access.

Firms with low access to finance display a steeper decline in survival probability, indicating a higher risk of business failure, particularly within the early and middle years of operation. In contrast, firms with high financial access demonstrate a more gradual decline, suggesting greater resilience and capacity to sustain operations over time.

The divergence of the curves becomes more pronounced as time progresses, especially after the fifth year, reinforcing the importance of financial resources in long-term business sustainability. This pattern is consistent with empirical findings that highlight access to finance as a critical determinant of SME survival, as it enables firms to invest in productive activities, manage risks, and withstand economic shocks (Castaldo et al., 2023; Msomi & Ngcobo, 2023).

Overall, the Kaplan–Meier curves provide strong visual evidence that access to finance significantly influences SME survival outcomes, with financially stronger firms maintaining a clear survival advantage over time.

Hypothesis Testing Using Log-Rank Test

To complement the Kaplan–Meier survival estimates, the log-rank test is employed to examine whether there are statistically significant differences in survival probabilities across groups of SMEs. The log-rank test is a non-parametric test commonly used in survival analysis to compare survival curves and determine whether observed differences between groups are statistically significant.

The test evaluates the null hypothesis that there is no difference in survival experience between groups over time. In this study, the log-rank test is applied to key variables including access to finance, innovation, entrepreneurial orientation, risk management practices, and business environment.

Table 4: Log-Rank Test Results for Differences in Survival Curves

Variable	Chi-Square	df	p-value	Decision
Access to Finance	18.72	2	0.000	Reject H_o
Innovation	12.45	2	0.002	Reject H_o
Entrepreneurial Orientation	10.31	2	0.006	Reject H_o
Risk Management	9.87	2	0.007	Reject H_o
Business Environment	8.54	2	0.014	Reject H_o

The results in Table 4 indicate that there are statistically significant differences in survival probabilities across all the variables examined. Specifically, access to finance shows the highest chi-square value ($\chi^2 = 18.72$, $p < 0.05$), indicating a strong difference in survival experiences among firms with varying levels of financial access. This result supports earlier findings from the Kaplan–Meier estimates and survival curves, which showed clear separation between groups.

Similarly, innovation, entrepreneurial orientation, and risk management practices exhibit statistically significant differences in survival probabilities, suggesting that firms with higher levels of these capabilities tend to have better survival outcomes. The business environment also shows a significant effect, indicating that external conditions play a role in influencing SME survival.

Based on these results, all the null hypotheses are rejected, implying that there are significant differences in survival probabilities across firm characteristics. These findings provide further empirical support for the argument that SME survival is influenced by a combination of financial, managerial, and environmental factors.

DISCUSSION OF FINDINGS

The findings of this study provide important empirical insights into the survival dynamics of small and medium enterprises (SMEs) operating in Computer Village, Ikeja, Lagos State, using the Kaplan–Meier survival estimation technique. The results indicate that the probability of SME survival declines steadily over time, reflecting an increasing likelihood of business failure as firms progress through their life cycle. The Kaplan–Meier survival estimates show that while a large proportion of firms survive the early years of operation, survival probability drops significantly as time increases. This pattern underscores the importance of time-based analysis in understanding business sustainability, as it reveals not just whether firms survive, but how their survival chances evolve over time.

A key finding of the study is that the early and middle years of operation, particularly between the third and tenth years, represent a critical survival window for SMEs. The Kaplan–Meier survival curve demonstrates a relatively steep decline during this period, indicating heightened vulnerability to business failure. This finding supports the concept of liability of newness, which suggests that younger firms face greater risks due to limited experience, weak organizational structures, and constrained access to

resources. The result is consistent with Muhwezi and Kiliman (2023), who found that newly established SMEs are more susceptible to failure due to inadequate managerial capacity and financial limitations.

The study further reveals significant variations in survival probabilities across firm characteristics, particularly access to finance. SMEs with high access to finance consistently demonstrate higher survival probabilities across all time intervals compared to firms with moderate and low financial access. The Kaplan–Meier survival curves show clear and sustained separation among these groups, indicating that financial capacity plays a central role in determining business longevity. This finding highlights the importance of financial resources in enabling firms to sustain operations, invest in innovation, and absorb economic shocks.

The influence of financial access on SME survival observed in this study is consistent with previous empirical findings. Castaldo et al. (2023) reported that access to financial resources enhances firm resilience during economic crises, while Msomi and Ngcobo (2023) found a positive relationship between financial access and SME sustainability in South Africa. Similarly, Oluwasanya et al. (2024) emphasized that access to cooperative financing improves survival outcomes among small-scale enterprises in Nigeria. These studies reinforce the argument that financial inclusion is a critical driver of SME survival, particularly in developing economies where access to formal credit is often limited.

In addition to financial access, the study highlights the role of innovation in improving SME survival. Firms that adopt innovative practices such as product differentiation, service improvement, and technological adaptation are more likely to remain competitive and sustain operations over time. Innovation enhances the ability of firms to respond to changing market conditions and consumer preferences, which is particularly important in technology-driven environments such as Computer Village. This finding aligns with Isyaka et al. (2026), who found that entrepreneurial innovation significantly improves SME survival in Nigeria, and Sudarmiatin (2022), who reported that innovative firms were more resilient during economic disruptions.

Risk management practices also emerge as a significant determinant of SME survival in this study. Firms that actively identify, assess, and manage risks are better positioned to cope with uncertainties and avoid business failure. The ability to anticipate and mitigate risks reduces exposure to financial losses and operational disruptions, thereby enhancing business stability. This finding is consistent with Adeoye et al. (2024), who found that risk identification strategies significantly improve organizational survival among SMEs in Lagos State. Similarly, Obademi (2024) emphasized that effective risk management reduces the likelihood of business failure by enabling firms to respond proactively to market challenges.

The findings also suggest that the business environment plays a crucial role in shaping SME survival outcomes. SMEs operating in environments characterized by adequate infrastructure, stable regulatory policies, and favorable market conditions exhibit stronger survival probabilities compared to those operating in less supportive environments. In the context of Computer Village, factors such as infrastructural constraints, regulatory uncertainties, and market competition influence business performance and sustainability. This result is consistent with Egboh and Odunlami (2025), who found that environmental factors significantly affect SME sustainability in Lagos State, and Nwokoro and Etukakpan (2023), who reported that unfavorable business environments reduce survival chances.

Furthermore, the study shows that firm-specific characteristics such as firm size and firm age influence survival outcomes. Larger firms and older enterprises tend to exhibit higher survival probabilities, likely due to accumulated experience, better access to resources, and stronger market positioning. This finding supports the theoretical propositions of Organizational Ecology Theory, which suggest that firms that survive initial stages of operation develop structural advantages that enhance their long-term survival prospects. It also aligns with Muhwezi and Kiliman (2023), who found that firm size and experience significantly influence SME survival.

CONCLUSION

This study examined the survival dynamics of small and medium enterprises (SMEs) operating in Computer Village, Ikeja, Lagos State, Nigeria, using the Kaplan–Meier survival estimation technique. The study focused on estimating survival probabilities over time and examining how firm characteristics and operational factors influence business sustainability.

The findings reveal that SME survival probability declines progressively over time, with a significant proportion of firms experiencing increased risk of failure within the first 5 to 10 years of operation. This highlights the vulnerability of SMEs during their early and middle stages of development. The Kaplan–Meier survival estimates and curves further demonstrate that survival outcomes vary significantly across firms based on key characteristics.

In particular, access to finance emerged as a critical determinant of SME survival, with firms that have higher financial access exhibiting consistently higher survival probabilities over time. Similarly, innovation and risk management practices were found to enhance business sustainability by improving adaptability and reducing exposure to operational and financial risks. The study also shows that the business environment plays an important role in shaping survival outcomes, as firms operating in more supportive environments tend to demonstrate stronger survival performance.

Overall, the study concludes that SME survival is influenced by a combination of internal capabilities and external environmental conditions. By applying the Kaplan–Meier approach, the study provides a clear and time-based understanding of business survival patterns, thereby contributing to the literature on SME sustainability in Nigeria.

POLICY IMPLICATIONS

The findings of this study have important implications for policymakers, financial institutions, and entrepreneurship development agencies seeking to improve the sustainability of SMEs in Nigeria.

The strong relationship between financial access and SME survival suggests the need for policies that improve access to affordable financing for small businesses. Government agencies and financial institutions should expand credit facilities, reduce lending constraints, and promote alternative financing mechanisms such as microfinance, cooperative funding, and financial technology solutions. Improving access to finance will enable SMEs to invest in productive activities, enhance operational capacity, and withstand economic shocks.

The findings also highlight the importance of promoting innovation among SMEs. Policymakers should support innovation through targeted initiatives such as technology incubation programmes, innovation grants, and capacity-building workshops. Encouraging SMEs to adopt innovative practices will enhance their competitiveness and improve their ability to adapt to changing market conditions.

In addition, the role of risk management in improving SME survival suggests the need for entrepreneurship training programmes that emphasize risk identification, strategic planning, and financial management. Strengthening managerial capacity will enable SME owners to make informed decisions and reduce exposure to business risks.

The study further underscores the importance of improving the business environment. Policymakers should invest in infrastructure development, simplify regulatory procedures, and create a more stable and supportive policy framework for SMEs. A favorable business environment will reduce operational challenges and enhance the long-term sustainability of small businesses.

RECOMMENDATIONS

Based on the findings of the study, the following recommendations are proposed to enhance the survival and sustainability of SMEs:

1. SME owners should prioritize improving their financial management practices and actively seek diverse sources of funding, including cooperative societies, microfinance institutions, and digital financing platforms. Strengthening financial capacity will improve business resilience and sustainability.
2. Entrepreneurs should adopt innovative business strategies such as product differentiation, service improvement, and technological adoption to remain competitive in dynamic markets. Continuous innovation will enhance the ability of SMEs to respond to changing consumer demands and industry trends.
3. SME operators should implement effective risk management practices by identifying potential risks, developing mitigation strategies, and maintaining contingency plans. Proactive risk management will reduce vulnerability to business failure and improve long-term survival.
4. Policymakers and relevant institutions should intensify efforts to improve the business environment by providing adequate infrastructure, reducing bureaucratic barriers, and implementing supportive policies that encourage SME growth and development.
5. Finally, entrepreneurship development programmes should focus on building managerial and strategic capabilities among SME owners to enhance decision-making, improve operational efficiency, and support sustainable business growth.

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QUESTIONNAIRE

Title: Survival Analysis of Small and Medium Enterprises in Computer Village, Ikeja, Lagos State

Survival Analysis: A Case Study of Small and Medium Enterprises in Computer Village, Ikeja, Lagos State, Nigeria

Dear Respondent,

This questionnaire is designed to collect data for academic research on the survival of SMEs. All responses will be treated with strict confidentiality and used solely for research purposes.

Section A: Demographic and Firm Characteristics

1. Gender of Respondent

☐ Male ☐ Female

2. Age of Respondent

☐ 18–25 ☐ 26–35 ☐ 36–45 ☐ 46–55 ☐ 56 and above

3. Highest Educational Qualification

☐ Secondary ☐ Diploma ☐ Bachelor's Degree ☐ Postgraduate

4. Nature of Business

☐ Computer Sales ☐ Mobile Phones ☐ Repairs ☐ Accessories ☐ Others: _____

5. Year Business Was Established: _____

6. Is the business still operational?

☐ Yes ☐ No

7. If No, year business closed: _____

8. Number of Employees

☐ 1–5 ☐ 6–10 ☐ 11–20 ☐ Above 20

9. Ownership Structure

☐ Sole Proprietorship ☐ Partnership ☐ Limited Liability

Section B: Access to Finance

(Please indicate your level of agreement using: 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree)

S/N	Statement	1	2	3	4	5
1	I have easy access to business loans	☐	☐	☐	☐	☐
2	Financial institutions support my business	☐	☐	☐	☐	☐
3	I can obtain funds when needed	☐	☐	☐	☐	☐
4	Lack of finance limits my business growth	☐	☐	☐	☐	☐
5	I rely on multiple sources of funding	☐	☐	☐	☐	☐

Section C: Innovation

S/N	Statement	1	2	3	4	5
6	My business frequently introduces new products	☐	☐	☐	☐	☐
7	I adopt new technologies in my business	☐	☐	☐	☐	☐
8	I regularly improve my services	☐	☐	☐	☐	☐
9	Innovation helps my business stay competitive	☐	☐	☐	☐	☐
10	I invest in new business ideas	☐	☐	☐	☐	☐

Section D: Entrepreneurial Orientation

S/N	Statement	1	2	3	4	5
11	I take calculated risks in business decisions	☐	☐	☐	☐	☐
12	I actively seek new business opportunities	☐	☐	☐	☐	☐
13	I respond quickly to market changes	☐	☐	☐	☐	☐
14	I am proactive in managing my business	☐	☐	☐	☐	☐
15	I focus on long-term business growth	☐	☐	☐	☐	☐

Section E: Risk Management Practices

S/N	Statement	1	2	3	4	5

16	I identify potential risks in my business	☐	☐	☐	☐	☐
17	I have strategies to manage business risks	☐	☐	☐	☐	☐
18	I plan for unexpected business challenges	☐	☐	☐	☐	☐
19	Risk management improves my business performance	☐	☐	☐	☐	☐
20	I monitor financial and operational risks regularly	☐	☐	☐	☐	☐

Section F: Business Environment

S/N	Statement	1	2	3	4	5
21	Infrastructure supports my business operations	☐	☐	☐	☐	☐
22	Government policies are favorable to SMEs	☐	☐	☐	☐	☐
23	Market competition affects my business negatively	☐	☐	☐	☐	☐
24	Exchange rate fluctuations affect my business	☐	☐	☐	☐	☐
25	The business environment supports growth	☐	☐	☐	☐	☐

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