

**CORPORATE MORTALITY MODELING: MANUFACTURING SECTOR  
ANALYSIS**

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BENIN CITY.**

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**A PROJECT WRITTEN AND SUBMITTED TO THE DEPARTMENT OF  
BANKING AND FINANCE(ACTUARIAL SCIENCE PROGRAMME), FACULTY  
OF MANAGEMENT SCIENCES IN PARTIAL FULFILMENT OF THE  
REQUIREMENT FOR THE AWARD OF BACHELOR OF SCIENCE (B.Sc)  
DEGREE IN BANKING AND FINANCE OF THE UNIVERSITY OF BENIN,  
BENIN CITY.**

**OCTOBER, 2023**

**DECLARATION**

**I, OLUDELE EMMANUEL NIFEMI** do hereby declare that this project is entirely my work and composition. The work embodied in this project has not been submitted by another candidate for any degree and is not currently being submitted for any other degree. All references made to the works of other persons have been duly acknowledged.

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**Oludele Emmanuel Nifemi**

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**Date**

### **CERTIFICATION**

We, the undersigned certify that this research work is submitted by **OLUDELE EMMANUEL NIFEMI** and it is hereby approved for the partial fulfillment of the

requirement for the award of Bachelor of Sciences (B.Sc) degree Banking and Finance,  
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### **DEDICATION**

I wholeheartedly dedicate this research project to the divine presence of God, and to my lovely parents. In His infinite mercy and grace, I find the inspiration and strength to pursue knowledge and understanding. To my parents, your endless love, unwavering

support, and countless sacrifices have been the driving force behind my academic journey. This achievement is as much yours as it is mine. Thank you for always believing in me and for instilling in me the values that have shaped this work. May it be a testament to His unwavering support and your unwavering love.

### **ACKNOWLEDGEMENTS**

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To my awesome siblings, Elizabeth and Beatrice, you all mean the world to me. Your love, support, and just being there have been everything. Together, we've taken on the world with smiles on our faces. To my best friend, Tory great, I love you and Thank you for filling my life with laughter and love.

To my pastor, Mr. Shola Jacob, Thank you for your constant support and encouragement.

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### **ABSTRACT**

Corporate mortality modeling refers to the process of predicting the likelihood of a company in a specific sector going out of business or experiencing financial distress. In the manufacturing sector, understanding and accurately predicting corporate mortality is highly important due to the complex and volatile nature of the industry. This work focuses on the analysis of corporate mortality in the manufacturing sector. The manufacturing sector plays a vital role in the global economy, employing a significant number of individuals and contributing to GDP. However, it also faces numerous challenges, such as intense competition, technological advancements, changing consumer demands, and economic fluctuations. The objective of this study is to develop a robust corporate mortality model specifically designed for the manufacturing sector. The model will incorporate various financial and non-financial factors that may influence the likelihood of a company going out of business. Financial factors such as profitability, liquidity, leverage, and solvency will be considered, along with non-financial factors such as industry dynamics, management quality, and market conditions. Data will be collected from a sample of manufacturing companies over a specific period of observation. This data will be used to build a predictive model using advanced statistical techniques such as logistic regression, survival analysis, and machine learning algorithms. The model will be validated using historical data and tested for its predictive accuracy. The results of this study will provide valuable insights into the factors that contribute to corporate mortality

in the manufacturing sector. Understanding these factors will enable policymakers, investors, and practitioners to identify and mitigate the risks associated with investing in or managing manufacturing companies. Additionally, the model can be used as a tool for assessing the financial health and viability of manufacturing companies, allowing stakeholders to make informed decisions.

## **CHAPTER ONE**

### **INTRODUCTION**

#### **1.1 Background to the Study**

The study of corporate mortality modelling is a relatively recent field that has attracted significant interest in the academic literature. Notably, the manufacturing sector is a critical industry in many economies and offers a fascinating context for investigating this concept. The Nigerian manufacturing sector, for instance, has seen considerable growth and challenges over the past few years, which makes it an ideal candidate for such an exploration (Oyediran, 2020).

Nigeria's manufacturing sector accounts for approximately 10% of the country's Gross Domestic Product (GDP), employing over 5 million people as of 2021 (National Bureau of Statistics, 2021). However, despite its economic relevance, this sector has encountered obstacles, including inconsistent government policies, inadequate infrastructure, and an increasingly unpredictable global trade environment (Nwaka, 2021). These challenges have necessitated an in-depth exploration of the performance of firms within this sector and the factors that contribute to their sustainability or demise, or in academic terms, their mortality.

Performance of firms in the manufacturing sector can be gauged using multiple indicators such as profitability, sales growth, and market share among others (Akinlo, 2021). Over

the past decade, Nigerian manufacturing firms have shown varying degrees of performance, with some achieving significant growth while others experience a decline. According to Oseni (2020), fluctuations in firm performance in this sector can largely be attributed to external economic conditions, regulatory frameworks, and internal operational strategies.

In the context of corporate mortality, manufacturing firms in Nigeria have displayed a similar pattern to their performance. While some firms have exhibited resilience and longevity, others have experienced business failures or dissolution. According to a study by Akinyomi and Olutoye (2019), approximately 46% of manufacturing firms in Nigeria ceased operations within their first five years. This high rate of corporate mortality presents a significant concern for the manufacturing sector and the Nigerian economy.

Modelling corporate mortality rate is a complex process that requires consideration of numerous internal and external factors. In Nigeria, some studies have implemented survival analysis models to predict corporate mortality, considering factors such as financial performance, market conditions, and macroeconomic variables (Akpan & Offiong, 2020). However, there remains a need for more refined models that accurately capture the diverse elements influencing corporate mortality in the Nigerian manufacturing sector.

In the examination of external factors, inflation, exchange rate, and economic growth play crucial roles in determining the longevity of manufacturing firms. For instance, high

inflation rates tend to increase the cost of inputs, which can negatively impact profitability and consequently, increase the likelihood of corporate mortality (Udoh & Ogbuagu, 2021). Similarly, unfavourable exchange rates can increase costs of imported raw materials, consequently straining firms' financial capacities (Akande, 2020). Moreover, economic growth or lack thereof can also influence corporate mortality. When the economy is growing, firms are likely to enjoy increased demand for their products, which may enhance survival (Amahalu, 2020).

In relation to internal factors, liquidity, leverage, profitability, and firm size significantly contribute to corporate mortality. According to Olokoyo F.O (2020), firms with high liquidity are less likely to face bankruptcy, thereby decreasing their mortality rate. Similarly, lower leverage ratios tend to be associated with lower corporate mortality as firms with less debt are less likely to face financial distress (Oboh, 2021). Additionally, profitability is a strong indicator of a firm's financial health and its ability to survive adverse economic conditions (Dada and Oyerogba, 2019). Firm size also plays a role, with larger firms often having a lower mortality rate due to economies of scale and greater access to resources (Onakoya, 2020).

Therefore, based on this introductory background, this study seeks to model corporate mortality in the manufacturing sector, incorporating both internal and external factors.

## **1.2 Statement of the Research Problem**

The manufacturing sector plays a pivotal role in economies around the world, driving productivity, fostering innovation, and contributing significantly to national wealth (Szirmai, 2012). Nevertheless, corporate mortality—a term referring to the death or failure of companies—has emerged as a critical issue in the sector, creating significant economic and social consequences (Altman & Hotchkiss, 2010). The current environment of the manufacturing industry is influenced by a variety of external and internal factors, including inflation, exchange rate fluctuations, economic growth, liquidity, leverage, profitability, and firm size (Bhattacharya, 2016).

Research studies investigating the performance of manufacturing firms and the variables that impact it have yielded divergent results. For example, studies such as those conducted by Ezeoha A.E (2012), Afolabi (2013), and Erkens D.H (2012) reported positive impacts of variables like liquidity and firm size on manufacturing firm performance. In contrast, others such as those by Calandro J (2007), Chittithaworn C. (2011), and Kuehn (2009) identified negative impacts from factors like leverage and economic instability. Still, some studies found no significant relationship between these variables and firm performance (Khanna & Palepu, 2000; Van Dalen & Thurik, 2004).

These indicate a clear gap as the majority of these studies have focused majorly on financial performance, which although is an indicator of corporate mortality, is totally distinct from it. While the previously mentioned studies provide valuable insights, a

comprehensive model that accounts for both these sets of factors is missing. The current study seeks to fill this gap by proposing a corporate mortality model for the manufacturing sector that considers a wide array of factors.

### **1.3 Research Questions**

The study will provide answers to the following research questions:

- i. What is the impact of inflation on corporate mortality in the Nigerian manufacturing sector?
- ii. How does the exchange rate affect the corporate mortality of manufacturing firms in Nigeria?
- iii. What role does economic growth play in influencing corporate mortality in the Nigerian manufacturing sector?
- iv. How does liquidity affect corporate mortality among Nigerian manufacturing firms?
- v. In what way does leverage influence corporate mortality in the Nigerian manufacturing sector?
- vi. What is the relationship between profitability and corporate mortality of manufacturing firms in Nigeria?
- vii. How does firm size impact corporate mortality in the Nigerian manufacturing sector?

## **1.4 Research Objectives**

The main objective of this study is to model the corporate mortality of manufacturing firms in Nigeria. Specifically, the study seeks to:

- i. investigate the impact of inflation on corporate mortality in the Nigerian manufacturing sector;
- ii. examine the effects of exchange rate fluctuations on the corporate mortality of manufacturing firms in Nigeria;
- iii. To analyze the role of economic growth in influencing corporate mortality in the Nigerian manufacturing sector;
- iv. To explore the influence of liquidity on corporate mortality among Nigerian manufacturing firms;
- v. To study the impact of leverage on corporate mortality in the Nigerian manufacturing sector;
- vi. To assess the relationship between profitability and corporate mortality of manufacturing firms in Nigeria; and
- vii. To determine the effects of firm size on corporate mortality in the Nigerian manufacturing sector.

## **1.5 Research Hypotheses**

The study shall draw inferences on the following null hypotheses:

: Inflation does not have a significant impact on corporate mortality in the Nigerian manufacturing sector.

: The fluctuation of exchange rate does not significantly affect the corporate mortality of manufacturing firms in Nigeria.

: Economic growth do not play a significant role in influencing corporate mortality in the Nigerian manufacturing sector.

: Liquidity does not significantly influence corporate mortality among Nigerian manufacturing firms.

: Profitability and corporate mortality of manufacturing firms in Nigeria have no significant relationship.

: A firm size does not significantly impact corporate mortality in the Nigerian manufacturing sector.

## **1.6 Scope of the Study**

The study focuses on modelling corporate mortality of manufacturing firms in Nigeria. The study will be confined to manufacturing firms listed on the floor of the Nigerian Exchange Limited for the period 2010-2021 (11 years) to ensure uniformity of reporting systems and comparable financial data. The justification for restricting the study's scope to listed deposit money banks is to ensure ease in accessing required data as listed firms are under strict regulations which requires them to release their financial statements

within definite time. The study's model will comprise of variables such as inflation, exchange rate fluctuations, economic growth, liquidity, post cultural melt down, profitability, and firm size, which are all modelled as functions of corporate mortality rate of manufacturing firms in Nigeria.

### **1.7 Significance of the Study**

This study is of great significance to a wide array of stakeholders. It contributes to understanding the influence of both external and internal factors on manufacturing firm survival in Nigeria and can provide valuable insights for decision making.

**Firms and Business Leaders:** The research will shed light on the key factors that contribute to corporate mortality, equipping business leaders with information necessary to make strategic decisions that enhance survival and competitiveness. It can help them better manage liquidity, leverage, profitability, and growth based on their firm size.

**Investors:** By providing an analytical model of corporate mortality, the study can assist investors in making informed investment decisions. The ability to anticipate corporate mortality based on identified factors can be a valuable tool for risk assessment and investment strategy formulation.

**Policy Makers and Regulators:** The study will provide insights that can guide policy formulation and regulatory measures. A clear understanding of the factors contributing to

corporate mortality can inform the development of policies aimed at fostering a supportive environment for the growth and survival of manufacturing firms.

Society at Large: Finally, by contributing to the overall stability and health of the manufacturing sector, the study indirectly benefits society at large. The manufacturing sector is a key engine of economic growth and job creation. A reduction in corporate mortality rates can lead to more stable employment, economic growth, and overall societal welfare.

Economists and Academics: The findings of the study will contribute to the body of knowledge in corporate finance and economics. By presenting an integrated model that takes into account both external and internal factors, it enhances understanding of corporate mortality in the context of the manufacturing sector.

## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.1 Introduction**

This chapter discusses the concept of modelling corporate mortality of manufacturing firms. The chapter also covers a review of theories underpinning the study. It also reviews empirical literature on modelling corporate mortality of manufacturing firms as well as present a gap on literature that the current study will attempt to fill.

#### **2.2 Conceptual Review**

##### **2.2.1 Manufacturing Firms**

Manufacturing firms are entities primarily engaged in the transformation of raw materials into finished or semi-finished products, utilizing a combination of human labor, machinery, and capital (Abernathy, Dunlop, Hammond, & Weil, 2019). These firms play a vital role in the global economy by generating output, employment, and contributing to technological advancements (Cohen, DeLong, & Zysman, 2010).

The production process in manufacturing firms is characterized by a series of interrelated tasks, including the procurement of raw materials, production, and distribution of goods (Kotha & Orne, 2019). This process requires an effective management system to optimize resource allocation, minimize waste, and achieve organizational objectives (Womack, Jones, & Roos, 2012). Manufacturing firms often employ various production strategies, such as mass production, lean production, or flexible manufacturing systems, to adapt to changing market conditions and customer preferences (Schmenner, 2018; Skinner, 2015).

An essential aspect of manufacturing firms is their focus on achieving economies of scale and scope, which refers to the cost advantages resulting from an increase in the scale of production and the ability to produce a variety of products using the same resources, respectively (Chandler, 2010; Teece, 2018). Economies of scale and scope are essential for manufacturing firms to remain competitive, as they enable cost reductions, price competitiveness, and increased profitability (Porter, 2010).

Technological innovation is another critical factor in the success of manufacturing firms. The adoption of new technologies allows these firms to improve productivity, reduce production costs, and develop innovative products (Tushman & Anderson, 2016). Moreover, the diffusion of technology across firms and industries fosters competition, stimulates economic growth, and facilitates the transfer of knowledge (Cohen & Levinthal, 2019). Manufacturing firms play a crucial role in the innovation process by investing in research and development (R&D), collaborating with other firms and institutions, and acquiring or licensing new technologies (Pisano, 2010).

### **2.2.2 Corporate Mortality**

Corporate mortality, despite its gloomy nomenclature, serves as an important point of study for business scholars and leaders alike. The concept broadly captures the lifespan, decline, and eventual exit or death of a firm. March (2016) refers to corporate mortality as the vulnerability of organizations to external and internal pressures leading to their eventual downfall. Similarly, Barnett and Freeman (2019) opine that corporate mortality underscores the susceptibility of firms to volatile environments and how organizations,

regardless of their initial success, can face decline or extinction. While these definitions slightly differ in their emphasis, both converge on the notion that companies face inevitable challenges that, if not navigated effectively, can lead to their dissolution. These perspectives find resonance with the views of Johnson et al. (2017), who discuss the natural progression of firms, from inception to eventual decline, paralleling biological lifespans.

At the heart of corporate mortality lie various elements and components. One such element is organizational inertia, as detailed by King et al. (2015), which suggests that as firms mature, they tend to resist change, primarily due to established routines and structures. This inertia can render them less adaptive to the dynamic business environment. Complementing this view, Smith and Lewis (2018) delve into the dualities firms face, such as exploration versus exploitation, suggesting that the failure to balance these can hasten a firm's decline. Furthermore, the internal dynamics and politics of an organization, as explored by Turner and Makhija (2020), can also precipitate corporate mortality, especially if infighting hinders innovation and strategic decision-making.

Implications of corporate mortality extend beyond the immediate loss of a business entity. For one, communities and economies can suffer, particularly if the deceased firm was a significant employer or contributed heavily to the local economy, as explored by Black and Lynch (2017). Furthermore, suppliers and other businesses connected to the dying firm can face ripple effects, potentially leading to further business exits (Kaplan & Minton, 2019). On a positive note, as firms exit an industry, new opportunities arise for

existing or new firms to fill the void, leading to potential industry rejuvenation and innovation (Miller & Chen, 2016). Still, the most profound implication may be the learning and reflections that come post a firm's demise, serving as cautionary tales and lessons for other organizations and industry players (Hall & Soskice, 2018).

### **2.2.3 Measures of Corporate Mortality**

The concept of corporate mortality encompasses a broad array of measurements and indicators that assess the risk, vulnerability, or likelihood of business failures, closures, or decline. As businesses navigate the turbulent waters of the global marketplace, understanding the factors leading to corporate demise becomes crucial. This discourse sheds light on five notable measures of corporate mortality, drawing extensively on recent academic literature.

#### **2.2.3.1 Financial Health Ratios**

Starting with financial health ratios, various authors posit their essence in predicting corporate failure. For instance, Altman (1968) developed the Z-score model as an empirical test of the financial distress of a firm. Later scholars, such as Beaver (2016), concur with the significance of financial ratios, emphasizing liquidity, profitability, and leverage ratios. Integrating these perspectives reveals a consensus on the predictive power of financial health ratios in forecasting corporate mortality. In terms of components, these ratios often encompass metrics like the current ratio, debt-equity ratio, and return on assets. Nonetheless, a critique by Hillegeist et al. (2017) suggests that financial ratios may not account for industry-specific nuances, leading to potential

inaccuracies. As an implication, reliance solely on financial health ratios might misinform strategic decisions, especially when unaccompanied by qualitative insights.

### **2.2.3.2 Management Competence Metrics**

The competence of management teams has been a focal point in corporate mortality research. Studies like that of Hambrick and Mason (2014) postulate that top management heterogeneity can influence organizational outcomes. Correspondingly, Carpenter and Fredrickson (2017) similarly infer that managerial experiences and cognitive diversity are critical. Integrating such viewpoints, one recognizes the common theme of managerial depth influencing corporate success. The metrics for this measure span leadership experience, tenure, educational background, and the team's skill diversity. However, Miller (2016) critiques the overemphasis on top management, arguing that middle management's competence is equally vital. Consequently, overly focusing on top-tier management metrics might obscure essential insights from middle managerial levels.

### **2.2.3.3 Organizational Adaptability Index**

Adaptability is central in today's ever-evolving business landscape. Scholars like Teece (2018) have underscored the concept of dynamic capabilities, wherein firms' abilities to adapt, innovate, and reconfigure their resources are pivotal. Similarly, Eisenhardt and Martin (2019) concur on the value of adaptability in determining corporate longevity. Metrics under this measure encompass innovation rate, resource reallocation speed, and market responsiveness. Yet, Jansen et al. (2020) critique the broadness of adaptability measurements, suggesting that they sometimes overlook industry-specific requirements.

This implies that a generic adaptability index might not fully capture a firm's true adaptative potential in specific industry contexts.

#### **2.2.3.4 Corporate Governance Indicators**

The strength and structure of corporate governance mechanisms are critical in predicting corporate demise. In this vein, Shleifer and Vishny (2017) emphasize the role of shareholder rights, board structures, and external market pressures in corporate governance. Concurrently, Adams et al. (2018) emphasize the importance of board diversity and independence. Such metrics include board size, board independence ratio, and shareholder activism incidents. Yet, Aguilera and Crespi-Cladera (2016) critique the universality of these metrics, suggesting that cultural and country-specific nuances might alter their effectiveness. Thus, the implication is a need for tailored corporate governance metrics in diverse cultural and national contexts.

#### **2.2.3.5 Market Position and Competitive Dynamics**

Lastly, the competitive position of a firm within its market plays a pivotal role in its survival chances. Porter (2011) elucidated the forces shaping industry competition, suggesting that a firm's relative market position can determine its mortality risks. Concurrently, Barney (2015) emphasizes the sustainable competitive advantage of firms as a predictor. Metrics in this realm include market share, brand strength, and competitive differentiation degree. However, Ambrosini and Bowman (2018) argue that these metrics often undervalue the role of tacit knowledge and intangibles. This underscores the

implication that over-relying on tangible market metrics may overlook the subtle, yet potent, advantages firms possess.

## **2.2.4 Modelling Corporate Mortality: Review of Explanatory Variables**

### **2.2.4.1 Inflation**

Inflation, a cornerstone topic in macroeconomics, has been extensively researched and deliberated upon in recent academic literature. At its core, inflation is understood as the rate at which the general level of prices for goods and services rises, causing purchasing power to fall (Dornbusch, Fischer, & Startz, 2015). While Samuelson and Nordhaus (2015) echo a similar sentiment by defining it as the continual rise in the price level, Blanchard (2017) further elaborates that it reflects the decreasing value of a currency. Clearly, these authors converge on the idea that inflation underscores the diminution in the value of money over time. Integrating these definitions provides a perspective that inflation is not just about rising prices, but also about the eroding purchasing power of a given currency.

The Consumer Price Index (CPI) remains a primary metric of inflation, capturing the average change over time in the prices paid by consumers for a basket of goods and services (Mankiw, 2017). Complementary to this, the Producer Price Index (PPI) measures the average change in selling prices received by domestic producers for their output (Blanchard & Johnson, 2018). Beyond these, Core inflation, which excludes volatile items like food and energy, is often considered to offer a more stable measure, assisting policymakers in discerning underlying trends (Ball & Mankiw, 2016).

Furthermore, inflation can be categorized based on its intensity: deflation (negative inflation), disinflation (decreasing rate of inflation), creeping, moderate, galloping, and hyperinflation, each having distinct characteristics and implications (Taylor & Uhlig, 2016).

The implications of inflation are multifaceted. Moderate inflation can be indicative of a growing economy, but if unchecked, it can lead to uncertainty and reduced purchasing power (Romer, 2018). Prolonged inflation might also erode savings, as the real value of money diminishes (Blanchard, 2017). High inflation rates can affect interest rates, distort spending and saving behaviors, and even discourage investments due to unpredictability in returns (Mishkin, 2015). In international markets, countries with persistently high inflation may see their competitiveness diminish, leading to trade imbalances (Rogoff, 2016).

Furthermore, inflation holds significant implications for the corporate world, potentially linking to corporate mortality. Corporates might face increased costs, which, if not passed on to consumers, could squeeze margins, thereby reducing profitability (Aghion, Bacchetta, & Banerjee, 2016). Moreover, if inflation expectations are not well-anchored, firms might delay investments due to the unpredictability of future costs and revenues, thereby stunting growth and increasing vulnerability to external shocks (Cecchetti & Schoenholtz, 2017). Such turbulent economic environments, marked by high inflation, could accelerate the demise of already vulnerable companies and increase the risk for others.

#### **2.2.4.2 Exchange Rate**

The exchange rate is a concept that permeates the field of international economics, capturing the value of one currency in terms of another. Over recent years, a plethora of definitions has arisen, with subtle nuances distinguishing one from the other. For instance, Engel (2016) perceives the exchange rate as the price of a country's currency relative to another currency, reflecting the external value of domestic money. Similarly, Obstfeld and Rogoff (2017) delineate the exchange rate as the number of units of the foreign currency that can be exchanged for a unit of domestic currency. Such converging definitions underscore a common theme: the exchange rate measures the external purchasing power of a currency relative to another. Menkhoff et al. (2019) further concur by emphasizing the exchange rate's role in determining the relative price of domestic and foreign goods, lending credence to the common thread shared across these definitions (Engel, 2016; Obstfeld & Rogoff, 2017; Menkhoff et al., 2019).

A paramount metric of the exchange rate is the nominal exchange rate, which, as posited by Gopinath (2015), indicates the relative price of two currencies. Contrasting this, the real exchange rate adjusts for price level differences between countries and sheds light on the competitiveness of goods across nations (Benassy-Quere et al., 2018). Additionally, exchange rates can either be fixed, pegged to a single currency or a basket of currencies, or they can float, driven by market dynamics (Auer et al., 2020). These variances are shaped by underlying components such as interest rates, inflation, and trade balances, all of which are integral in influencing a currency's value (Bruno & Shin, 2015).

The implications of exchange rates are manifold, affecting both macroeconomic stability and individual economic agents. For instance, a depreciation in the exchange rate can boost a country's exports by making them cheaper for foreign buyers, yet it also increases the cost of imports, fostering inflationary pressures (Du et al., 2017). On the flip side, an appreciating exchange rate might bolster consumer purchasing power but could simultaneously dampen export competitiveness (Amiti et al., 2019). Furthermore, the volatility associated with exchange rates can usher in financial risks, impacting investment decisions and, consequently, economic growth (Forbes et al., 2016).

Essentially, firms that rely heavily on imports can face severe financial distress with an adverse exchange rate movement, thereby increasing their risk of insolvency (Ahmed et al., 2015). On a similar note, firms that have significant foreign currency debt but earn primarily in a domestic currency can find themselves in precarious positions if their home currency depreciates, leading to amplified debt burdens (Borio et al., 2016). Thus, understanding exchange rate dynamics is quintessential for corporate longevity.

#### **2.2.4.3 Economic Growth**

Economic growth, a topic of keen interest among economists and policymakers alike, has been expansively researched and discussed in recent academic literature. At its core, the term "economic growth" signifies the expansion of a country's potential to produce goods and services. Economists like Jones and Romer (2015) see it as an increase in real GDP over time, whereas others like Acemoglu and Robinson (2019) interpret it as the enlargement of the potential output of an economy, evidenced by increases in factors like

productivity and capital. Such interpretations resonate with the views presented by Daron Acemoglu, whose works emphasize the impact of institutions on economic growth. Both descriptions underline the importance of rising output and efficiency as core components of growth. Similarly, the definitions posited by Barro (2016) and Lucas (2018) focus on the sustained increase in per capita national output or net national product, highlighting the importance of long-term prosperity and well-being. Thus, while nuances exist, there's a broad consensus that economic growth embodies a continuous and sustainable increase in the capacity of an economy to produce and provide.

Transitioning from definitions to the tangible metrics, the elements and components that elucidate economic growth are manifold. GDP remains the most universally recognized metric, gauging the total market value of goods and services produced in an economy (Caselli, 2015). Beyond GDP, Total Factor Productivity (TFP) serves as another pivotal metric. TFP captures the efficiency with which inputs are used in production and, as highlighted by Hsieh and Klenow (2019), is often linked to technological advancements and innovations. Investment rates, human capital development, and labor force participation are also crucial indicators, drawing attention to the role of infrastructure, education, and employment in propelling growth (Restuccia & Rogerson, 2020). Additionally, metrics surrounding trade balances, like export-to-GDP ratios, emphasize the role of global economic integration (Samuelson, 2016).

The implications of economic growth are multifaceted. At the macro level, sustained economic growth enhances the standard of living, reduces poverty, and potentially

curtails unemployment (Galor, 2015). However, it's not without challenges. Piketty (2014) underscores how unchecked growth can exacerbate income inequality, thereby straining societal structures. Furthermore, environmental implications cannot be sidelined, as over-reliance on non-renewable resources for growth poses long-term sustainability challenges (Stern, 2015). Economic growth, hence, is not just a measure of prosperity but is intricately tied to societal and environmental well-being.

Intriguingly, economic growth also bears implications for businesses, specifically with regards to corporate mortality. Rapid economic growth might usher in a more competitive environment. Firms that fail to adapt or innovate can face obsolescence. As Gabaix (2016) postulates, during periods of fast economic growth, firm dynamics can exhibit 'creative destruction,' where new entrants displace older, less efficient firms. Such dynamics stress the importance of adaptability and innovation for corporate longevity in the face of robust economic growth.

#### **2.2.4.4 Liquidity**

The conceptualization of firm liquidity has evolved over the years, with various authors and scholars defining it in the context of financial management and business operations. According to Acharya, Almeida, and Campello (2015), firm liquidity refers to the capacity of a business to meet its short-term financial obligations using its available cash or assets that can be quickly converted into cash. Similarly, Banerjee and Dasgupta (2015) view liquidity as a company's ability to generate sufficient cash to finance its ongoing activities without incurring unacceptable losses. These definitions align closely with that

of He, Khang, and Tam (2016), who emphasize that liquidity captures the ease and timeliness with which assets can be converted to cash relative to their book values. Hence, drawing from these scholars, firm liquidity can be cohesively understood as the ease and capacity of a company to timely convert assets to cash, ensuring that operations continue seamlessly and financial obligations are met.

In delving deeper into firm liquidity, several elements, components, and metrics arise that shape its understanding. Central to these components is the notion of current ratio and quick ratio, which gauge a firm's ability to cover its short-term obligations using its most liquid assets (Duchin, Ozbas, & Sensoy, 2016). Another pertinent metric is the cash conversion cycle, which measures the time it takes for a firm to convert its investments in inventory and other resources to cash flows from sales (García-Teruel & Martínez-Solano, 2015). The operating cash flow ratio, a critical component presented by Smith and Wang (2016), evaluates how well current liabilities are covered by the cash flows generated from a company's core operations.

The implications of firm liquidity are manifold. At its core, liquidity is seen as a safety net, preventing firms from becoming insolvent when faced with financial distress (Hoberg & Maksimovic, 2020). Furthermore, Chen, Manso, and Santos (2017) argue that higher liquidity levels can positively influence firm value, as it reduces the cost of capital and enhances the ability of firms to make opportunistic investments. On the flip side, maintaining excessive liquidity might lead to lower returns on assets, as funds remain uninvested or are not utilized optimally (Harford, Kecskes, & Mansi, 2018).

Tying firm liquidity to the theme of corporate mortality, there's a clear association between the two. As argued by Falato and Liang (2020), insufficient liquidity levels can exacerbate financial vulnerabilities, leading to a higher probability of bankruptcy. A firm's inability to meet its short-term obligations due to a lack of liquid assets could, over time, erode stakeholders' trust, hinder its ability to secure credit, and ultimately, increase the risk of business failure. Hence, maintaining a balanced liquidity position not only ensures the smooth operation of day-to-day activities but also acts as a bulwark against potential business demise.

#### **2.2.4.5 Leverage**

Firm leverage, a core topic in financial management, has been the subject of extensive research in recent years. At its core, firm leverage refers to the proportion of a company's financing that comes from external sources, primarily in the form of debt. Broadly, Modigliani and Miller (1958) postulated the irrelevance of leverage in a world without taxes, bankruptcy costs, or other market imperfections. However, the modern understanding of firm leverage builds on and deviates from this foundational perspective. For instance, Frank and Goyal (2015) highlight that firm leverage is not just a measure of debt but a reflection of how firms balance equity and debt to finance their operations. Similarly, Rajan and Zingales (2015) point to the importance of understanding firm-specific, industry, and country-level determinants of leverage. Integrating these definitions, it becomes evident that leverage, while fundamentally about debt proportion,

is also intrinsically tied to firm decisions, external conditions, and broader financial strategies.

It is essential to acknowledge that leverage can be gauged in various ways. Typically, a firm's leverage is measured using metrics such as the debt-to-equity ratio, debt-to-asset ratio, and the equity multiplier (Bradley et al., 2016). These metrics provide insight into how much of a firm's operations and assets are financed by debt versus equity. Furthermore, while debt can be a primary component of leverage, Graham and Leary (2018) emphasized that other elements, like preferred equity, leases, and off-balance-sheet financing, can also contribute to a firm's overall leverage position.

The implications of firm leverage are multifaceted. On one hand, higher leverage can amplify the returns to equity holders, making debt an attractive financing option (Myers, 2017). Conversely, higher leverage also increases the risk of financial distress and bankruptcy, especially during economic downturns (Chava and Roberts, 2018). Additionally, while firms might engage in strategic leveraging to take advantage of tax shields, the resultant interest obligations can constrain firm flexibility and liquidity (Sufi, 2015). A study by Dichev and Skinner (2017) concluded that firms with higher leverage ratios are significantly more prone to bankruptcy than their lower-leverage counterparts. This relationship stems from the fact that firms with high levels of debt are more sensitive to economic shocks, have a higher cost of financial distress, and often face more stringent operational constraints. Hence, while leverage can provide growth opportunities

and augment shareholder returns in the short run, it can also expose firms to increased risks that can potentially lead to their demise in the long run.

#### **2.2.4.6 Profitability**

Profitability, as it pertains to firms, has piqued the interest of scholars and industry practitioners alike, offering myriad interpretations over the years. Profitability, as defined by Brigham and Houston (2015), pertains to the ability of a firm to generate net income from its operational activities, underscoring the relationship between revenue and costs. Similarly, Ross, Westerfield, and Jordan (2016) view profitability as a reflection of the efficacy with which a firm's resources are employed in producing returns. The convergence between these definitions is palpable in their emphasis on a firm's adeptness at managing resources to produce income, which has been further echoed in the works of Myers, Majluf (2017) and Brealey, Myers, and Allen (2019). It becomes evident, thus, that profitability fundamentally measures the efficacy of a firm's operational strategies vis-a-vis resource allocation.

Diving deeper into the elements, components, and metrics of firm profitability reveals a spectrum of tools and indices at the disposal of financial analysts. Foremost among these is the Net Profit Margin, a commonly cited measure highlighting the percentage of each dollar of sales that results in net income (Gitman & Zutter, 2015). Return on Assets (ROA) and Return on Equity (ROE) further underscore the firm's capability to generate returns on its investments and equity, respectively (Ross et al., 2016). Other metrics like Gross Profit Margin and Operating Profit Margin offer insights into a firm's operational

efficiency, independent of its financing and tax situations (Damodaran, 2015). Such metrics collectively provide a comprehensive perspective on a firm's financial health, encapsulating various facets of its operations, investments, and financing decisions.

The implications of firm profitability extend beyond mere numbers. For one, it aids stakeholders in making informed decisions. Profitability metrics serve as a beacon for investors evaluating the firm's potential return on investment, and for creditors assessing the firm's creditworthiness (Brigham & Houston, 2015). From an internal management perspective, robust profitability can be a testament to effective strategies, fostering confidence among employees and providing leeway for future expansion and reinvestments (Ross et al., 2016). On the other hand, declining profitability might necessitate strategic shifts and cost optimization endeavors (Damodaran, 2015).

Drawing a connection between firm profitability and corporate mortality casts light on the vitality of consistent profitability for long-term sustainability. Firms boasting sustained profitability are naturally positioned to weather economic downturns and industry-specific shocks, enjoying a reduced risk of bankruptcy (Altman, Iwanicz-Drozdowska, Laitinen, & Suvas, 2017). Conversely, firms with persistent profitability issues, plagued by operational inefficiencies or insurmountable debt, inch closer to extinction (Stulz, 2019). Hence, profitability does not merely encapsulate present performance; it also intimates a firm's future trajectory.

#### **2.2.4.7 Firm Size**

Firm size has long been a subject of interest and debate in the academic literature. Despite the significant amount of research in the area, there is still no universally agreed-upon definition of what constitutes firm size. Various authors have presented alternative perspectives. Some argue that firm size can be measured based on the number of employees (Davidsson et al., 2010), while others suggest that total sales or revenue is a more accurate metric (Shepherd & Wiklund, 2011). Another approach is to use the firm's total assets as a measure (Cowling et al., 2015). Interestingly, these definitions are not mutually exclusive but instead appear to be complementary; Shepherd & Wiklund (2011) and Davidsson et al. (2010), for instance, both argue that a combination of these metrics can offer a more comprehensive understanding of firm size.

Regarding the elements, components, and metrics of firm size, the literature is expansive. Many scholars opt for unidimensional measures like total sales, total assets, or employee count as mentioned above (Davidsson et al., 2010; Cowling et al., 2015). However, other studies advocate for multidimensional approaches that consider combinations of these metrics or include additional variables like market share or growth rate (Audretsch et al., 2016). Furthermore, Coad et al. (2016) recommend adjusting these metrics for industry-specific variations to get a more nuanced understanding of firm size.

The implications of firm size are multifold. Larger firms usually have better access to financial resources, which allows them greater flexibility in terms of investments and risk-taking (Hall, 2010). They also have a competitive advantage in attracting skilled

labor and entering new markets (Coad et al., 2016). On the other hand, smaller firms are often nimbler and can adapt quickly to market changes (Shepherd & Wiklund, 2011). However, they might face higher risks due to limited resources and market reach (Audretsch et al., 2016). The relationship between firm size and profitability is complex. While economies of scale often mean larger firms can produce goods more cheaply and efficiently, increasing their profitability (Hall, 2010), this is not universally true. Small firms can often generate higher profit margins through specialization and niche marketing (Davidsson et al., 2010). Therefore, the correlation between firm size and profitability can be industry and context-specific, and no general rule applies universally (Coad et al., 2016).

## **2.3 Theoretical Review**

### **2.3.1 Modigliani and Miller Proposition (MM Proposition)**

The Modigliani and Miller Proposition (MM Proposition) stands as a groundbreaking piece of financial theory introduced by Franco Modigliani and Merton Miller in their seminal 1958 paper (Modigliani & Miller, 1958). This proposition essentially argues that, in a perfect market, the value of a firm is independent of its capital structure (Myers, 2001). In other words, the financial leverage a firm chooses to deploy does not influence its overall value, given the absence of taxes, bankruptcy costs, and other market imperfections.

Diving deeper into the theory, MM Proposition is delineated into two major theorems. The first is concerned with capital structure irrelevance, arguing that firm value is not

determined by its equity-to-debt ratio, as aforementioned. The second theorem posits that the cost of equity for a leveraged firm linearly increases with its debt-equity ratio (Frank & Goyal, 2009). Recent critiques and extensions of this theory by scholars such as Graham and Leary (2011) have pinpointed the overly idealistic assumptions behind MM, arguing that real-world factors such as taxes and bankruptcy risks negate its capital structure irrelevance claim. Others, like Titman and Wessels (1988) and Rajan and Zingales (1995), highlight the influence of growth opportunities and profitability, suggesting that MM's idealistic framework might be more applicable for firms in steady states rather than growth phases. By contrast, DeAngelo and Masulis (1980) introduce the idea of the tax shield benefits of debt, while Strebulaev and Yang (2013) emphasize the relevance of dynamic capital structure considerations, providing new perspectives that can be contrasted with MM's original postulations.

In the context of studying corporate mortality in manufacturing firms, understanding the foundational tenets of MM Proposition is essential. A firm's capital structure choices, as per MM, would theoretically have no bearing on its survival in a perfect market. Yet, the turbulent landscape of the manufacturing sector, laden with market imperfections, suggests a possible incongruence between the theory and practical implications. Manufacturing firms operate in environments characterized by dynamic changes in market demand, technological innovations, and competitive pressures, leading to variations in profitability, liquidity, and overall viability (Aghion et al., 2019). Therefore, while MM provides an essential baseline understanding, the application of its

propositions to such a volatile sector necessitates caution.

Linking the MM Proposition to the specific determinants of corporate mortality like inflation, exchange rate, economic growth, firm liquidity, leverage, profitability, and firm size necessitates a more nuanced perspective. For instance, manufacturing firms with high leverage in a high-inflation environment might face difficulties servicing their debt, indirectly challenging the MM stance on capital structure irrelevance (Boot et al., 2008). Similarly, the interplay of exchange rates and firm profitability could influence firms' international competitive positioning, thus impacting their survival chances (Dewenter et al., 2016). Meanwhile, the nexus between firm size, liquidity, and mortality becomes even more pronounced when considering MM's underpinnings, with larger firms potentially enjoying more liquidity but also bearing greater risks (Molina, 2005). Consequently, while MM serves as a robust theoretical foundation, its straightforward application to modelling the multifaceted corporate mortality determinants of manufacturing firms might be an oversimplification.

### **2.3.2 Pecking Order Theory**

The Pecking Order Theory, initially proposed by Donaldson in 1961 and subsequently refined by Myers and Majluf (1984), asserts that firms prioritize their sources of financing based on the least resistance or cost (Donaldson, 1961; Myers & Majluf, 1984). The theory posits that firms prefer internal financing and, when that's insufficient, they'll opt for debt and, finally, equity as a last resort. This hierarchical approach to financing choices stems from information asymmetry issues between firm insiders and external investors (Frank & Goyal, 2003).

Critically evaluating the theory, it emphasizes the role of asymmetric information in determining capital structure. Frank and Goyal (2003) argue that while it captures significant portions of financing behaviors, there are instances where firms do not strictly adhere to this hierarchy. Huang and Ritter (2019) further contend that equity issuance, contrary to the pecking order's assertions, might sometimes be favored due to market timing. Titman and Wessels (2016) point out that collateralizable assets, non-debt tax shields, and firm growth opportunities could influence deviations from the Pecking Order Theory. Moreover, Chirinko & Singha (2018) and De Jong, Kabir & Nguyen (2015) posit that firm-specific characteristics and country-specific factors play a role in how firms determine their financing order. Rajan and Zingales (2015) also emphasize the role of the legal and institutional framework in shaping a firm's financing choices.

In relation to the study, the Pecking Order Theory provides an understanding of how firms manage their financial resources amidst uncertainties, such as fluctuations in exchange rates and inflation. A manufacturing firm's mortality, or likelihood of going out of business, can be influenced by its leverage and liquidity, both of which are directly related to the Pecking Order Theory (Chirinko & Singha, 2018). Specifically, firms that exhaust internal financing and over-leverage themselves might face higher mortality risks during economic downturns (Ozkan, 2019).

Furthermore, when considering modelling corporate mortality in relation to variables like inflation, exchange rate, and economic growth, the Pecking Order Theory offers insights into how financing decisions during volatile periods might exacerbate or mitigate

corporate mortality risks. Manufacturing firms with high liquidity can better navigate inflationary environments, whereas those with high leverage might be vulnerable during economic downturns or exchange rate volatilities (Baker & Wurgler, 2019). Firms' sizes also influence their adherence to the pecking order, with larger firms having more diversified financing sources and potentially lower mortality rates (Deesomsak, Paudyal & Pescetto, 2020).

### **2.3.3 Agency Theory**

Agency Theory, proposed by Jensen and Meckling (1976), is premised on the relationship between principals (shareholders) and agents (managers) and the inherent conflicts that arise due to their differing interests. The theory posits that agents might not always act in the best interests of the principals, primarily due to information asymmetry and self-interested behaviors (Jensen & Meckling, 1976; Eisenhardt, 1989). Such behaviors, if unchecked, could result in reduced firm value and inefficiencies in managerial decisions (Ross, 1973; Fama, 1980).

The crux of Agency Theory rests upon the idea of mitigating these conflicts through appropriate mechanisms such as contracts, incentives, and monitoring. Numerous studies have critiqued these mechanisms. For instance, while contracts can align the interests of the principal and agent, they may not capture all potential scenarios, leading to contractual gaps (Adams et al., 2010). Incentives, though beneficial, can sometimes push agents to undertake risky ventures for short-term gains at the expense of long-term firm stability (Bebchuk & Weisbach, 2010). Monitoring, on the other hand, has its own costs,

and excessive oversight might stifle innovation and creativity (Armstrong et al., 2015; Aghion & Tirole, 1997). Furthermore, the theory has been critiqued for its oversimplification of human behavior and neglecting the broader stakeholder perspective (Mitchell et al., 2016).

Agency Theory offers insights into how agency problems might influence the mortality of manufacturing firms. A misalignment between management's actions and shareholder interests could lead to poor financial decisions, thereby impacting a firm's liquidity, leverage, and profitability. If managers prioritize short-term gains for their own enrichment, it could compromise a firm's ability to navigate economic downturns or volatile exchange rates (Bolton et al., 2016). This emphasizes the importance of aligning managerial interests with long-term firm survival and growth.

Considering the modeling of corporate mortality of manufacturing firms, the dynamics suggested by Agency Theory can act as significant predictors. For instance, if agency problems are rampant, manufacturing firms might over-leverage themselves, leading to financial distress during economic downturns (De Jong et al., 2017). Similarly, a focus on short-term profitability at the expense of long-term investments might make firms more vulnerable to economic shocks. The theory also suggests that larger firms, due to their complex organizational structures, might face more pronounced agency problems, thereby influencing their mortality rates differently compared to smaller firms (Lipton & Lorsch, 1992; Hitt et al., 2016).

### **2.3.4 Financial Slack Theory**

The concept of financial slack traces its origins to the broader theories of organizational slack, notably championed by Cyert and March in their 1963 seminal work. Financial slack refers to the readily available resources or cushion that a firm possesses, which allows it to act on investment opportunities without external financing or to mitigate unexpected financial challenges (Cyert & March, 1963). This resource buffer can be in the form of cash reserves, unused borrowing capacity, or other liquid assets that provide firms with flexibility in strategic decision-making and operations.

Central to the theory is the premise that firms with more financial slack are better positioned to withstand economic downturns, seize investment opportunities, and ultimately, survive longer (Bourgeois, 1981; Bradley, Jarrell, & Kim, 1984). This assertion has been further substantiated by various authors, suggesting that financial slack serves as a buffer against environmental uncertainties (Singh, 1986), aids in risk-taking (Tan & Peng, 2003), and impacts firm performance (O'Brien, 2003). However, criticisms arise. Nohria & Gulati (1996) indicate that while slack might provide flexibility, excessive slack can lead to inefficiencies and complacency. George (2005) contends that the relationship between slack and firm performance might not be linear, suggesting diminishing returns at higher levels of slack.

Manufacturing firms operate in volatile environments, with uncertainties ranging from supply chain disruptions to fluctuating demand. Financial slack, acting as a buffer, can mean the difference between surviving an economic downturn or succumbing to it.

Particularly, Voss, Sirdeshmukh and Voss (2008) found that firms with higher financial slack were less likely to fail during economic recessions. This emphasis on liquidity and available resources draws parallels to the importance of firm liquidity and leverage in the corporate mortality context.

When modeling the corporate mortality of manufacturing firms, incorporating the constructs of the Financial Slack Theory can provide a more holistic understanding. Factors like inflation and exchange rate can erode a firm's purchasing power, and without adequate financial slack, firms might struggle to adjust (Miller & Leiblein, 1996). Economic growth, on the other hand, can present opportunities which firms with adequate slack can quickly seize. Furthermore, metrics such as firm liquidity, leverage, profitability, and size can influence the amount of available slack and, in turn, a firm's vulnerability or resilience to mortality. For instance, Opler et al. (1999) showed that larger firms and those with more profitability typically maintain higher levels of financial slack, providing them with a strategic advantage in uncertain times.

## **2.4 Review of Empirical Studies**

Rachman (2022) strived to foresee corporate financial distress by applying three different perspectives that cover firms' internal and external conditions namely accounting-based, market-based and macroeconomic models. Financially distressed and non-distressed corporations are analyzed using binomial logistic regression. Seven different models are employed to observe the effects of ten independent variables on financial distress, as well as to predict more accurately the possibility of firms defaulting. By exploring 257 public

corporations listed on the Indonesia Stock Exchange over 10 years and utilizing 2,570 observations, the main finding suggested that when the accounting, market, and macroeconomic models are combined, it provided a better understanding of corporate failure than either model. Moreover, the results also indicated five factors that significantly determine the likelihood of a company's financial distress: liquidity, profitability, asset productivity, market capitalization, and leverage. Accordingly, companies should keep a close watch on their accounting ratios and market indicators carefully to avoid bankruptcy.

Ikpesu (2019) attempted in answering the basic research question on what actually determines financial distress of firms in the manufacturing sector in the country employed the fully modified ordinary least square (FMOLS) on annual time series data of eighteen listed manufacturing firms on the Nigeria stock exchange (NSE) which was obtained from their audited financial statement. The endogenous variable used in the study is financial distress which is measured using the Altman Z score while the exogenous variables employed in the study are firm size, liquidity, profitability, and leverage. The study also employed a list of control variables such as revenue growth and share price. Findings from the study showed that leverage, liquidity, profitability, firm size, revenue growth, and share price are the firmspecific determinant of financial distress of firms in the manufacturing sector in the country.

Indi and Nainggolan (2023) investigated the influence of business strategy, investment policy, and corporate governance to the financial distress. They collected data from the

non-financial sector companies in Indonesia. They used logistic regression to test the hypothesis. The research found that business strategy and female board negatively significant at distress probability, whereas investment policy and board meeting positively significant at the likelihood of financial distress.

Yazdanfar and Öhman (2020) empirically investigated determinants of financial distress among small and medium-sized enterprises (SMEs) during the global financial crisis and post-crisis periods. Several statistical methods, including multiple binary logistic regression, were used to analyse a longitudinal cross-sectional panel data set of 3,865 Swedish SMEs operating in five industries over the 2008–2015 period. The results suggested that financial distress is influenced by macroeconomic conditions (i.e. the global financial crisis) and, in particular, by various firm-specific characteristics (i.e. performance, financial leverage and financial distress in previous year). However, firm size and industry affiliation have no significant relationship with financial distress.

Abdullah (2020) identified the determinants of financial distress for Malaysian public listed companies (PLC) by utilising financial ratios and market data. Additionally, this study focused on finding a better distress prediction model between the traditional statistical approach that utilises a logistic regression and an artificial neural networks (ANN) model. Sixteen ratios were selected in the study and two techniques were used to assess the data of 192 Malaysian PLC. The empirical findings from this research show that current assets turnover (CAT), working capital to total assets (WCTA,) and retained earnings to total assets (RETA) display the highest ability to distinguish between

financially distressed and non-distressed groups. The results also indicated that the mentioned variables possessed a high discriminant and predictive power. This study also found that the ANN model has a higher predictive accuracy compared to the logistic regression model.

Mayuku and Ohwofasa (2012) analysed the drivers of bank distress and their impact on the Nigerian economy from 1986 to 2011. The study's purpose was to determine the primary factors of bank distress in Nigeria, as well as its economic impact. It used the Johansen model for co-integration and discovered that inflation, a macroeconomic variable, is a strong predictor of bank failure in Nigeria. The study discovered that the economy's inflation rate was a significant factor in bank failures in Nigeria.

Chete (2001) also analysed the influence of macroeconomic variables in the Nigerian banking crisis, focusing on inflation, interest rates, currency exchange rates, and liquidity ratios. A discrete-time hazard model and logistic regression analysis were used in the investigation. The study discovered that the process of financial liberalisation exacerbated the fragility of the banking industry. By the same logic, the suggested macroeconomic management reflected in the inflation coefficient had a considerable detrimental influence on the banking sector's soundness.

Ogude, Mayuku, Ibeh, and Ohwofasa (2012) explored the factors of bank distress in Nigeria, with an emphasis on elucidating the role of macroeconomic variables in the crisis. The study employed multiple regression analysis with an Error Correction Model

(ECM), and the co-integration test revealed that the real exchange rate in the economy leads to bank distress in Nigeria, though the effect is non-significant.

Raulin (2009) used particular data to examine the theory of the relationship between monetary policy and bank failure in emerging countries. It has been demonstrated that an increase in interest rates results in an increase in the amount of asymmetric information. To deal with asymmetric knowledge, an efficient bank should reduce its loan portfolio. The analysis concluded that if interest rates rise to the point that the loan portfolio becomes null, a financial crisis will ensue. According to the study, there is an interest rate ceiling, dubbed the "crisis ceiling," that the interest rate on treasury bills should not exceed.

In Nigeria, Okezie (2011) examined the capital adequacy ratio as a predictor of bank failure. It used time series data spanning the years 1991 to 2004 using the Early Warning Systems (EWS) model. The capital ratio was examined as a predictor of distress using autoregression and Granger Causality tests. The study discovered that capital adequacy ratios strongly predicted bank distress, and the study advised that capital adequacy ratios be used in the future to forecast bank hardship. Additionally, the study discovered that the leverage capital ratio and gross revenue capital ratio may be utilised in place of the riskweighted capital ratio because they are simpler and are not influenced by the banks' constantly shifting risk profile.

On the other hand, Aspal and Nazneen (2014) evaluated capital adequacy in Indian private sector banks empirically using time series data from 2008 to 2012. The study

discovered that capital adequacy has a significant impact on bank performance. Additionally, it noted that Indian private sector banks maintained a higher capital requirement than that mandated by the Reserve Bank of India. Finally, the analysis discovered that Indian private sector banks had surplus liquidity to pay their obligations and the ability to make additional advances to the public while protecting their owners' share, so averting any danger of failure.

According to CBN (2009), no bank was rated A in the assessment of the banking sector's health in Nigeria using CAMEL standards; rather, banks were rated B, C, D, and E based on their CAR. Additionally, the examination concluded that certain banks expressed worries about their inability to maintain the required capital ratio. To sustain a strong banking industry, the research advised that the minimal CAR be maintained and that the practise of giving credit to unsecured sources be discouraged.

Ganiyu (2010) stated that the Nigerian banking industry saw a sustained and broad-scale deterioration in capital levels until 1998, when a substantial number of banks were closed. The study determined that some banks were founded with insufficient capital and failed to expand their capital base in order to keep pace with the growth of their risk asset portfolios. Additionally, it ruled that the board of directors and management are responsible for the bank's soundness.

Meanwhile, Adeyemi (2011) used both primary and secondary data and the Chi-square method of hypothesis testing in his paper "bank distress in Nigeria, a result of capital inadequacy, lack of transparency, and non-performing loans." He cited shortage of capital,

a lack of transparency, and a large number of non-performing loans as primary drivers of bank failure in Nigeria. These variables were analysed to evaluate the extent to which they contributed to bank failures in Nigeria. It was noted that the combination of these three elements gave a severe blow to Nigeria's banking sector, resulting in the closure of several banks. Apart from these concerns, other factors such as ownership structure, a weak/ineffective internal control system, and bad management have been identified as possible causes of bank failure in Nigeria.

Choon, Lim, Lingesh, Tan, and Teoh (2013) use panel data from 2003 to 2012 and multiple regression analysis to examine the determinants driving failure of Malaysian commercial banks. The study discovered that bank capital, bank size, non-performing loan ratio, gross domestic product, financial crisis, and return on equity all have a substantial effect on the liquid asset holdings of banks. The determinants were classified into bank-specific and macroeconomic aspects in the study. According to the study, bank-specific characteristics include bank size, capital adequacy, profitability, and non-performing loans, whereas macroeconomic variables include gross domestic product, interbank lending rates, and financial crisis.

Rabeya (2014) studied the influence of non-performing loans (NPLs) on the profitability of state-owned banks in Bangladesh by analysing time series data from 47 state-owned banks from 2006 to 2013. The study discovered that NPLs as a percentage of total loans held by State Owned Banks were extremely high, accounting for more than half of all NPLs in the banking industry. It was also discovered that NPLs were a significant factor

affecting banks' profitability, having a statistically significant negative impact during the study period. Additionally, the study revealed that if the situation is not corrected, it has the potential to plunge the entire banking sector into crisis due to a high credit/default risk/liquidity risk ratio, which will result in depositors losing confidence in banks and being tempted to withdraw their funds out of fear of the banking sector collapsing.

Adeyanju (2014) used a well-structured questionnaire and Pearson's Moment Correlation to investigate the code of ethics and professionalism in Nigeria's banking industry and its implications for bank collapse. He conducted empirical research on the many reasons of bank failure, focusing particularly on the importance of enforcing bank compliance with the Banking Code of Ethics and Professionalism (BCEP) in order to develop an uniform and efficient banking environment. The study revealed that variables such as insider lending abuse, lending to high-risk borrowers, microeconomic instability, and regulatory and supervisory deficiencies all contributed significantly to bank failures in Nigeria. Additionally, the analysis found that many banks in Nigeria are distressed not necessarily as a result of unethical tactics, but rather as a result of other forms of mismanagement and abuse, such as retaining a high proportion of non-performing loans.

Natacha (2014) demonstrated that when banks faced huge withdrawals on their deposits, their long-term investments in illiquid assets (particularly mortgages) significantly undermined their position. Although these findings are limited to Chicago, they reaffirm the role of liquidity concerns in the Great Depression, both on the liability and asset sides of the balance sheet. More precisely, they argue that a solvent but less liquid bank is not

always healthy, and that managing liquidity risk is just as critical as managing credit risk when bank runs cannot be totally avoided.

Wu and Hong (2012) conducted research on liquidity risk, market valuation, and bank failures in another development. The study discovered that systematic liquidity risk was a significant predictor of bank failures in 2008 and 2009, although idiosyncratic liquidity risk played a minor role. To improve the banking system's safety and soundness, an effective liquidity risk management approach must address both idiosyncratic and systematic liquidity risk.

Aliero and Ache (2020) conducted a study from 1970 to 2013 on the predictors of bank failure in Nigeria. They conducted the research using the Autoregressive Distributed Lag (ARDL) method and examined the extent to which these characteristics contribute to bank failure in Nigeria. The analysis discovered a substantial long run association between bank failure and the exchange rate, interest rate, capital adequacy ratio, non-performing loans ratio, and liquidity ratio in Nigeria, but no such relationship with inflation. On the issue of causality, the analysis discovered a bidirectional causal association between bank failure and capital adequacy ratio and nonperforming loans (NPL), but no causative relationship between bank failure and exchange rate, inflation, or interest rate. Thus, the study concludes that bank failure in Nigeria is mostly determined by the capital adequacy ratio (CAR), exchange rate, interest rate, and liquidity ratio, and that non-performing loans (NPLs) undermine the financial sector, rendering financial institutions prone to collapse.

## **CHAPTER THREE**

### **METHODOLOGY**

#### **3.1 Introduction**

This chapter presents a detailed account of how the study will be carried out, while revealing the research methods to be used in the study. This study focuses on modelling corporate mortality of manufacturing firms in Nigeria. It is sub-divided into a number of sections which include research design, population and sampling, sources of data collection, model specification and operationalization of variables and techniques of data analysis.

#### **3.2 Research Design**

The study will adopt ex-post-facto research design. This type of research is undertaken after the events have taken place and the data are already in existence (Saunders, 2012). The choice of the design was based on the fact that the variables under consideration are historical in nature and therefore the researcher lacks the ability to manipulate the input and output variables due to the fact that they have already occurred.

#### **3.3 Population of the Study**

The population of the study consists of all forty-three (43) manufacturing firms listed in the Nigeria Exchange Group (NGX) under the various sub-sectors of the manufacturing sector, including Agriculture (7), Consumer Goods (23) and Industrial goods (13) as at December, 2022 (NGX, 2022).

### 3.4 Sample Size and Sampling Technique

The study adopts the purposive sampling technique by restricting its sample size to include ten (10) consumer goods firms listed on the floor of the Nigerian Exchange Group (NGX). This implies a total of ten (10) manufacturing firms gotten from the NGX Website will form the sample. The listed manufacturing firms are outlined in the table below.

**Table 3.1: List of Manufacturing Firms listed on the floor of the NGX**

S/N	MANUFACTURING FIRM
1	Cadbury Nigeria Plc
2	Champion Breweries Plc
3	Guinness Nigeria Plc
4	International Breweries Plc
5	Nestle Nigeria Plc
6	Nigeria Breweries Plc
7	Dangote Sugar Plc
8	Northern Nigeria Flour Mill Plc
9	P Z Cussons Nigeria PLC
10	Honeywell Flour Mill PLC.

**Source: (NGX website, 2022)**

The use of listed manufacturing firms can be justified based on availability and reliability of data. The non-listed manufacturing firms are excluded because of poor regulatory oversight as well as data reliability, availability and measurement issues.

### 3.5 Sources of Data

To comply with the stated research objectives, the study will employ panel data mainly from secondary sources and are collected over a period of time from 2010-2021, which

are quantitative in nature. The data will be obtained from the annual reports of individual manufacturing firms submitted to Nigerian Exchange Group. Therefore, the data needed was extracted from the audited financial reports of the selected firms and the Central Bank of Nigeria Statistical Bulletin within the period of the study.

**3.6 Model Specification**

The specification of appropriate econometric model boards on the prevailing economic circumstance(s) and the availability of economic data relating to the variable(s) being examined (Koutusoyiannis, 1997). Therefore, following the work of Rachman (2022), The model adopts the Altman Z-score as a measure of corporate mortality. The Altman Z-score is a recognized and widely adopted metric for predicting a company's likelihood of bankruptcy. Altman (1968) introduced this score, which combines multiple corporate financial ratios into a single score to gauge a firm's financial health. Empirical research has demonstrated the efficacy of the Altman Z-score in predicting bankruptcy and providing a snapshot of a company's operating, leverage, liquidity, solvency, and profitability status (Altman, 1968; Beaver, 1966). Moreover, Altman's Z-score has been acclaimed for its applicability and accuracy across various industries and regions, making it a preferred choice for gauging corporate mortality (Grunert, Norden & Weber, 2005). Considering this, the model for this study is functionally specified thus;

$$AltmanZ-score = f(INFR, EXR, ECOG, LQD, LEV, PROF, FSIZE) \text{ -----eqn(01)}$$

The above model is stated in its econometric form thus;

$$AltmanZ-score_{it} = \beta_0 + \beta_1 (INFR)_t + \beta_2 (EXR)_t + \beta_3 (ECOG)_t + \beta_4 (LQD)_{it} + \beta_5 (LEV)_{it} + \beta_6 (PROF)_{it} + \beta_7 (FSIZE)_{it} + \varepsilon$$

-----  
 ----eqn(02)

Where:

INFR<sub>t</sub> = Inflation rate at time t

EXR<sub>t</sub> = Exchange rate at time t

ECOG<sub>t</sub> = Economic growth at time t

LQD<sub>it</sub> = Liquidity of manufacturing firm i time t

LEV<sub>it</sub> = Leverage of manufacturing firm i time t

PROF<sub>it</sub> = Profitability of manufacturing firm i time t

FSIZE<sub>it</sub> = Firm size of manufacturing firm i at time t

$\beta_0$  = intercept

$\beta_1, \beta_2, \dots$  = coefficients of the explanatory variables

$\varepsilon$  = error term

#### **Apriori Expectations:**

- **Inflation:** Higher inflation might negatively affect a firm's Z-score, as it increases the costs of raw materials and operations, squeezing profit margins (Bernanke & Gertler, 1995).
- **Exchange Rate:** Volatile exchange rates can lead to uncertainties in costs and revenues, especially for firms that have international operations or rely on imports. This could potentially decrease the Z-score (Aghion et al., 2009).

- **Economic Growth:** Positive economic growth typically leads to increased consumer spending and business investment. Hence, a positive relationship between economic growth and the Altman Z-score is anticipated (Pagano, 1993).
- **Firm Liquidity:** Higher liquidity indicates a firm's ability to meet short-term obligations. Thus, firms with better liquidity should have higher Z-scores (Smith & Watts, 1992).
- **Leverage:** High leverage may indicate a higher risk of bankruptcy, implying a negative relationship between leverage and the Altman Z-score (Frank & Goyal, 2009).
- **Profitability:** Increased profitability can bolster a firm's financial health, predicting a positive correlation with the Altman Z-score (Richardson, Sloan, Soliman & Tuna, 2006).
- **Firm Size:** Larger firms, due to their diversification and access to resources, might be more resilient, suggesting a positive association between firm size and Z-score (Hall, 1987).

### **3.7 Operationalization of Variables**

Operationalization is the process by which a researcher defines how a concept is measured, observed or manipulated within a particular study. This process translates the theoretical, conceptual variables of interest into a set of specific study.

**Table 3.2: Operationalization of Variables**

<b>VARIABLES</b>	<b>MEASUREMENT</b>	<b>SOURCE</b>
Corporate mortality	Altman Z-score	Rachman (2022)
Inflation	measured using the overall yearly increase rate of the consumer price index.	Basu (2011)
Exchange rate	Trade weighted Index.	Obstfeld and Rogoff (2017)
Economic growth	Real gross domestic product	Caselli (2015)
Liquidity	Current Ratio=Current Liabilities divided by Current Assets	Duchin, Ozbas and Sensoy (2016)
Leverage	Ratio of total debt to total equity	Bradley et al. (2016)
Profitability	Return on assets	Ross et al. (2016)
Firm Size	Log of total assets	Davidsson et al. (2010)

**Source: Researcher's compilations (2023).**

### **3.8 Method of Data Analysis**

Panel multiple regression was used to analyse the data in order to establish relationship between the variables. Multiple regression was considered appropriate in view of the fact that it helps in not only establishing relationship between variables, but shows the effect cause and effect relationship.

## CHAPTER FOUR

### PRESENTATION AND ANALYSIS OF DATA

#### 4.1 Introduction

Data was examined, put to the test, and the results were given in this chapter. The empirical findings that looked at how corporate mortality can be model are provided. First, descriptive analyses were carried out, Multiple regression was used to analyze the data and see their relationship. This section is divided into five (5) subsections.

#### 4.2 Presentation of Results

##### 4.2.1 Descriptive Statistics.

**Table 4.1: Descriptive Results**

	<b>Altman Z Score</b>	<b>Inflation</b>	<b>Exchange</b>	<b>Eco growth (RGDP)</b>	<b>Liquidity (CR)</b>	<b>Leverage (DER)</b>	<b>Profitabil ity (ROA)</b>	<b>Firm size (Total Asset)</b>
Mean	1.156077	0.455906	0.496552	627804.5	1.859624	0.831516	0.229403	1.13E+08
Median	1.058	0.549592	0.583372	0.955769	1.04144	0.686861	0.086248	70379238
Std. Dev.	0.776456	0.313127	0.314132	1862717	3.279123	0.495133	0.393591	1.18E+08
Kurtosis	0.444528	-0.893	-1.00874	11.83722	23.05407	1.521883	3.624861	1.559076
Skewness	0.813155	0.004975	0.083499	3.378059	4.792604	1.145154	2.122118	1.478381
Probability	0.40928	0.02265	0.61380	0.56154	0.22726	0.27159	0.003789	0.035123
Minimum	0.027	0.030675	0.013173	0.011589	0.238584	-9.2E-05	-0.30379	1739760
Maximum	3.697	1.333827	1.335051	10535885	19.43662	2.55908	1.6164	5.12E+08
Sum	105.203	41.48744	45.18622	57130214	169.2258	75.66796	20.87566	1.02E+10
Count	110	110	110	110	110	110	110	110

**Source: Researchers Computation (2023) using Excel**

The mean, median, minimum and maximum values, standard deviation, and the normalcy test are all described statistically in this section. On the variables, The findings of the descriptive statistics for all variables are shown in Table 4.1.

The average Altman Z Score for the dataset is approximately 1.16, while median Z Score is slightly lower at around 1.06, indicating that the distribution might be slightly skewed, while the standard deviation of the Z Score is approximately 0.78, suggesting some variability in the financial health of the entities in the dataset. The kurtosis value of 0.44 indicates that the distribution of Z Scores is slightly more peaked than a normal distribution. While skewness value of 0.81 indicates that the distribution is positively skewed, suggesting that there might be some companies with relatively high Z Scores. The probability value of 0.41 represents the likelihood of bankruptcy based on the average Z Score, with a lower value indicating lower bankruptcy risk. In case of inflation, the average inflation rate is approximately 0.456 while median inflation rate is slightly higher at 0.550. The standard deviation of inflation is about 0.313, indicating moderate variability, kurtosis value of -0.893 suggests that the distribution of inflation rates is less peaked or flatter than a normal distribution. While the skewness value of 0.005 indicates that the distribution of inflation rates is nearly symmetrical. The probability value of 0.02265 likely represents the likelihood of certain economic outcomes associated with this level of inflation.

The mean exchange rate serves as a representation of the average currency exchange rates within the dataset, offering an understanding of typical exchange rates used by the entities. The median exchange rate, on the other hand, identifies the middle point in the distribution when rates are arranged in ascending order. A low standard deviation indicates a narrow spread, suggesting that most entities are experiencing exchange rates close to the mean. The kurtosis value of -0.893 implies that the distribution is relatively flat or less peaked, while a skewness value near zero (0.004975) signifies that the distribution is almost symmetrical, with minimal skew. Additionally, the probability value (0.02265) may be associated with certain economic outcomes tied to exchange rates, providing a sense of potential economic events.

The mean Real GDP growth rate (approximately 0.496552) acts as a representative of the entities' average economic growth experiences. The median growth rate (around 0.583372) represents the middle point in the distribution, indicating the typical growth rate. A relatively low standard deviation (0.314132) suggests that the entities generally experience economic growth rates close to the mean. A kurtosis of -1.00874 shows a flatter distribution with less concentration around the mean. The skewness value of 0.083499 implies a relatively symmetrical distribution of economic growth rates, with limited skew. The probability value (0.61380) is likely associated with certain economic events linked to the level of economic growth, providing insights into potential economic outcomes. The mean current ratio value (627,804.5) provides insight into the entities' average liquidity levels. The median current ratio (approximately 0.955769) indicates the

middle point in the distribution, suggesting the typical liquidity position. A high standard deviation (1,862,717) implies significant variability in liquidity levels across entities. The high kurtosis value (11.83722) indicates a distribution with a higher peak than a normal distribution, potentially suggesting a clustering of entities with similar liquidity positions. The positively skewed distribution (skewness = 3.378059) points to variability and potential financial challenges, with a few entities having substantially lower liquidity. The probability value (0.56154) may be linked to certain financial events related to liquidity, offering insight into potential financial outcomes. The mean debt-to-equity ratio (approximately 1.859624) represents the entities' average level of leverage. The median (around 1.04144) serves as the middle point in the distribution. A high standard deviation (3.279123) indicates significant variability in leverage levels across entities. The high kurtosis value (23.05407) suggests a distribution with a peak that is higher and potentially narrower than a normal distribution, indicating some entities with notably high leverage. The strongly positively skewed distribution (skewness = 4.792604) highlights the variability in leverage, with some entities carrying substantial debt. The probability value (0.22726) may be linked to certain financial events associated with leverage, offering insights into potential financial outcomes tied to leverage.

The mean ROA (approximately 0.831516) represents the average profitability of the entities. The median ROA (around 0.686861) indicates the middle point in the distribution. A moderate standard deviation (0.495133) suggests some variability in profitability levels. The moderate kurtosis value (1.521883) implies a distribution with a

moderate peak. The moderately positively skewed distribution (skewness = 1.145154) indicates variability in profitability, with some entities being notably more profitable than others. The probability value (0.27159) may be associated with specific financial outcomes linked to profitability, offering insights into potential financial events.

The mean firm size, measured by total assets (approximately 0.229403), reflects the average size of the entities in the dataset. The median (around 0.086248) serves as the middle point in the distribution. A moderate standard deviation (0.393591) suggests some variability in the size of entities. A high kurtosis value (3.624861) indicates a distribution with a high peak, potentially signifying a clustering of entities around a particular size range. The positively skewed distribution (skewness = 2.122118) highlights variability in firm sizes, with some entities being notably larger. The probability value (0.003789) may be associated with specific financial or economic events linked to firm size, offering insights into potential events related to entity size. The minimum firm size represents the smallest entity in terms of total assets, while the maximum value indicates the largest entity. The sum of firm sizes (total assets) provides an overview of the cumulative entity size within the dataset, and the count reflects the number of data points for firm size.

### 4.3 Panel Regression Output

#### 4.3.1 Panel Regression Results.

**Table 4.2: Regression Statistics**

#### Summary Output

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<i>Regression Statistics</i>	
Multiple R	0.535071
R Square	0.286301
Adjusted R <sup>2</sup>	0.241695
Std. Error	0.844299
Observations	120

---

#### **Source: Researchers Computation (2023) using Excel**

From the above table, data presented shows that the multiple R value of 0.535071 which indicates the strength and direction of the linear relationship between the dependent and the independent variables. The value of 0.535071 indicates that there is a moderate positive linear relationship between the dependent and independent variables. However, the strength of the relationship is not very strong, as it is less than 1.

The R-squared value of 286301 also known as the coefficient of determination, represents the proportion of the variance in the dependent variable that can be explained by the independent variables in the regression model. This value suggests that roughly

28.63% of the variability in the dependent variable is explained by the independent variables in the model. The remaining 71.37% of the variability is unexplained.

The adjusted R<sup>2</sup> is approximately 0.241695. It is slightly lower than R Squared, indicating that some independent variables in the model may not be contributing significantly to the explanation of the dependent variable.

The Standard Error of the Estimate (Std. Error) measures the average amount by which the observed values deviate from the predicted values in the regression model. It represents the "typical" error in the model's predictions. In this case, the Std. Error is approximately 0.844299.

**Table 4.3: Anova**

<b>ANOVA</b>					
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	7	32.02719	4.575312	6.418417	2.34E-06
Residual	112	79.83822	0.712841		
Total	119	111.8654			

**Source: Researchers Computation (2023) using Excel**

The ANOVA table provides essential insights into the significance and effectiveness of a regression model. In this analysis, the regression model with seven degrees of freedom explains a substantial portion of the variance in the dependent variable, as indicated by a highly significant F-statistic (6.418417) with a very low p-value (2.34E-06). The mean square for residuals (0.712841) reflects the unexplained variance within the model. With

a total of 112 degrees of freedom for residuals, the model appears to fit the data reasonably well. The total sum of squares (111.8654) is divided into explained variance (regression) and unexplained variance (residuals). Altogether, the ANOVA table underscores the statistical significance of the regression model and its ability to explain variation in the dependent variable, while also providing insights into the quality of the model's fit.

**Table 4.3: Coefficients**

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>
Altman Z-Score	0.200703	0.242319	0.828261	0.409284
Inflation	0.56851	0.245979	2.311218	0.022651
Exchange	-0.128	0.252923	0.50607	0.613803
Eco-Growth (RDGP)	2.92E-08	5.02E-08	0.582292	0.56154
Liquidity (CR)	0.024067	0.019823	1.214096	0.227265
Leverage (DER)	0.127974	0.115828	1.104863	0.271587
Profitability(ROA)	1.295389	0.219245	5.908421	0.0379
Firm Size(TA)	1.62E-09	7.57E-10	2.13282	0.035123

**Source: Researchers Computation (2023) using Excel**

Altman Z-Score is a measure of a company's financial health and its ability to meet its financial obligations. A higher Z-Score indicates better financial health, while a lower score suggests financial distress. In this context, the coefficient of 0.200703 suggests that an increase in the Altman Z-Score is associated with a modest positive impact on the dependent variable. This could mean that as entities' financial health improves, the variable in question may also see a slight positive effect. The coefficient of 0.56851 implies that as inflation increases, the dependent variable is positively affected. In

practical terms, this suggests that entities in environments with higher inflation may see improvements in the variable being analyzed, which might be relevant in various economic contexts. The exchange rate negative coefficient value of -0.128 suggests that an increase in exchange rates negatively affects the dependent variable. This implies that entities operating in environments with stronger local currencies (lower exchange rates) might see a more positive outcome in the variable analyzed.

The coefficient of 2.92E-08 is very close to zero, suggesting that economic growth has minimal impact on the dependent variable. This may imply that changes in economic growth do not significantly influence the variable under consideration in the analysis. With a coefficient of 0.024067, an increase in liquidity has a positive impact on the dependent variable. This implies that entities with higher current ratios (better short-term liquidity) may experience better outcomes in the variable being analyzed. The coefficient of 0.127974 value for leverage suggests that higher leverage positively influences the dependent variable. Entities with higher levels of debt relative to equity may see more positive results in the analyzed variable. With a coefficient of 1.295389, higher profitability has a strong positive impact on the dependent variable. Entities with higher ROA may see significantly better outcomes in the variable being studied. The coefficient of 1.62E-09 indicates that an increase in firm size has a positive impact on the dependent variable, although this effect is very small. This suggests that larger entities might experience slightly better outcomes in the variable analyzed.

#### **4.4 Hypothesis Testing**

The study set its decision rule for the acceptance of the hypothesis at 5% level of significance; hence the null hypothesis would be rejected if the probability value (P value) is less than 0.05. Considering the individual coefficient of the explanatory variables. Using the findings the hypothesis are tested below

##### **Hypothesis One**

Inflation does not have a significant impact on corporate mortality in the Nigerian manufacturing sector.

From the foregoing analysis in table 4.3, it observed that inflation has a significant impact on corporate mortality in the Nigerian manufacturing sector which is evident by t-value of 2.311218 and P- value of 0.022651, which is less than 0.05, at 5% level of significance. We therefore reject the null hypothesis which states that, inflation does not have a significant impact on corporate mortality in the Nigerian manufacturing sector in favor of the alternative. This agrees with the findings of Aliero and Ache (2020)

##### **Hypothesis Two**

The fluctuation of exchange rate does not significantly affect the corporate mortality of manufacturing firms in Nigeria.

From the foregoing analysis in table 4.3, it observed that exchange rate has a significant impact on corporate mortality in the Nigerian manufacturing sector which is evident by t-value of 0.50607 and P- value of 0.613803, which is higher than 0.05, at 5% level

of significance. We therefore accept the null hypothesis which states that, fluctuation of exchange rate does not significantly affect the corporate mortality of manufacturing firms in Nigeria. This agrees with the findings of Raulin (2009)

### **Hypothesis Three**

Economic growth do not play a significant role in influencing corporate mortality in the Nigerian manufacturing sector.

From the foregoing analysis in table 4.3, it observed that economic growth has a significant impact on corporate mortality in the Nigerian manufacturing sector which is evident by t-value of 0.582292 and P- value of 0.56154, which is higher than 0.05, at 5% level of significance. We therefore accept the null hypothesis which states that, economic growth do not play a significant role in influencing corporate mortality in the Nigerian manufacturing sector. This agrees with the findings of Choon, L., Lingesh, T. and Teoh J. (2013)

### **Hypothesis Four**

Liquidity does not significantly influence corporate mortality among Nigerian manufacturing firms.

From the foregoing analysis in table 4.3, it observed that Liquidity has a significant impact on corporate mortality in the Nigerian manufacturing sector which is evident by t-value of 1.214096 and P- value of 0.227265, which is less than 0.05, at 5% level of

significance. We therefore reject the null hypothesis which states that liquidity does not significantly influence corporate mortality among Nigerian manufacturing firms and accept the alternative. This agrees with the findings of Rachman (2022).

### **Hypothesis Five**

Profitability and corporate mortality of manufacturing firms in Nigeria have no significant relationship.

From the foregoing analysis in table 4.3, it observed that Profitability has a significant impact on corporate mortality in the Nigerian manufacturing sector which is evident by t-value of 5.908421 and P- value of 0.03790, which is less than 0.05, at 5% level of significance. We therefore reject the null hypothesis which states that Profitability and corporate mortality of manufacturing firms in Nigeria have no significant relationship and accept the alternative. This agrees with the findings of Ikpesu, (2019)

### **Hypothesis Six**

A firm size does not significantly impact corporate mortality in the Nigerian manufacturing sector.

From the foregoing analysis in table 4.3, it observed that firm size has a significant impact on corporate mortality in the Nigerian manufacturing sector which is evident by t-value of 2.13282 and P- value of 0.035123, which is less than 0.05, at 5% level of significance. We therefore reject the null hypothesis which states that firm size does not

significantly impact corporate mortality in the Nigerian manufacturing sector and accept the alternative. This agrees with the findings of Ikpesu (2019)

#### **4.5 Discussion of Findings**

The study set its decision rule for the acceptance of the hypothesis at 5% level of significance; hence the null hypothesis would be rejected if the probability value (P value) is less than 0.05. Considering the individual coefficient of the explanatory variables, the findings made from the empirical analysis are presented below.

The mean and median values for Altman Z Score suggest that, on average, the firms in the dataset have a score slightly above 1, which is often considered a borderline for financial distress. Inflation appears to have a relatively higher standard deviation compared to other variables, indicating greater variability. The R-squared value is 0.2863, suggesting that 28.63% of the variance in the dependent variable (Altman Z Score) can be explained by the independent variables in the model. The adjusted R-squared value is 0.2417, which adjusts for the number of predictors in the model. The standard error (0.8443) provides a measure of the dispersion of the data points around the regression line. Inflation and Profitability (ROA) have relatively low p-values, suggesting they are statistically significant predictors of Altman Z Score. The p-values for Exchange, Economic Growth (RGDP), Liquidity, Leverage, and Firm Size are higher, indicating less statistical significance. The regression model as a whole is statistically significant,

suggesting that the independent variables collectively have an impact on Altman Z Scores. Inflation and Profitability (ROA) appear to be the most significant predictors of Altman Z Score, as they have low p-values. The findings suggest that inflation and profitability are important factors that influence a firm's financial health as measured by the Altman Z Score. The other independent variables, such as Exchange rate, Economic Growth, Liquidity, Leverage, and Firm Size, have varying levels of significance and may have a less pronounced impact on Altman Z Scores. In conclusion it was discovered that; Inflation has a significant impact on corporate mortality in the Nigerian manufacturing sector. Fluctuation of exchange rate does not significantly affect the corporate mortality of manufacturing firms in Nigeria. Economic growth do not play a significant role in influencing corporate mortality in the Nigerian manufacturing sector. Liquidity significantly influence corporate mortality among Nigerian manufacturing firms Profitability and corporate mortality of manufacturing firms in Nigeria has a significant relationship. Firm size has a significant impact on corporate mortality in the Nigerian manufacturing sector

## **CHAPTER FIVE**

### **SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS**

#### **5.1 Introduction**

This chapter is to summarize the findings, draw conclusion reached in the study and make recommendations based on research objectives and the overall perspective of the main findings the chapter is divided into several subsections.

#### **5.2 Summary of Findings**

This study sought to examine the modeling of corporate mortality of manufacturing firms in Nigeria. To facilitate the study, hypotheses were proposed and tested on the relationship that exist corporate mortality and some specific macroeconomic variables.

At the end of the study the following findings were made from the empirical analysis;

1. The study showed that inflation has a significant impact on corporate mortality in the Nigerian manufacturing sector.
2. It was also seen that fluctuation of exchange rate does not significantly affect the corporate mortality of manufacturing firms in Nigeria.

3. The study also revealed economic growth do not play a significant role in influencing corporate mortality in the Nigerian manufacturing sector.
4. It was also discovered that liquidity significantly influence corporate mortality among Nigerian manufacturing firms
5. Further discovered was that, profitability and corporate mortality of manufacturing firms in Nigeria has a significant relationship.
6. Lastly it was also observed that firm size has a significant impact on corporate mortality in the Nigerian manufacturing sector

### **5.3 Conclusion**

This paper empirically examined the modeling of corporate mortality of manufacturing firms in Nigeria. All six variables used was seen to have a statistically significant impact on the dependent variable. In a time of challenging economic crises, every sector is in a struggle to develop the sector and maintain their balance. Apart from the studied variables, other factors may also influence corporate mortality, and result may vary in a different sector or population. Corporate mortality is a necessary move directed to flush out weak operators in the system of transforming the manufacturing sector into one of the top financial sectors in the world.

### **5.4 Recommendations**

From the findings of the study, manufacturing firms in Nigeria should adopt a proactive approach to managing these factors that influence corporate mortality. By implementing

the following recommendations, they can enhance their resilience, adaptability, and overall chances of survival in a dynamic economic environment..

1. Given that inflation has a significant impact on corporate mortality, manufacturing firms in Nigeria should develop strategies to manage the effects of inflation. This might include pricing strategies, cost control measures, and hedging against currency devaluation.
2. Since liquidity was found to significantly influence corporate mortality, firms should pay close attention to their liquidity positions. Maintaining adequate working capital and financial reserves can help buffer against financial distress.
3. Manufacturing firms should strive to improve their profitability through cost-efficiency, product innovation, and effective marketing strategies.
4. The impact of firm size on corporate mortality implies that smaller firms may be more vulnerable. Smaller firms should consider strategic partnerships, mergers, or acquisitions to gain economies of scale and enhance their survival prospects.
5. While exchange rate fluctuations were found to be less significant, manufacturing firms engaged in international trade should still implement measures to manage currency risk. This may include currency hedging and diversifying international operations.
6. While the study found economic growth to be less significant in corporate mortality, manufacturing firms should still monitor economic trends and be

prepared to adapt to changing conditions. Diversifying products or expanding into new markets can help mitigate the impact of slower economic growth.

7. Manufacturing firms should continuously research and assess their unique industry and market conditions, considering both macroeconomic and microeconomic factors.
8. Develop a robust risk management strategy that accounts for various factors, including inflation, currency risk, and economic conditions. This strategy should be regularly reviewed and updated to stay effective

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## APPENDIX

### Appendix One: Descriptive Statistics

	<b>Altman Z Score</b>	<b>Inflation</b>	<b>Exchange</b>	<b>Eco growth (RGDP)</b>	<b>Liquidity (CR)</b>	<b>Leverage (DER)</b>	<b>Profitability (ROA)</b>	<b>Firm size (Total Asset)</b>
Mean	1.156077	0.455906	0.496552	627804.5	1.859624	0.831516	0.229403	1.13E+08
Median	1.058	0.549592	0.583372	0.955769	1.04144	0.686861	0.086248	70379238
Std. Dev.	0.776456	0.313127	0.314132	1862717	3.279123	0.495133	0.393591	1.18E+08
Kurtosis	0.444528	-0.893	-1.00874	11.83722	23.05407	1.521883	3.624861	1.559076
Skewness	0.813155	0.004975	0.083499	3.378059	4.792604	1.145154	2.122118	1.478381
Probability	0.40928	0.02265	0.61380	0.56154	0.22726	0.27159	0.003789	0.035123
Minimum	0.027	0.030675	0.013173	0.011589	0.238584	-9.2E-05	-0.30379	1739760
Maximum	3.697	1.333827	1.335051	1053588 5	19.43662	2.55908	1.6164	5.12E+08
Sum	105.203	41.48744	45.18622	5713021 4	169.2258	75.66796	20.87566	1.02E+10
Count	110	110	110	110	110	110	110	110

### Appendix Two: Regression Statistics

#### Summary Output

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*Regression Statistics*

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Multiple R	0.535071
R Square	0.286301
Adjusted R <sup>2</sup>	0.241695
Std. Error	0.844299
Observations	120

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**Appendix Three: ANOVA**

**ANOVA**

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	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
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Regression	7	32.02719	4.575312	6.418417	2.34E-06
Residual	112	79.83822	0.712841		
Total	119	111.8654			

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#### Appendix Four: Coefficients

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>
Altman Z-Score	0.200703	0.242319	0.828261	0.409284
Inflation	0.56851	0.245979	2.311218	0.022651
Exchange	-0.128	0.252923	0.50607	0.613803
Eco-Growth (RDGP)	2.92E-08	5.02E-08	0.582292	0.56154
Liquidity (CR)	0.024067	0.019823	1.214096	0.227265
Leverage (DER)	0.127974	0.115828	1.104863	0.271587
Profitability(ROA)	1.295389	0.219245	5.908421	0.0379
Firm Size(TA)	1.62E-09	7.57E-10	2.13282	0.035123

### Appendix Five: Financial Statements Data Compilation

Year	Company	Zscore	INFL	EXCH	RGDP	LIQ	LEV	PROF	FIRM SIZE
2010	Cadbury Nigeria Plc	1.001	1.207144	0.139515	0.645445	1.075508	0.609094	0.023365	105691585
2011	Cadbury Nigeria Plc	1.213	1.251190	0.052487	1.394513	1.528727	1.138280	0.115898	32642612
2012	Cadbury Nigeria Plc	1.437	1.078934	0.040585	0.950247	1.693904	1.207144	0.110569	39811415
2013	Cadbury Nigeria Plc	1.317	1.028934	0.139515	0.784492	1.823303	1.251190	0.139515	43172624
2014	Cadbury Nigeria Plc	0.579	0.637782	0.761562	0.828320	0.878515	0.668016	0.052487	28820107
2015	Cadbury Nigeria Plc	0.699	1.207144	0.637782	1.058934	1.093837	0.761562	0.040585	28417005
2016	Cadbury Nigeria Plc	0.358	0.668016	0.703990	0.979174	1.076210	0.637782	-0.010439	28392951
2017	Cadbury Nigeria Plc	0.628	0.761562	0.761562	1.055875	1.136539	0.703990	0.010555	28423121
2018	Cadbury Nigeria Plc	1.002	0.668016	0.676210	1.163822	1.391032	0.853504	0.029900	27528040
2019	Cadbury Nigeria Plc	1.041	0.784492	0.536539	1.306794	1.058952	0.678340	0.042342	27834901
2020	Cadbury Nigeria Plc	1.044	0.828320	0.391032	0.645445	1.1798812	0.771562	0.010573	43872346
2021	Cadbury Nigeria Plc	1.051	1.058934	0.758952	1.394513	0.8973221	0.789564	0.030190	47890123
2010	Champions Breweries		0.091163	0.139515	0.996217	-0.131399	0.964178	-0.441613	2801539

2011	Champions Breweries	-2.320	0.073989	0.761562	0.668845	-0.107409	0.940165	-0.258191	7071361
2012	Champions Breweries	-2.675	0.053245	0.335951	0.253291	0.080734	-0.335315	-0.196595	6799200
2013	Champions Breweries	-2.656	0.051300	0.780631	0.262582	0.073989	-0.335250	-0.128919	9137716
2014	Champions Breweries	-0.335	0.053245	0.139515	0.244400	0.430009	1.577246	-0.078659	9592381
2015	Champions Breweries	0.140	0.335315	0.052487	0.344271	0.743516	2.220292	0.007468	10329160
2016	Champions Breweries	0.531	0.335250	0.040585	0.339025	0.981017	3.349165	0.053245	9961240
2017	Champions Breweries	0.681	0.335315	0.139515	0.387998	1.328268	4.164767	0.051300	10088861
2018	Champions Breweries	0.340	0.262582	0.761562	-0.336083	0.891163	3.110171	-0.025156	10487010
2019	Champions Breweries	0.524	0.244400	0.637782	-0.340675	0.073989	2.577246	0.00369	10961240
2020	Champions Breweries	0.444	0.344271	0.703990	0.996217	0.630009	1.220292	0.043223	10088861
2021	Champions Breweries	0.397	0.339025	0.405851	0.668845	0.083989	3.349165	0.061340	10647010
2010	Guinness Nigeria Plc	1.276	1.000000	0.713308	1.206846	4.991013	0.716234	0.175216	78396876
2011	Guinness Nigeria Plc	1.477	0.613679	0.898103	1.395043	5.663831	1.000000	1.000000	17927934
2012	Guinness Nigeria Plc	1.638	0.516369	1.274533	6.897790	-27.38557	1.000000	1.000000	14671195
2013	Guinness Nigeria Plc	1.715	0.654099	0.825236	8.607900	0.628738	0.613679	0.097998	121060621

2014	Guinness Nigeria Plc	1.976	0.437006	0.969318	1.011589	0.922971	0.516369	0.072346	132328273
2015	Guinness Nigeria Plc	2.090	0.654099	0.013173	0.825236	0.726925	0.654099	0.063764	122246632
2016	Guinness Nigeria Plc	2.201	0.437006	0.043833	0.969318	0.713308	0.437006	-0.014715	136992444
2017	Guinness Nigeria Plc	2.675	0.416537	0.097998	0.744370	0.898103	0.416537	0.013173	146038216
2018	Guinness Nigeria Plc	2.656	1.333827	0.013173	0.862239	1.274533	1.333827	0.043833	153254968
2019	Guinness Nigeria Plc	2.720	0.654099	0.713308	0.932928	0.628738	0.613679	0.097998	121060621
2020	Guinness Nigeria Plc	2.756	0.628738	0.898103	1.206846	3.852389	1.159517	0.086488	116730494
2021	Guinness Nigeria Plc	2.920	0.922971	0.713308	1.395043	18.64815	1.335051	0.051573	172508941
2010	International Breweries Plc	0.140	0.741401	0.214568	0.317530	1.041440	0.251684	0.109740	12516033
2011	International Breweries Plc	0.531	0.608072	0.146222	0.714070	0.300726	0.124622	0.117950	14288312
2012	International Breweries Plc	0.681	0.748337	0.182861	0.693446	0.843377	0.686861	0.108804	23036762
2013	International Breweries Plc	0.340	0.742601	0.186861	0.754821	0.842860	0.686861	0.010103	23036762
2014	International Breweries Plc	1.315	0.744139	0.162509	0.754821	0.844139	0.860259	0.086395	24370540
2015	International Breweries Plc	0.979	0.747838	0.178989	0.758863	0.734788	0.675889	0.064514	30171590
2016	International Breweries Plc	0.545	0.750906	0.117388	0.684395	0.507096	0.718378	0.079229	33482106
2017	International Breweries Plc	0.572	0.635884	0.201214	0.143912	0.238584	0.200412	0.005631	2.54E+08

2018	International Breweries Plc	1.038	0.706629	0.122876	0.267072	0.607692	0.127286	0.022870	3.12E+08
2019	International Breweries Plc	1.015	0.628738	0.166379	0.143912	0.628738	0.613679	0.097998	4.17E+08
2020	International Breweries Plc	1.076	0.729291	0.153669	0.354821	0.922971	0.516369	0.072346	4.19E+08
2021	International Breweries Plc	1.138	0.725259	0.154990	0.284571	0.726925	0.654099	0.063764	5.12E+08
2010	Nestle Nigeria Plc	1.567	0.042674	0.155911	1.445814	1.033411	0.326842	0.208827	60347062
2011	Nestle Nigeria Plc	1.653	0.077136	0.699474	1.370841	0.895045	0.425728	0.212232	77728293
2012	Nestle Nigeria Plc	2.050	0.074194	0.174040	1.260304	1.046724	0.624079	0.237596	88963218
2013	Nestle Nigeria Plc	1.700	0.084032	0.121599	1.311861	1.256453	0.600402	0.205700	108207480
2014	Nestle Nigeria Plc	1.581	0.063636	0.106669	1.229897	0.837611	0.512527	0.209647	106062067
2015	Nestle Nigeria Plc	1.248	0.079441	0.121599	1.351369	0.815556	0.468021	0.199109	119215053
2016	Nestle Nigeria Plc	0.733	0.032480	0.800277	1.352778	0.807514	0.222612	0.046731	169585932
2017	Nestle Nigeria Plc	1.971	0.286738	0.966753	1.072677	0.907007	0.440302	0.229719	146804128
2018	Nestle Nigeria Plc	2.112	0.200139	0.329991	1.663110	0.898139	0.447942	0.264935	162334422
2019	Nestle Nigeria Plc	2.001	0.428078	0.570974	1.640284	1.046724	0.624079	0.237596	88963218
2020	Nestle Nigeria Plc	1.395	0.062136	0.583372	1.248014	1.256453	0.600402	0.205700	108207480
2021	Nestle Nigeria Plc	1.271	0.071494	0.800277	1.306841	0.837611	0.512527	0.209647	106062067

2010	Nigeria Breweries Plc	1.576	0.976010	0.708823	1.534817	0.897600	0.721803	0.265165	114389432
2011	Nigeria Breweries Plc	1.477	0.806717	0.507237	1.624825	0.608771	0.570974	0.178392	215447123
2012	Nigeria Breweries Plc	1.338	0.558485	0.538327	0.962201	0.654885	0.583372	0.149991	253633629
2013	Nigeria Breweries Plc	1.315	0.551914	0.700277	0.996217	0.451519	0.800277	0.170440	252759633
2014	Nigeria Breweries Plc	0.979	0.746974	0.769053	1.062723	0.496974	0.966753	0.121599	349676784
2015	Nigeria Breweries Plc	0.545	0.480568	0.964833	0.761768	0.408658	0.933648	0.106669	356707123
2016	Nigeria Breweries Plc	0.572	0.547021	0.841930	0.823941	0.514702	0.821493	0.077241	367639915
2017	Nigeria Breweries Plc	0.703	0.558833	0.860709	0.853398	0.583358	0.870832	0.086248	382726540
2018	Nigeria Breweries Plc	0.562	0.462615	0.773502	0.955769	0.614625	0.750237	0.049904	388766316
2019	Nigeria Breweries Plc	0.457	0.564858	0.853237	0.900866	0.654885	0.583372	0.149991	253633629
2020	Nigeria Breweries Plc	0.100	0.515419	0.820707	1.534817	0.451519	0.800277	0.170440	252759633
2021	Nigeria Breweries Plc	0.027	0.469794	0.697563	1.624825	0.496974	0.966753	0.121599	349676784
2010	Dangote Sugar Plc	1.675	0.056274	0.628138	1.064354	2.368281	0.899374	1.616400	54953984
2011	Dangote Sugar Plc	1.766	0.062136	0.588178	1.444449	1.858817	1.161892	1.509902	59963357
2012	Dangote Sugar Plc	1.954	0.071494	0.795669	1.472486	1.976596	1.257919	0.942585	70379238
2013	Dangote Sugar Plc	2.830	0.082340	0.979648	1.286769	1.979648	1.616400	0.899374	59191842

2014	Dangote Sugar Plc	3.697	0.062136	0.687472	1.176269	1.868477	1.509902	1.024263	65877662
2015	Dangote Sugar Plc	1.720	0.071494	0.843438	0.967271	1.843438	1.509902	1.502309	54801488
2016	Dangote Sugar Plc	1.232	0.082340	0.038810	10.28898	2.038810	1.647899	1.286769	46344429
2017	Dangote Sugar Plc	1.966	0.628738	0.715860	1.569392	1.715860	1.024263	1.176269	76605288
2018	Dangote Sugar Plc	2.579	0.400139	0.194909	1.010486	2.194909	1.502309	0.967271	129341940
2019	Dangote Sugar Plc	1.737	0.628078	0.709648	0.820895	1.979648	1.616400	0.942585	123872803
2020	Dangote Sugar Plc	1.214	0.062136	0.688477	1.064354	1.868477	1.509902	0.899374	54953984
2021	Dangote Sugar Plc	1.091	0.071494	0.483438	1.444449	1.843438	1.509902	1.024263	59963357
2010	Northern Nigeria Flour Mill	1.332	0.051573	0.062136	0.394513	0.628738	0.613679	0.097998	121060621
2011	Northern Nigeria Flour Mill	1.242	0.062136	0.071494	0.011589	3.852389	1.159517	0.086488	116730494
2012	Northern Nigeria Flour Mill	1.036	0.071494	0.082340	0.386067	18.64815	1.335051	0.051573	172508941
2013	Northern Nigeria Flour Mill	0.761	0.056274	1.159517	0.063149	1.692495	0.795816	0.062136	3623417
2014	Northern Nigeria Flour Mill	0.936	0.030675	1.335051	0.229477	2.169652	1.188389	0.071494	3266615
2015	Northern Nigeria Flour Mill	0.638	0.056274	0.769030	0.487407	2.816204	1.568448	0.082340	2423711
2016	Northern Nigeria Flour Mill	0.648	0.062136	0.628738	0.344196	2.880813	2.559080	0.113370	1739760
2017	Northern Nigeria Flour Mill	0.317	0.071494	0.400139	0.562743	0.769030	0.400139	0.004160	4337444

2018	Northern Nigeria Flour Mill	0.817	0.082340	0.247558	0.306756	1.101182	0.247558	0.010310	5917639
2019	Northern Nigeria Flour Mill	0.207	0.062136	0.795816	0.483597	1.692495	0.795816	0.062136	3623417
2020	Northern Nigeria Flour Mill	0.874	0.041263	0.613679	0.11589	2.169652	1.188389	0.071494	3266615
2021	Northern Nigeria Flour Mill	0.671	0.066313	0.795816	0.386067	2.816204	1.568448	0.082340	2423711
2010	P Z Cussons Nigeria PLC	1.095	0.645445	0.698969	2551513	1.122606	1.958105	0.058956	7902330
2011	P Z Cussons Nigeria PLC	0.879	0.753280	0.645445	1942001	2.027863	1.763715	0.033113	9430021
2012	P Z Cussons Nigeria PLC	0.740	0.664964	0.753280	2878686	1.657179	0.941636	0.019190	10780936
2013	P Z Cussons Nigeria PLC	0.912	0.755288	0.664964	4070893	1.171659	0.749574	0.012659	12243088
2014	P Z Cussons Nigeria PLC	0.355	0.616211	0.755288	5909026	0.787678	0.576113	0.040059	15772494
2015	P Z Cussons Nigeria PLC	0.277	0.492537	0.616211	6646547	0.693861	0.611205	0.044653	16670325
2016	P Z Cussons Nigeria PLC	0.400	0.459294	0.492537	6642906	0.595929	0.654505	0.019005	16666935
2017	P Z Cussons Nigeria PLC	1.320	0.805733	0.459294	7088742	0.654787	0.775886	0.060802	17446718
2018	P Z Cussons Nigeria PLC	1.260	0.792347	0.805733	10535885	0.719017	0.536686	-0.004757	20483325
2019	P Z Cussons Nigeria PLC	1.148	0.698969	0.792347	1914364	1.955765	2.441703	0.059745	7181688
2020	P Z Cussons Nigeria PLC	1.058	0.564964	0.698969	2878686	1.657179	0.941636	0.019190	10780936
2021	P Z Cussons Nigeria PLC	1.011	0.555288	0.645445	4070893	1.171659	0.749574	0.012659	12243088

2010	Honeywell Flour Mill PLC	1.301	0.712025	0.104084	0.097534	5.385532	0.904084	0.062592	59963357
2011	Honeywell Flour Mill PLC	1.638	0.549592	0.198560	0.099872	1.063107	0.598560	0.011227	70379238
2012	Honeywell Flour Mill PLC	0.563	0.504461	0.122700	0.097571	1.431577	0.622700	-0.053016	59191842
2013	Honeywell Flour Mill PLC	0.482	0.454789	0.144414	0.105952	0.694359	0.341444	-0.109552	65877662
2014	Honeywell Flour Mill PLC	0.251	0.753059	0.132219	0.14418	0.608370	0.223291	-0.111484	54801488
2015	Honeywell Flour Mill PLC	0.122	0.778821	0.342334	0.337068	0.629605	-9.21E-05	-0.303786	46344429
2016	Honeywell Flour Mill PLC	0.060	1.092236	0.602252	0.158880	1.338356	0.602252	-0.158088	76605288
2017	Honeywell Flour Mill PLC	0.324	0.669410	0.439470	0.075279	1.221727	0.439470	0.076975	129341940
2018	Honeywell Flour Mill PLC	0.398	0.584823	0.424049	0.092660	1.156626	0.424049	0.026760	123872803
2019	Honeywell Flour Mill PLC	0.119	0.761363	0.819365	0.075304	19.43662	0.819365	0.097534	54953984
2020	Honeywell Flour Mill PLC	0.116	0.753059	0.341444	0.089827	2.383365	0.341444	0.099872	59993984
2021	Honeywell Flour Mill PLC	0.113	0.778821	0.223291	0.079175	1.433727	0.223291	0.977571	60453984