

**Production Planning and Profitability of Selected Fast-Moving Consumer Goods
Companies in Nigeria**

**Adeolu Ayodeji ADELODUN
LCU/PG/001562**

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Faculty of Management and Social Sciences,
Lead City University, Ibadan, Oyo State, Nigeria**

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Certification

This is to certify that Adeolu Ayodeji Adelodun with matriculation number LCU/PG/001562 carried out this research work titled "Production Planning and Profitability of Selected Fast-Moving Consumer Goods Companies in Nigeria" in the Department of Management and Accounting, Faculty of Management and Social Sciences, Lead City University, Ibadan, Oyo State, for the award of Master Degree (M.Sc) in Production and Operations Management and that this has not been previously submitted.

Prof. G. E. Oyedokun
Supervisor

Date

Dr. T. M. Akinbo
Head of Department

Date

Dedication

This research work is dedicated to God Almighty and my mother, Dr. (Mrs.) Ruth Egun Adelodun.

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Acknowledgement

I want to express my sincere gratitude to the management of the Lead City University, Ibadan for providing me with the opportunity and requisite training to carry out this research.

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Even though the above-mentioned institutions and persons have assisted in the process of this research work, I alone stand responsible for the errors, if any, found in the work.

Abstract

In past years, the Fast-Moving Consumer Goods (FMCG) companies in Nigeria have been facing declining Profitability due to macroeconomic changes, reducing consumer purchasing power, and Central Bank of Nigeria (CBN) policies. Review of extant FMCG annual reports shows growing operational concerns despite marginal revenue improvement. In the light of this, this study examines the effect of production planning on the profitability of selected FMCG companies in Nigeria from 2011 to 2020. Correlational research design and ex post facto method were employed using secondary data obtained from the annual reports of the firms on the Nigerian Stock Exchange website. Three (3) theories namely: Theory of Constraint, Theory of Production and Pecking Order were used with the theory of constraint underpinning the study. The population of the study consists of 21 firms, and the sample size of the study comprised of 8 firms selected using purposive technique. The robust random effect regression analysis proved that inventory turnover ($P = 0.047^*$, Coeff = 0.013, T-Stat = 2.30) and workforce productivity ($P = 0.026^*$, Coeff = 0.056, T-Stat = 2.72) have a positive and significant effect on the profitability of the selected FMCGs. In contrast, capital structure has a negative and significant effect ($P = 0.000^*$, Coeff = -0.003, T-Stat = -6.43) on the profitability of the selected FMCGs. The study concluded that inventory turnover and workforce productivity improve the profitability of listed FMCGs in Nigeria, also capital structure has negatively influence on the profitability of the selected FMCGs in Nigeria. The study recommended that management of FMCGs companies in Nigeria should focus on strategic inventory management, improve the working environment, and structure their capital need with focus on equity to improve profitability.

Keywords: Capital structure, Fast Moving Consumer Goods, Financial performance, Inventory management, Production planning, Workforce productivity,

Word Count: 278

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List of Acronyms

Abbreviation	Meaning
CBN:	Central Bank of Nigeria
COGS:	Cost of Goods Sold
DER:	Debt-to-Equity Ratio
DPO:	Days Payable Outstanding
DSO:	Day Sales Outstanding
EPS:	Earnings per share
FGLS:	Feasible generalized least square
FMCG:	Fast Moving Consumer Goods
GPM:	Gross Profit Margin
IPMA:	International Personnel Management Association
MILP:	Multi Integer Linear Programming
NIM:	Net Interest Margin
OLS:	Ordinary Least Square
PS:	Production Scheduling
RAROA:	Risk-Adjusted Return on Asset
RAROE:	Risk-Adjusted Return on Equity
ROA:	Return on Asset
ROE:	Return on Equity
SKU:	Stock-Keeping Units
TDE:	Total Debt to Equity
TDTA:	Total Debt to Tangible Assets
WIP:	Work-in-Progress

Chapter One

Introduction

1.1 Background to the Study

Fast Moving Consumer Goods (FMCG) industry is one of the fastest-growing industries globally. The sector produces goods commonly used by households and considered essentials. These goods are produced in large volumes and sold more frequently. Increasing global populations, lifestyle changes, growing awareness of product innovations, and growing consumer spending power drive the FMCG market. Expansion in the supply chain contributes to the rise in the fast-moving consumer market, with supermarkets and hypermarkets accounting for more than half of the distribution channel. Despite the growing market share and turnover, some FMCG companies in Nigeria are having inconsistency and decline in profitability as a return on total asset employed.

The global FMCG market size in 2017 was about \$10 trillion, and it is projected to grow to around \$15 trillion in 2025 with a compounded growth rate of 5.4%. The food and beverage segment accounts for 89% of the global FMCG market share, with healthcare at 4% and personal care at 5%. North American leads the global market share, with the Asia Pacific leading the developing market share¹.

Africa's FMCG industry market share is about \$240 billion. The industry's growth results from the improvement in the African economy with gains in GDP per capita and increasing consumer spending. Households living on US\$2.97 per capital a day spend over 56% of their income on food items, while higher income groups spend less on FMCG products. Thus, poorer African countries with high population clusters are a potential market for FMCG industries. The African

population is estimated to be 1.68 billion by 2030, which will drive the growth of FMCG products².

With a population of 200 million, Nigeria has a significant FMCG market in Africa. In 2010, Nigeria's market share of FMCG products was \$41.7 billion. Households spend 56.65% of their income on food and beverages, with only about 6% on health³.

Fast Moving Consumer Goods industry faces challenges that can impact their Profitability despite the considerable market opportunities. FMCG is considered a low-margin and high-volume industry, and companies operating in this sector focus more on driving sales⁴. In addition, companies use intensive and dynamic manufacturing processes due to the varieties and seasonality of the products. Product shelf life, carcass utilization, and production lead time are constraints faced by manufacturers of consumer goods like foods, drinks, and perishable products⁵.

Another rising challenge in the industry is the growing consumer shift towards personalized and customized production, fragmentation of tastes and preferences, and demand for health and wellness products which the companies have to adapt to in the face of continued resource shortage and commodity price volatility⁶. Technology is also disrupting the FMCG landscape by lowering the barrier to entry. With new business models such as subscription and direct-to-customer delivery, many small and medium-sized companies are penetrating the market faster with better customer relationships.

The declining economic condition has reduced the purchasing power of consumers, putting pressure on products prices and squeezing the Profitability of producers. However, the FMCG sector performs better during an economic downturn as consumers require essential items more than luxury items⁷. Also, operating environmental challenges associated with doing business in

Nigeria, decrepit infrastructures, double-digit inflation, porous borders, sluggish economic recovery have compounded the challenges faced in the sector as they struggle to grow profitability.

With increasing competition in the industry and government restrictions on foreign exchange for importing certain raw materials, the performance of each company will depend, among other things, on how well it can organize its production activities.

Profit from operations is one of the goals of any corporate organization, no matter the size. Profitability has traditionally been a critical metric for evaluating a company's performance, long-term survival, and development. To remain competitive and promote long-term prosperity, every company must be profitable. Selling goods or services can help a firm accomplish its primary profit goal. The profit created by a corporation is proportional to the volume of goods and services sold⁸. Other factors may also affect a company's profitability. "The effects of liquidity, asset management, and debt on operating performance will be visible in profitability"⁹. The company's profitability results from various policies and actions that optimize operational activities of which production planning policy is critical.

Production Planning is the lifeblood of any manufacturing company. It requires maintaining the delicate balance between customer satisfaction and supplier management. Production planning attempts to maximize the efficiency and effectiveness of production resources while fulfilling product demand and accounting for all relevant variables that affect the manufacturing environment⁴. During production planning, targets and resource allocations are determined.

Production planning is becoming one of the most important aspects of a company's operations that should be embraced by every business, no matter how big or little.

Production is a method or procedure for converting a set of inputs, such as men, materials, capital, information, and energy, into a specified set of outputs, such as finished goods and services, in the right amount and quality, to meet an organization's goals⁹. It is a sequential production function that ensures strategic raw materials (materials, men, money, and machine) are accessible at the correct time and in the right quantity to produce finished products according to the schedule given. It is a managerial function that determines the production facility requirements based on space availability and market demands¹¹.

The primary goal of production planning is to guarantee that departments within an organization work together to eliminate obstacles in the manufacturing process. Production planning helps an organization determine workforce, material, and equipment requirements, schedule production according to marketing demand, secure diverse inputs at the correct time and in the right quantity and make the most efficient use of production inputs¹⁰.

Any firm must make at least three different decisions during its operations. It must first decide on a production strategy—how much to produce and which productive elements to use to achieve this. Second, it must determine how much capital it should put into fixed assets and the working capital required continuing production. Finally, it must decide how to fund this investment¹¹. Production can be sustained if the firm raises a particular amount of needed cash capital. Two factors contribute to the demand for money capital. First, the company may need to fund the purchase of fixed assets essential for production. Second, the company will almost always require working capital because factor payments and sales receipts do not always match up¹². Therefore, the Capital structure is an aspect of production planning that influences a company's profitability. The decision by managers to fund their firm's operations and investments could include the issuance of debt, raising new capital through the issuance of additional shares of equity, or retaining capital from earnings generated from operations; and the

choice between them is based mainly on the impact they have on the organization's Profitability¹³. Thus, financial managers should consider maximizing shareholders' wealth by establishing the best combination of financial resources for their organization.

Inventory turnover is a part of a production planning process that influences Profitability. Companies frequently increase inventory sales to enhance inventory turnover. The larger the inventory turnover, the higher the cost that can be avoided, and hence the more significant the company's profitability. It is not easy to obtain a high level of inventory turnover, and the organization may take a lot of this into account for effective inventory management¹⁴. Processing inventory regularly and efficiently is essential to an organization's performance. Another critical part of production planning is workforce productivity. How productive the production team is will determine the company's competitiveness and Profitability.

Most FMCG organizations spend considerable time and investment in production planning and control to optimize their processes. They sometimes invest in cutting-edge technologies to drive their aggregate planning and capacity expansion. However, most FMCG organizations still face increasing pressure on Profitability and susceptibility of their crucial production planning variables to dynamic changes in market conditions, significant variation in the resources employed in the production process, process instability, and a fast rate of change in client expectations¹⁴. Companies are burdened by high financing and operating costs¹⁵. Accessing finance at a low-interest rate is challenging in Nigeria, which impedes the growth and performance of local businesses¹⁶.

In general, an organization's ability to deal with specific production management issues such as inventory control, production scheduling and control, equipment selection, maintenance, plant size, plant location, plant layout and structure, quality and inspection, traffic and material

handling, workforce planning, and finally capital management determine its competitiveness. Most FMCG companies in Nigeria are faced with these challenges and often experience misalignment in planning and implementation. As the local and global economies slowly unlock post-Covid-19, competition for market share will increase in this sector. Profitability growth will not only be driven by increasing market share through marketing strategies and product innovation but will also depend on companies' capacity to operate efficiently and sustainably, focusing on the three critical production variables of inventory management, workforce productivity, and capital structure.

A review of empirical studies shows that Inventory control and capital are production planning variables that impact a manufacturing company's Profitability¹⁷. Some studies found that firms' capital structure aligns with pecking order theory²⁰. Others discovered that the capital structure relationship aligns with trade-off theory due to the negative relationship between capital structure and profitability¹⁸. Some studies found inventory turnover to negatively influence Profitability, while others found a positive effect on Profitability¹⁹. However, there are limited studies linking workforce productivity as a production planning input to the Profitability of a manufacturing company.

1.2 Statement of the Problem

By the nature of their operations, FMCG companies should anticipate constant, profitable growth and performance if they have proper production planning strategies to satisfy rising customer demand. In the past decade, FMCG companies in Nigeria have had inconsistent profitability due to macroeconomic issues and declining consumer buying power. A preliminary examination of the literature of a few FMCG companies reveals that their management is concerned with preserving profitability in Nigeria's dynamic and uncertain economic climate. This study will

help to understand how production planning influences the profitability of selected FMCG companies in Nigeria by studying three significant production variables.

1.3 Aim and Objectives of the Study

This study's primary aim is to investigate the effect of production planning on the Profitability of listed FMCG companies in Nigeria. However, the specific objectives are to:

- i. examine the effect of inventory turnover on the Profitability of listed FMCG companies in Nigeria;
- ii. assess the influence of workforce productivity on the Profitability of listed FMCG companies in Nigeria; and
- iii. evaluate the effect of capital structure on profitability of listed FMCG companies in Nigeria

1.4 Research Questions

- i. What effect does inventory turnover have on the return on assets to measure the Profitability of listed FMCG companies in Nigeria?
- ii. To what extent does workforce productivity affect the net profit of listed FMCG companies in Nigeria?
- iii. How does capital structure impact the return on assets of listed FMCG companies in Nigeria?

1.5 Hypotheses

H₀₁ - Inventory turnover has no significant effect on the Profitability of listed FMCG companies in Nigeria.

H₀₂ - The workforce's productivity does not significantly influence the Profitability of listed FMCG companies in Nigeria.

H₀₃ - Capital structure does not significantly impact the Profitability of listed FMCG companies in Nigeria.

1.6 Significance of the Study

This study will help the management of the FMCG organization understand and quantify the importance of production planning and maximize its profit through effective use of capacity and resources. It will also help policymakers make policies that will grow the capacity of a manufacturing organization, increase productivity, and grow the economy. The finding is also beneficial to academics and researchers as it serves as an empirical ground for future research on production planning and Profitability.

1.7 Scope of the Study

This study focuses on selected FMCG firms in Nigeria. The operations of these companies are dispersed around the nation. The listed firms on the Nigerian Stock Exchange are classified as consumer-packaged goods. The study investigates the annual reports of these companies during a period of ten (10) years (2011–2020), which corresponds to a period of diminishing Gross Domestic Product (GDP) growth in Nigeria.

1.8 Limitations of the Study

This study focused only on the listed FMCG in Nigeria and the aspect of money (capital structure), manpower (workforce productivity), and material (inventory management). The research did not consider other variables like demand forecast, capacity utilization, process flow,

work layout, product design, and quality management. These variables require primary data and extensive observation of the shop floor, which was not practical due time constraint, cost, accessibility and confidential nature of the data.

Also, the research used return on assets (ROA) as a measure of Profitability. Other measure of Profitability like return on equity, gross profit margin, net profit margin, and others were not considered in the study

1.9 Operational Definitions of Terms

Capital Structure: is the combination of debt and equity employed by a company to finance its business operation.

FMCG: Fast Moving Consumer Goods are goods consumed or used regularly by households and individuals and are manufactured in large quantities and sold quickly.

Inventory Turnover: the number of times the inventory is used in production measure by the cost of goods soles to the average inventory.

Profitability: the ability of a company to generate revenue more than its total cost measured by the profit after tax to total asset employed.

Workforce Productivity: the relative efficiency gains resulting from different management systems, organization, coordination, or engineering measure by revenue to average number of employees in a given firm.

Working Capital: the capital a business needs to carry out its day-to-day operations.

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Chapter Two

Literature Review

This chapter discussed the relevant conceptual, theoretical, and empirical issues relating to Production Planning and Profitability of Selected Fast-Moving Consumer Goods Companies in Nigeria. The chapter presents the relevant literature which spurs the empirical investigation of this study.

2.1 Conceptual Studies

2.1.1 Operations Management

Operations management is the set of activities that creates value in the form of goods and services by transforming inputs into outputs. Operations management activities include production planning, inventory management, product innovation, location strategy, and supply chain management. Each of these activities directly impacts the performance of an organization¹.

Operations management is complex, and it may be presumptuous to study every part of it simultaneously. It is also model-driven, and different works have been done on the scheduling algorithm model. This paper, however, is not focusing on the mathematical modelling of operations. Instead, the focus is on understanding how the effect of production planning impacts on Profitability².

2.1.2 Production Planning

The art of scientifically analyzing production activities started with Adam Smith's. He argued that productivity increases when the production process is divided into specialization and repetitive tasks are automated³. Other management researchers expanded the work of Adam

Smith to produce a scientific management approach that identifies other factors such as job analysis, workers' training, and environmental aspect. With increasing pressure to reduce the cost of operation and be more competitive, companies emphasize optimizing their processes through knowledge management and skills enhancement⁴.

Production planning is, therefore, critical to increasing enterprise productivity. Production is the making of goods and services for consumption. Production starts with labour, capital, material and management as inputs which pass through a conversion process to become the final output of goods and services. Productivity can be measured as a single factor where one resource is used as input. However, production activities often involve many resources as input; thus, a multifactor approach to productivity measurement is more appropriate¹.

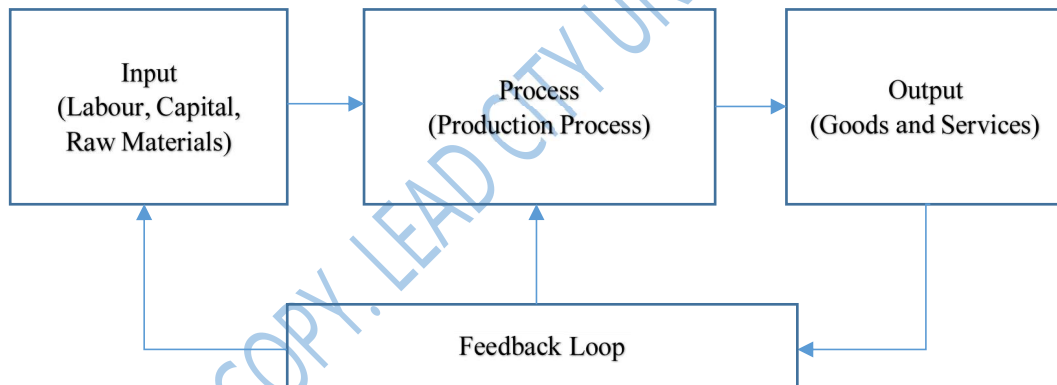


Figure 2.1: Basic Production Process

Source: Researcher's Computation, 2022

"Production planning involves the sequence of activities performed before the production process. These include a production schedule, economic batch quantities, dispatch of priorities, and operation sequence. On the other hand, production control ensures the implementation of all production plans"⁵.

Production planning is a management strategy that manufacturing organization use to ensure that resources are allocated and coordinated in manner that result in operational efficiency.

In an environment where consumer demand is fluid and the resources of production are scarce, it is important for management to have oversight over all production elements⁶.

The purpose of planning and controlling all the activities involved in making a product is to improve productivity. Production Planning establishes efficient use of materials, money, machine, and manpower to achieve improved profitability for the organization. The impact of Production Planning is improved organization for regular and timely delivery, better suppliers' communication for raw materials procurement, reduced investment in inventory, reduced production cost by increasing efficiency, smooth flow of all production processes, reduced waste of resources and production cost savings that improve the bottom line².

The critical decisions involve in Production Planning are what to produce, how to product, where to produce, when to produce, who will produce and how much to produce. All these decisions spread across different functions in an organization. Production planning therefore forms the central nervous system of a manufacturing organization that interconnects all other functions.

In the study on the impact of production planning on operational cost control, many beverage companies were using production planning to drive their operation, which has led to their growth. Production planning depended on other variables such as material requirement, production approach, and strategic plan. However, the study did not develop or use any cost model for measuring the relationship between production planning and operational cost or profitability⁵.

Decision-making in a production environment is complicated due to uncertainties in the production variables such as changes in demand, unavailability of raw materials, labour action, etc. Production planning, therefore, involves forecasting and aggregate demand estimation.

Forecasting helps manage the dynamic and complex business environment, predict the short-term fluctuation in production, better manage resources, rationalize workforce decisions, and play an essential role in strategic decisions⁷. Many production facilities have used extrapolative methods using time series and causal forecasting methods in production planning.

The objectives of production planning and control include the following: the delivery of quality goods in the required quantities to the customer on the schedule necessary to attain the highest level of customer satisfaction, to facilitate effective resource/material utilization, to reduce production/manufacturing cycle time, to maintain optimal inventory levels, to schedule production facilities optimally, to organize the activities of the different departments, create backup plans in case of an emergency or contingency, and keep extra capacity on hand to deal with rush orders⁸.

The construction of a distinct position comprising a specific set of activities is characterized as a strategy. Another perspective sees strategy as organizational leadership's intentions developed and stated to ensure surprise-free implementation in a predictable and realistic environment. The strategy ensures the company's survival in a competitive market by anticipating and responding to rival problems⁹. As a result, it should be mentioned that strategy is primarily concerned with competing and surviving in the market by providing products, services, and competitive programs that are superior to those offered by competitors.

Production planning happens at different levels of the organization and at different time frames. Strategic production planning is done at the upper level, which ties the business, financial, operations, and marketing plan together. At this level, aggregate production planning is the main focus. Demand fluctuations due to seasonality are considered, capacity fluctuations such as scheduled and unscheduled maintenance are considered, and the complexity of operations

systems, decisions around difficulty level in altering operations rate, and the need for multi-period planning are made. At the middle level, tactical production planning is done. Material and capacity requirements are evaluated, and a detailed master production plan is developed. At a lower level, a detailed operation schedule is drawn, implementation carried out with real-time control¹.

Aggregate operations planning methods can be classified into heuristic methods and optimal methods. Heuristics methods involve trial-and-error methods and search methods. It is simple to use without the need for mathematical sophistication. However, it does not consider all the variables in the solution space and provides the best solution. Optimal methods include Transportation Model and Linear Programming Model. These models offer optimal solutions. The Transportation Model focuses more on the shipment of commodities while the Linear Programming Model factors all other operations variables such as hiring and lay-off of workers¹⁰. Multi Integer Linear Programming (MILP) approach was also proposed for use, which is believed to have a significant improvement on change over time with the benefit of overall plant productivity⁷.

Production Scheduling (PS) is the process of fitting specific jobs into a general timetable to create orders in line with contractual obligations or mass production. Each component can arrive in the order and at the time required. As a result, the highest production efficiency is achieved by using the best and cheapest way to produce the necessary quantity of goods, of the required quality, at the required time. This explains why Lean Manufacturing and Just-in-Time production management techniques are so popular right now. Management uses PS to coordinate and improve all industrial activities' performance to achieve this goal¹¹.

Forecasting is the act of making systematic estimations of future conditions, and the figure or statement that results is called a forecast. Almost every commercial and economic decision is

based on projected future conditions in an uncertain world. Forecasting would not be unnecessary if the future could be predicted with confidence. However, uncertainty exists; future events are rarely guaranteed, necessitating a well-organized forecasting system. The following are the critical roles of forecasting: the formulation of action plans, the most common application of forecasting is in tracking the progress of forecast-based programs, the forecast serves as a warning system for crucial issues that must frequently be reviewed since they could have a significant impact on the plan's success. Forecasting strives to reduce the uncertainty surrounding management decision-making in costs, profit, sales, production, pricing, capital investment, and so on¹².

Demand Forecasting System, which the company's Marketing department usually oversees, is required for optimal production planning. This approach generates time-phased estimates of each finished good's unconstrained market potential (i.e., potential sales at current pricing if product availability is imminent)¹³. The Order Board is an essential input to the Demand Forecasting System because orders need to represent actual demand that is known.

Lean manufacturing is a modern approach to production and manufacturing used in many industries. The cardinal aim of lean manufacturing is to achieve organizational profitability by improving productivity and eliminating waste within the system. Waste is anything that does not add value to the customer but consumes resources¹⁴.

Waste elimination, cost reduction, and employee empowerment are the basic ideas behind the lean manufacturing system, which has been used in Japan for many years. The Japanese business philosophy is completely different from the one that has long prevailed in the United States. In the west, the traditional belief has been that the only way to make money is to add it to the manufacturing cost to arrive at the desired selling price⁷. The Japanese approach, on the other

hand, believes that the selling price is determined by the customers. The higher the quality of the product and the more services provided, the higher the price that customers will pay. The profit is determined by the difference between the product's cost and this price. The goal of the lean manufacturing discipline is to eliminate waste in every aspect of the value stream to reduce costs, generate capital, increase sales, and stay competitive in a global market that is growing. The value stream is defined as “the specific activities within a supply chain required to design, order and provide a specific product or value”¹⁵.

This business ideology is known by a variety of names. In addition to lean manufacturing, phrases like agile manufacturing, just-in-time manufacturing, synchronous manufacturing, world-class manufacturing, and continuous flow are employed. As a result, the overarching premise of lean manufacturing is to cut costs via continuous improvement, which will eventually lower the cost of services and goods, resulting in increased profits.

"Lean" focuses on eliminating or minimizing wastes (or "Muda," the Japanese word for waste) and optimizing or fully using customer-value-adding operations. In the eyes of the consumer, value is everything that the client is willing to pay for in the product or service that follows. As a result, the fundamental premise of lean manufacturing is waste removal.

Waste sources are all interconnected and eliminating one source of waste can lead to the elimination or reduction of others. Inventory is perhaps the major cause of waste. Inventory of work-in-progress and finished parts add no value to a product and should be deleted or decreased. When inventory is reduced, hidden issues might emerge, allowing urgent action to be done. Reducing production lot sizes is one of the numerous approaches to minimizing inventory. Reducing lot sizes, on the other hand, should be followed by a reduction in setup time to keep the cost per unit constant, as stated by the famous economic order quantity formula¹⁶.

The delivery process (Time of transportation) is yet another cause of waste. Moving parts from one end of the facility to another end does not add value to the product. As a result, it is critical to reducing transportation times during the manufacturing process. One approach to achieve this is to adopt a cellular production plan to assure a continuous flow of the product. This also helps eliminate one other source of waste, which is energy. When machines and people are grouped into compartments, unproductive operations can be significantly reduced because a group of people can be fully dedicated to that compartment, and this avoids excess human utilization. Another source of waste is faults and junk materials¹⁰.

One technique to reduce flaws and scrap is to do total productive maintenance. Manufacturing parts that are fault-free from the start has a significant impact on productivity. Waste minimization is undeniably important in today's production world. Companies must aim to develop high-quality, low-cost items that can reach customers as quickly as feasible. Toyota has created a collection of tools that may be used to remove or decrease waste sources¹⁷.

2.1.3 Inventory Management

Inventory is defined as an inventory of items and resources on hand for commercial purposes. Stockpiles of raw materials, supplies, components, work-in-process, and finished goods form at various stages along with a company's production and logistical channels; inventory refers to the stock of any item or resource used. The three essential components of inventory are raw materials, work-in-progress (WIP). The supplier has delivered raw materials to the purchaser's warehouse. Still, they have not yet been moved into the manufacturing area for conversion¹⁸. WIP is a term used to describe a product from when it leaves the raw material storage area until it is declared ready for sale and delivery. To reduce buffer inventories, eliminate production processes, and shorten the overall production cycle time, working capital must be considered in

this process. Raw materials and finished goods must be maintained to a minimum in the manufacturing sector. WIP must be extensively examined to justify the time it takes for products to be cleared for sale. Quality control techniques usually handle this stage¹⁹. The merchandise in the warehouse waiting to be sold and delivered to clients is referred to as finished products.

Inventory management is all about getting the most out of your inventory to boost your company's performance, effectiveness, and efficiency. Poor inventory management on the factory floor will result in raw material surpluses or shortages, which will indirectly impact the company's Profitability²⁰. due to the need to meet irregular consumer demand with limited supplier capabilities and storage space. In addition, inventory management is a procedure used by businesses to organize, store, and replace inventory to ensure a sufficient supply of goods while reducing costs. Inventory management has an impact on a company's competitive edge. Competitive advantage results from crucial management decisions that allow a company to stand out from the competition. Also, inventory management is a process that corporations employ to arrange, store, and replace inventory to maintain an appropriate supply of items while minimizing costs. Inventory management affects manufacturing firms' competitive advantage. Competitive advantage results from crucial management decisions that enable a firm to differentiate itself from its competitors²¹.

Due to the complexity of anticipating demand and customer expectations regarding product availability, wholesalers and retailers who are essential participants in downstream distribution channels confront a unique challenge in keeping inventory at sustainable levels. When they consider the variety of items in terms of colour/design, package type, size, and so on, the issue becomes even more significant. To further understand the problem, imagine an accurate demand prediction; nonetheless, the aggregate demand must be broken down by various product specifications into sub-total demand forecasts to direct the company's stock-keeping units (SKUs)

to fulfil the final customer's order. On the other hand, sub-total demand predictions may be diverse, encompassing dozens, hundreds, or even thousands of categories; in this case, they become genuinely difficult, complex, and time-consuming. The challenge of precisely estimating demand inevitably leads to two problems: overstock and stock-out of goods. Companies tend to overstock to avoid lost sales due to stock-outs²².

Inventory management is a critical aspect of production operations planning. Regardless of their size, all organizations have an inventory planning and control system. Inventory could be raw materials stored for future production, or Work-In-Progress, which are raw materials that have undergone some changes but not yet at the finished state, and inventories supplies needed for maintenance and repairs. Finished goods are also inventory awaiting delivery or sales. Organizations hold inventories primarily to hedge against uncertainties, fluctuations in demand, and inflation and decouple various parts of the production system better to manage the peculiarities of each stage of production. Some inventories are seasonal with fluctuations in demand due to changes in environmental conditions or social reasons such as festive periods. Some stocks are cyclical as many repeated orders are made due to frequent consumption, while some inventories are used for decoupling, as pipeline, and as safety stock. Inventory turnover is one of the ways to evaluate inventory management performance. It shows the number of times a company has sold or replaced its inventories over a given period. It is an accounting-based performance variable that combines the cost of goods sold with inventories²³.

Demand for inventories influences the amount of stock a company will consider in its plan. This demand could be independent or dependent. Independent demand is a function of customers' requirements and preferences, which is continuous with considerable uncertainties. At the same time, dependent demand is a function of the production requirement, which is often derived with some measure of certainty. Therefore, it is essential to have adequate inventory planning to

prevent non-availability of items, lost sales, poor customer service, and maximize the Profitability of the company. The average time it takes to convert raw materials into finished goods is measured in days. The inventory turnover ratio, which measures inventory management efficiency, is expected to be high for profitable businesses. A low inventory turnover ratio may indicate poor sales or an oversupply of inventory. Shortening inventory collection periods can help managers boost corporate profits. Inventory turnover is a ratio that shows how many times a year the number of supplies must be replaced or how many times the funds invested in stock must rotate²⁴.

Different parts are very necessary for a warehouse management system, like inventory management, maintenance of the warehouse, overhead management, system for pricing, and so on. Nevertheless, determining the optimal quantity ordering is one of the major parts of inventory management that can ensure operations at optimal cost. The approach used in determining such optimal quantity for ordering is referred to as the Economic Order Quantity. The reason for discerning the EOQ is to reduce the Total Increment Cost (TIC), by contemplation of two major costs which are; Total Ordering Cost (TOC), and Total Handling Cost (THC). One of the two major techniques of discerning the EOQ is the trial and error technique and the second technique is the mathematical method. Mathematical model is greatly adopted to improve inventory management applications. Furthermore, the EOQ-related different measures also explain the inventory management system, especially the connections of EOQ to Economic Number of Orders (ENO), duration of the entry cycle, and reorder point of the quantity saved. EOQ is an inventory management system that shows the amount of an item to minimize the total cost of managing the inventory and order processing (Ordering Cost). EOQ is a model has been presented in 1913 by Ford W. Harris and R.H Wilson and K. Adler are all given enough credit for their insightful analysis and application of the EOQ model¹⁷.

When an item is being ordered from the perspective of a business, the EOQ model ascertains the amount of quantity to be placed in an order in contemplation of reducing the yearly cost of inventory management and order processing. In a context like this, these two kinds of costs are the major parts of discerning the EOQ in its primary illustration. Nevertheless, the model has been introduced with some kind of hypothesis for the original assimilation, and from that point going forward, its expansions are used broadly in businesses, particularly in handling inventory. The determination of EOQ will be discerned for every product/service personally in a business following assumptions such, knowing the yearly demand for the products in units, the cost for ordering and having a stable ordering cost all through the year, knowing the inventory management cost and for it to be consistent all through the year. If the cost for management of an item is given as a fraction of the price of the item, the unit price of the item remains the same all through the year, no cash or discount of quantity is allowed, the quantity ordered of the product is given as a single batch, quick replenishment of ordered quantity on time, there is no delay and no shortage of stock and consistent lead time is allowed only, fluctuation is not allowed²⁵.

The annual demand for a product is continual and known for its measurement units and this is also known as the annual requirement of the product. Making use of different prediction methods, a business must assume the annual prerequisites for the specific product, for which the business needs to be aware of the EOQ. As the requirement produces the based cost of purchasing the item, the total cost of purchase is not relevant in discerning the EOQ.

The cost for ordering has to do with the cost of orders to be placed for the item in contemplation of order interaction, allowances to buy officers, printing, and stationery of order, inspection cost, collecting the item, and cost of transportation. It is worthy to note that these costs remain stable

and unchanged for the duration, regardless of the number of orders to be placed. As the ordering cost per order is continual, the connection between the quantity ordered and the number of orders to be placed is adverse, that is, the higher the quantity ordered (Q) per order, reduces the number of orders to be placed; and the lower the quantity ordered (Q) per order, the higher the number of orders to be placed. This means the adverse connection between the quantities ordered (Q) and the total cost of the processed order (TOC)¹⁷.

The inventory handling cost has to do with managing and handling the product inventory in the workplace while condemning the costs for warehousing, shrinkage loss, evaporation, reduction and costs of spoilage, insurance, rent for the warehouse, obsolescence, and several other related overhead warehouse cost. As these costs are stable to handle the total demand, which is the annual demand of the products the managing cost per unit is constant. Hence, the total cost of managing has a great connection with the number of products in-store, reduced by the total handling cost (THC). It is worth more than stock management would be half the quantity to be ordered all through the year, hence, the average stock to manage will be $Q/2$.

The Basic EOQ model, with all the hypotheses in consideration, deals with two basic types of costs; TOC and Total Handling (THL). It is very clear from the above illustration that these costs are shifting in opposite directions, in which specific amounts quantities are ordered for storage reasons. Hence, a business must discover a trade-off point for trade-off quantity to reduce the total cost of both. TOC added with THC. In this context, the quantity to be ordered to reduce the total cost of both the TOC and THC can be referred to as the Economic Order Quantity (EOQ).

Saving inventory may be quite expensive for small business owners. The major advantage of the EOQ model is the custom-made suggestions offered in regard to the most economical amount of units per order. The model may propose buying a bigger quantity in small orders to take

advantage of discount bulk purchases and reduce the costs of the order. Alternatively, it may point towards more orders of smaller items to reduce the costs of holding if they are high and the costs of ordering if they are low. The ability to maintain enough levels of inventory to fit customer needs is an act of balancing for a lot of small business owners. Another benefit of the EOQ model is that it offers certain amounts mainly to the business regarding how much inventory to hold, when to order again and how many products to order. This evens out the process of stocking again and results in greater customer service as inventory is available when it is required. The EOQ model needs good assimilation of algebra, which is a drawback for small business owners that lack certain skills in mathematics. Also, effective EOQ models need detailed data to calculate different numbers. For instance, the important formula of the model calculates the square root of $2DS/H$, whereas D is the number of units bought yearly, A is the fixed charge of ordering, and it is the holding cost per unit. Rent or mortgage payments, costs of utility, and property taxes are needed to calculate H .

When it comes to inventory management, discerning EOQ is a major measure to handle other worries in warehouse management. The main goal of discerning the EOQ is to reduce the total incremental cost (TOC and THC) that incurs the cost of buying the product. In this context, this paper tries to bring out two major techniques of discerning the EOQ which are the trial and error method and also the mathematical method. Nevertheless, it is advisable to apply the mathematical method to make certain choices objectively.

One of the strategies adopted in inventory management is the Push-Pull strategy. The terms "push" and "pull" in business have their origins in logistics and (logistic) supply chain management, but they are also employed in large-scale marketing. The concept originated from study done on "Japanese Manufacturing Techniques," with the incredible subtitle "Nine Hidden

Lessons about Simplicity." Which resulted in the "Japanese technique" of producing consumer goods, which was thought to be highly competitive. One of the modes of production are at the root of the application of the "pull" and "push" is the Western "Push production system," which is based on the material resource planning mechanism and manufacturing resource planning philosophy; The other mode of production is the Japanese "Pull production system," which incorporates the KANBAN logic control technique and the concepts of the "Just-in-time" concept (JIT). A "push-pull" mechanism in business refers to the transportation of a product or related piece of information between two parties. As a result, in the market, consumers "pull" the items and pieces of information that are appropriate for their needs, whereas offers and suppliers "push" the required products/services toward consumers/customers. Both push and pull approaches are commonly used in logistic and supply chains to deliver desired products and services to clients²⁶.

When it comes to marketing, a "push" strategy is employed when it comes to the development and improvement of a new product that was previously unknown to consumers/users. When there is no consumer demand for a product that is about to be launched, the product and related information are "pushed" toward the consumer through distribution and promotion. Because of the information asymmetry, producers are always acting in favor of consumers/customers to limit the amount of information available about the items and services on sale²⁷.

The "push" mode of supply chain management is defined by the notion that products are "pushed" via distribution channels from manufacturing to retailers. The manufacturer determines the volume of production based on the quantities recorded in previous orders received from retailers. As a result, a supply chain based on the "push" strategy may need more time to respond to changes in demand, which may result in larger stockpiles or blockages and delays (due to poor

services and product obsolescence). The consumer desires a product that is compatible with "pull" systems and "pulls" it through the distribution channel in relational marketing. A significant automobile manufacturing company, for example, produces the make or models that were first introduced to the market when they were ordered by customers.

A push strategy relates to the development of processes that originate from the company and are directed toward the market: the company invents, develops, and proposes a product that will be purchased. As a result, the company maintains supply. A pull strategy is a polar opposite, referring to procedures that begin in the market and end at the company: demand requests supply and 'pulls' it out of the company. We may say that the market stimulates the needs that lead to the development of a specific product by the corporation which emerges due to the response to the action of demand of the pull. Push tactics are competitive because they rely on accumulated expertise, which is gained by repeating the same actions over time, as well as a diverse variety of activities that may be organized and exploited in a stable environment. When faced with a deadline, economies of scale and experience can be realized, resulting in tight but highly competitive cost structures, even if competitors are unable to do so. Pull strategies are predicated on the idea that the reverse is true. The corporation is unable to gain a full understanding of the market and its players, who are characterized by the dynamism and changeability of their actions and requirements. As a result, planning corporate activities is a very risky activity that cannot be done for long periods. As a result, the foundation for the use of pull strategies is an unstable environment in which the same corporate procedures cannot be successfully repeated. Corporate competitiveness is not based on the creation of rigid cost structures that are steadily decreased over time; instead, the competitive force of pull strategies is based on their capacity to respond to the market and move quickly. Experience in manufacturing and communications is not gained, but experience in flexible reactions is gained, both in terms of manufacturing processes and in

terms of information and communications. Pull solutions' competitiveness is based on their capacity to respond to changing demand needs ahead of the competition, and this applies to both material and information and communication flows. Push and pull strategies are not alternatives for corporate management because they are based on completely different competitive premises: each corporate process can be developed using a push or pull strategy, depending on the conditions and corporate skills that characterize the application context²⁶.

Determining the location of the so-called decoupling point concerning ongoing business processes is an important part of corporate governance (manufacturing, information, and communications). This is the point at which the push and pull strategies collide, i.e., when planned actions with a given risk profile (push) give way to reactive activities with a different risk profile (pull). The customer order is the starting point of a pull strategy, so the decoupling point is often referred to as the Customer Order Decoupling Point. It identifies the point at which the customer order 'enters the company,' resulting in the creation of a dedicated production or assembly process. In practice, it determines when business activities begin to focus on the customized response to the received order. This point is crucial in the context of logistic operations since it determines the appearance of unique expenses associated with each order received by defining operative materials handling procedures (stocks, manufacture, assembly, and so on).

With a push-oriented strategy, the decoupling point should be postponed as much as feasible, postponing the actions required to satisfy a specified order in time (and sometimes also in space and responsibility). This solution would allow the corporation to avoid some of the dangers that come with business-to-business relationships (insolvent customers, changes to ongoing orders, etc.). Push strategies are typically better suited to the first processes, i.e., those that occur early

in the value chain, whereas pull strategies are better suited to the later processes, i.e., those that connect the organization to its market. Identifying the decoupling point appears simple for tangible processes associated with manufacturing activities, but it is more difficult for information and communications processes, where the characteristic intangibility and availability of advanced ICT technologies allow for more flexible switching between push and pull strategies about the chronology of individual processes. Push and pull methods allow for the implementation of business processes related to activities that include the management of both assets and liabilities (from raw materials to finished products) as well as intangible elements like communications and corporate information²⁸.

The combination of push and pull strategies has significant implications not only in terms of relationships with the market, providing immediate confirmation of the effectiveness of a company's proposals, but also within the company, or in the network of companies involved in the supply process, because it accelerates the processes for verifying internal and external efficiency.

On the one hand, the feedback received by a company using a pull strategy reveals the market response immediately, allowing potential contexts for repeated responses (in other words, allowing push strategies to be used) or the need to step up pull-type solutions (responsive and flexible) to be identified. Push strategies, on the other hand, are traditionally associated with the maximization of internal efficiency controls, as was seen during the last century in the manufacturing companies in Japan, especially the automotive and textile sectors. They integrated the push and pull strategies first to the flow of goods, information, and communication which was done on a large scale. It was initially done about their manufacturing processes, and then their flow of goods globally, information, and communication²⁸.

The phenomenon of globalization has resulted in the creation of a business without borders. Most businesses nowadays only pay attention to two primary factors that have an impact on the worldwide market: customer happiness and product and service quality. Organizations all around the world must take the initiative to improve product quality or to change needs and consumer demands while lowering manufacturing costs. This action is required to maintain market competitiveness. Application of Just in Time is one of the most successful strategies (JIT). JIT implementation could include a few key elements at the organizational level, such as production, marketing, engineering, and purchasing. JIT focuses on the management process more than anything else. JIT is a management concept that was created specifically to eliminate waste. This is done to reduce waste and boost productivity. Lean manufacturing is a method of controlling production that is based on customer demand. It is also a waste-reduction measure. The use of Lean Manufacturing can help minimize inventory, workspace, and raw material output. This ideology has the potential to increase output. This can provide half of the inventory to cut production costs while also allowing for international knowledge transfer²⁹.

The implementation of JIT requires organization and supplier to have a good relationship and believe that when the factory has a demand, the suppliers will be able to meet it. The first way to implement JIT is to build a good relationship with the suppliers, customers, and subcontractor to reduce the inventory “buffer” to a few hours. JIT attempts to decrease the time waiting throughout the production process. The use of JIT would have numerous benefits, including allowing the manufacturer to improve quality to meet customer needs, minimize inventories, and establish a positive relationship with the supplier. Positive JIT applications can successfully benefit three communities: suppliers only, purchasers only, or both. Reduced inventories and time waiting for inventories, improved quality, and technical support, increased productivity, reduced waste, and machine maintenance are all advantages. JIT helps to reduce machine

maintenance while also ensuring that suppliers can provide inventory on time. The major issue with JIT implementation, is employer and supplier issues. The issue with employers is that they are opposed to the JIT concept, are less supportive of JIT, and have fewer staff²⁸.

JIT is designed to eliminate waste associated with overproduction, waiting, excess inventory, total quality control, and customer devotion. JIT inventory is designed to avoid instances where inventory exceeds demand and there is no place to store the excess stock. Manufacturers who employ JIT processes strive to use materials in production at levels that satisfy but do not exceed demand from distributors or retailers. Because excess inventory involves storage and management costs, retailers only want to acquire and carry inventory that matches immediate customer demand.

2.1.4 Workforce Productivity

Human resource planning is an essential aspect of production planning. Labour is an input into the production process, without which there cannot be a useful output or product for consumption. Therefore, managing labour and job design is an integral part of planning. Some factors affect the productivity of workforces, such as seasonality of product, the extent of technology use, and other conditions such as location and environmental factors. The organization combines the workforce differently, leading to different cost minimization and Profitability. Because of the increased competitiveness, the workforce sizing result-driven strategy has reshaped organizational spaces, stressing employee performance and skill development inside the company³⁰. Models for staff sizing are critical for accurately identifying personnel allocation needs.

Appropriate staff/workforce sizing is an organized and ongoing process of evaluating human resources' current and future needs in terms of the ideal number of workers and the composition of the workforce. Size specifies the correct number of individuals with the necessary abilities, competencies, and aptitude to complete the relevant tasks at a suitable time and location. It is vital to undertake a proper approach for predicting the size of an organization's workforce in a situation where strategic personnel planning is a powerful instrument. As a result, this procedure should aim for two critical outcomes: 1) subsidizing decisions about moves, assignments, promotions, and disconnections; and 2) identifying employee potential and interests concerning the needs of the institution's units, allowing reallocations. In an ideal world, like performance evaluations, workforce size implementation should be constantly enhanced to support fluid and consistent decision-making. A detailed methodology for sizing a private company's production capacity utilizing a non-parametric efficiency analysis method called Data Envelopment Analysis was proposed²⁹.

Human Resources or Personnel Management departments are usually in charge of staff planning based on mathematical modelling. Internal staff flows between various categories of workers (among other promotion flows), and waste are the three primary types of flows involved in staff planning: recruiting; internal staff flows between different categories of employees (among other promotion flows); and waste. Workforce planning ensures that an organization is ready for its present and future needs by putting the appropriate people in the suitable locations at the correct times. This idea establishes a systematic assessment of the content and composition of an organization's workforce to determine the measures that must be taken to respond to current and future demands to meet organizational people management goals and objectives³¹. The International Personnel Management Association (IPMA) describes planning as a systematic process that assesses current staff/workforce needs and forecasts future staff/workforce

requirements to achieve its purpose, goals, and objectives. Personnel, infrastructure, organizational design, organizational culture, and risk management are the five strategic topics generally covered by workforce planning³².

Competitive advantage, planning, concurrent policies, employee practices, and corporate strategy and decision-making at the highest level are all seen to achieve results of the application, planning, coherence between policies, employment practices, and business strategy and decision-making as appropriate the results of the use of the competitive advantage. Individuals' actions and organizational objectives relate to strategic business efforts. The human resources management model concentrates on human talent appraisal, people attraction and retention, motivation and mobility, diagnostics, information management, and integrated policies³³.

While the United States of America used to be the premier leader in industrial strength and affluence, other countries that were formerly not able to compete with the US both in technology and other economic areas have made serious transformations in the way they grow and produce their goods. With the help of modernization of their industries and by making use of the innovative organizational processes, these countries that are none industrial have started to compete with the factory giants on their turf. New rivalries from countries like Japan, Korea, and Brazil are having a dramatic effect on the economic, educational, and political systems of the US. America must enhance its stage of productivity to become stronger. It has been said that productivity isn't the major determinant of sensation in living standards³⁰. Hence, if the Americans are to continue enjoying their increased standards of living, they will have to discover means to continually enhance their productivity. Recent studies into financial product innovation in the US banking industries shows strong evidence in support of significant positive scope economies. The US banking innovation in derivatives, securitization and mortgages are

propelled by technology. Thus, US productivity development can be associated with technological creation³⁴.

While the growth of technology is an important key to productivity growth, the technology is useless unless it is being used. A basic reason the US has lost its competitive benefits in the steel and automobile factories is that those factories have been slow to know that modern facility, new tools, and creative organizational methods are needed to keep up with other countries. Recently, US rivals have been tooling up with revenge facilities that integrate the latest technologies and methods like robotics, computer-incorporated manufacturing, right-about-time manufacturing, and the Japanese ideology of Kaizen. At the exact time, American steel and automotive factories were trying to manufacture goods in antiquated facilities with former World War II technologies and traditional definitive management methods. The result of the declination of these US factories to expend the important capital to create new facilities and to get new technologies has been a reduced share of world markets, enhanced layoffs, and reduced profit margins. As an instance of the differences between US capital expenditures and that of Japan, the Japanese spend about 50-100% more per employee on capital than the US. To summarise the problem, US capital costs 50%-75% more than the Japanese capital³⁴. On a good note, the current surge in productivity in the US can be partly given to the willingness of firms to start investing in new capital.

There are different perspectives as regards technological development and its impact on the workforce. One perspective is that technological enhancement will be the basic source of new works in the future. People hear and read about new work being developed in the aspect of robotics, computers, optics, and lasers. A popular belief is that jobs in these places are completely brand new and will result in job changes for a lot of workers. The second perspective

is that advanced technologies will greatly upgrade the skills needed for future jobs. Improvements in technology are understood to make jobs a lot more complicated and hence, will need higher stage skills in the future. Another perspective is that the growth of new technologies will result in the displacement of large numbers of workers. The growth of robotics and controller processes is seen as a way to destroy the human worker from the workforce. It is valid that technology is having a constant impact on the nature and attributes of the workforce. New jobs are being established while conventional jobs are being changed or destroyed. The workers that fill these transforming jobs must enhance their knowledge and abilities to remain at work³³.

While the connection between technology education curriculum and conventional vocational discovery such as the workforce training and productivity has not been actively communicated by the discipline, technology education has a special and important part to play in the effort to enhance the productivity of the workforce. This part does not offer the exact fictional and technical abilities required for productive employment. Those abilities are best offered through post-secondary programs in public schools and other technical schools. Technology education can, nevertheless, motivate its students with literacy that improves future understanding and communication with technology, that is, the wide skills and abilities that are most wanted by employers. Through hands-on adventures with technology, learners can incorporate and apply their learning, improves their higher-order thinking abilities, and enhance their ability to communicate with technological tools and systems.

2.1.5 Capital Structure

Capital structure refers to integrating various sources of finances within or outside the firm's terrain to fund worthwhile investments and projects with positive net present value. The amount of equity and debt used to support its production operations determines its capital structure.

Capital investment in the production industry is used to purchase production tools and equipment and pay for labour and raw materials. Capital is significant in determining a manufacturing company's productivity. A corporation that invests in automation may extract more value from its operations than one that relies heavily on human labour. Furthermore, if employee investment is reduced, productivity may suffer, resulting in lower profitability³⁵.

The quantity of fixed income securities (debt and preferred stock) utilized in the Firm's capital structure is measured by leverage. Leverage is a policy that governs a company's decision to raise funds. Companies that use debt have commitments for interest expense and loan principal charges. Therefore, using debt (external financing) has a significant risk if the debt is not paid, so the firm's potential to earn profits must be considered³⁶.

Total Debt to Equity (TDE) is a ratio used to show the capital structure. The debt-to-equity ratio (DER) is one of the leverage ratios that compares total debt to own capital. This ratio estimates the amount of money provided by creditors as loans to that of the company's owner.

The percentage of a company's debt to total equity finance in its capital structure is known as the debt-to-equity ratio (1992). The ratio is calculated by dividing a company's total debt by its owner equity or shareholder fund. The amount of debt financing a company has been linked to equity funding. It assesses how a company's debt is leveraged against the money invested by its owners. When liabilities surpass net assets, creditors have a more significant stake in the company than shareholders³⁷.

A debt-to-equity ratio is a financial ratio that shows the proportion of equity and debt used to finance a firm's assets, and it is a measure of financial leverage. The debt-to-equity ratio displays how much naira was borrowed for every naira of equity. The higher this ratio, the greater the

likelihood of failure in the company, and vice versa; the lower the ratio, the lower the possibility of failure. The debt-equity ratio impacts dividends and risk for shareholders, as well as the cost of capital and the firm's market value.

Total debt to overall assets is a leverage ratio that expresses the total amount of debt compared to the total amount of assets. "The percentage of funds provided by creditors" is how the debt to asset ratio. It is a popular ratio used to measure a company's long-term solvency and indicates its financial risk position. The ratio considers both long and short-term debt and both tangible and intangible assets. The ratio reveals how many assets are to be disposed to offset the company's loan. "A firm's debt-equity financing refers to the mix of its financial liabilities"³⁸. The total debt to total assets ratio measures the leverage a company has used to acquire assets in the past³⁹. It's a coverage metric that gives a broad picture of a company's capacity to satisfy its financial obligations as they go due. It is one of the factors used to measure a company's strength, and lenders may use it to set loan interest rates. This statistic allows for comparisons of leverage across different businesses.

Working capital has different meanings in productivity, economic development, and public finance in commercial and public sectors. The short-term current assets and current liabilities of an organization or corporation are referred to as working capital. The difference between current assets and current liabilities is known as net-working capital. It reflects a company's capacity to meet short-term financial obligations. Effective working capital management comprises the reasoning and methods that protect against the risk of not meeting short-term financial obligations in one way and protect assets in the other by planning and controlling current assets and liabilities. Working capital management is an important measure of a company's performance. The primary goal of any company is to create money; companies are formed for no

other reason than to make and maximize profit, implying that maintaining the company's liquidity is also crucial. Increasing earnings at the expense of liquidity can put the company at grave risk⁴⁰.

As a result, there must be a symbiotic trade-off relationship between these two organizations' core goals. One goal should not be pursued at the expense of the other because both have important roles in increasing productivity. How can a company survive if it is neither profitable nor productive? On the other side, if the company pays less attention to liquidity, it will undoubtedly fail. As a result, working capital management is given utmost importance to boost the company's Profitability. Firms may have an ideal level of working capital, enhancing their worth even further. The impact of working capital management on a company's Profitability should never be underestimated. Efficient and effective working capital management must be a primary responsibility for every organization to survive and grow. This is a strong indication that too much idle capital in the firm indicates inefficiency, whereas too little cash in hand suggests that the company's survival is in jeopardy. Most businesses overshoot their leverage in terms of stocks, debts, and cash. As a result, the company could not satisfy its financial obligations and operational issues. How would a company maximize or grow its initiatives and improve its sales if it does not have adequate finances to maintain its operations? As a result, the company's growth and profits will be limited³⁹.

2.1.6 Profitability

Profitability is a metric that quantifies how much money a company makes and how much money it spends. The ability of a corporation to produce a profit in relation to sales, total assets, and own capital is referred to as Profitability. Profitability is the end consequence of a variety of policies and decisions. The profitability ratio depicts a company's ability to make a profit using

all available capabilities and resources, including sales activities, cash, capital, number of employees, number of branches, and so on⁴¹. Further, a company's Profitability depicts its ability to profit for a certain period at a given rate of sales, assets, and capital stock. Profitability ratios show how well a company's management generates profits from sales, total assets, and, most importantly, stockholders' money.

To compete, a company must create more revenue and maximize profits. Much research on Profitability has shown that high rates of business performance do contribute efficiently to income production and overall economic development. The following are examples of profitability ratios/ the gross profit margin is the percentage of each sales dollar that remains after the company has paid for its item. Gross margin determines cost policies and tells how much can be spent on operating expenses while maintaining acceptable bottom-line Profitability. Because sales can generate profit, the gross profit margin is calculated based on net sales. After deducting COGS from your income, your gross profit is the amount of profit you made⁴¹.

After subtracting the expenditures related to your core operational activity, you may calculate how much profit you made on the margin by dividing Gross Profit by Revenue. It's also heavily influenced by sales, which DSO and DPO influence. Furthermore, the emphasis on assets will be avoided by contrasting with the sales level. One issue with this metric is determining the COGS, which is challenging because not all companies in our sample have provided it. In the practical method chapter, there will be more explanations of how it was computed and a more in-depth discussion of why GPM was chosen as the dependent variable⁴⁰.

This ratio is used to assess a company's ability to generate net income (profit) from its main operating activities. The better the operation of a business, the bigger the net profit margin.

Understanding Return on Asset (ROA) measures management's total performance in generating profits with available assets. The return on Assets (ROA) ratio measures a company's success in managing its wealth (assets). As the Return on Assets (ROA) ratio rises, it reflects its performance in managing assets held, allowing it to create profits or earnings.

According to a past study, there appears to be a pattern in which ROA is frequently used and is frequently connected with other metrics like ROE⁴². Furthermore, incorporating ROA is just as important as eliminating ROE because the latter ignores the influence of certain types of resource investment. Also, a high ROE may merely suggest a deeply leveraged company, while a low ROE may indicate the inverse. As a result, it is recommended that ROA and ROI are better appropriate for capturing enterprises' contributions to broader resource investments. The strength of ROA is that it is less sensitive to leverage than ROE. On the other hand, ROA is more sensitive to fluctuations in working capital. The ratio of net profit after taxes to total equity is known as return on equity. Return on equity (ROE) is a measure of the earnings (income) available to the company's owners (including common and preferential shareholders) on the capital they invested³⁷.

Earnings per share (EPS) is a ratio that shows how much a company's ability to generate earnings per share is worth¹⁵. The ratio that describes the amount of rupiah gained for each share of common stock is called earnings per share. As a result, earnings per share are important to common and potential shareholders in general corporate management.

2.2 Theoretical Framework

2.2.1 Theory of Constraint

The underpinning theoretical framework for this research is the theory of constraint. The theory comprises operations strategy, performance measurement, and logical thinking. It states that

every production process will have at least one constraint that limits the production efficiency, impacting the organization's performance⁴³. The theory holds three key assumptions on organizational performance measurement based on throughput, inventory, and operational expense.

Some critics claimed that the theory approach to establishing an optimal product mix is unlikely to yield optimum results. Another criticism of the theory is its derivation of system dynamics and statistical process control. Some critics also considered the theory to have not proven its effectiveness in the academic literature for wide acceptance and failure to empower employees in the production process and address the unsuccessful policies as constraints. More case studies are necessary to show the connection between implementation and improved financial performance¹¹.

In contrast, supporters of the theory stated that much of the criticism of constraint theory has been focused on the lack of rigour and not on the bottleneck approach. Modern management thinking sees a broader application of the theory in production, logistics, distribution, research and development, and other fields.

The theory is relevant in studying production planning and performance of an organization because it considers the economic imperative, which determines the ability of a company to generate enough profit, and the management imperatives, which provide operational methods to achieving the goal.

2.2.2 Theory of Production

The theory of production is a supporting theory for this research. The theory of production is an economic theory that explains how organizations determine how much of an output to make

based on inputs available for production. Assuming the price and quality of a product is given to be acceptable, a production function can be used to determine the best outcome from combining different factors of production⁴⁴. The theory express factors of production mathematically as $y = f(x_1, x_2, \dots, x_n; k_1, k_2, \dots, k_m)$ where y denotes the quantity of output, n represents the number of variable factors of production and x indicates the quantity of the variable factor of production. The fixed factor of production is denoted k . The entire expression determines the output that can be extracted from specified quantities of production factors.

When considering cost minimization or Profitability, the cost of production is simply the sum of the costs of all of the various production factors expressed mathematically as:

$C = px_1 + \dots + p_n x_n + r_1 k_1 + \dots + r_n k_n$ where p is the price of a unit variable, r denotes the annual cost of owning and maintaining the fixed cost.

2.2.3 Pecking Order Theory

Pecking Order Theory is another theory that supports this research. The pecking order notion is a preference for different types of financing for businesses. In a meeting with twenty-five (25) significant United States (US) firms, it was discovered that company leadership firmly chooses to employ internal sources of financing over outside sources of funds, unless inside sources of funds are not available²³. In addition, if a company needed to raise new external capital, it preferred to arrange the sources of capital to reduce the average cost of asymmetric information.

The pecking order theory of capital structure relies heavily on information cost to clarify the organizational culture. The theory's pioneering study illustrates that if investors are less well-informed about the worth of a firm's assets than current firm insiders, the market may misprice equity. If companies must issue equity to fund new projects, underpricing may be so severe that new investors obtain more than the new project's NPV, leading to a net loss to existing owners.

In a world where business managers and investors have asymmetric information, an author challenges the notion of an optimal financial structure based solely on the tradeoff of debt-related benefits and costs⁴⁵. He also mentions that corporate finance isn't based on a simple trade-off model, and he speculates on the possibility of a pecking order among the company's funding sources. According to the pecking order hypothesis, funding can be gained from three sources: inside funds, which are the cheapest; debt finance, which is the costliest; and external equity sources, which are the costliest.

Two assumptions concerning corporate managers underpin the pecking order theory. According to the hypothesis, the quantity of debt a company owes reveals how much money it needs from outside sources. For starters, it is considered that company executives know more about its current Profitability and future growth prospects than investors. As a result, they want to keep this information private. Internal funds managers keep the public in the dark about the firm's investment prospects and the possible rewards on those investments.

In the second assumption, managers are assumed to behave in the best benefits of the firm's shareholders. Executives may even opt out of a project with a positive net present value if it necessitates issuing new shares, diluting existing shareholders' interests⁴⁶.

The pecking order theory has therefore been adopted for this study. It considers the internal source of raising funds which is the slightest costlier, before the debt financing, which is more costly, and finally the outside equity sources, which is the costliest of all.

2.2.4 Theory Underpinning the Study

The study is based on the theory of constraint (TOC). TOC provides a management approach to improving the performance of organization or any operations system by identifying factors that limits an organization from achieving its goal of profitability. Unlike the theory of production

that focuses solely on production inputs and the pecking order theory that states the order in which capital should be selected, theory of constraint considers all factors of operations as having potential to limiting the outcome of an organization. The limiting factor is considered as constraint which could be physical, policy, paradigm or market based.

The theory of constraints posits that organization performance will not improve without identifying and removing inefficiencies in the system and by looking at the undesirable effects of the different part of operations, constraints can be identified and removed. The theory measures the throughput, the operational expense and inventory.

Theory of constraint is best suited to explaining inventory management and how organization can improve their efficiency by removing bottlenecks in the operations. Inventory management helps companies to determine customer orders, how much materials is required for a production and how customer orders are fulfilled. This is vital to company's profitability. Different organizations use different techniques to manage their inventory such the ABC analysis, batch tracking, Economic Order Quantity, demand forecasting, FIFO and LIFO, lean manufacturing, Just-In-Time, Reorder Point, Perpetual Inventory Management, and many other techniques based on the company's peculiarity and preference. However, with the theory of constraint, what is important is identifying where the inefficiency lies and removing it by measuring the inventory turnover of the organization as a factor in achieving its profitability goal.

The theory of constraint also best explain labour as a factor of production. Performance of workforce is critical to the overall organizational performance and where workforce productivity is low, irrespective of the gains from other factors of operations, the company objectives may not be met. Therefore, theory of constraint is used to measure workforce productivity by explaining

how much the workforce contributes to the outcome of the organization. Workflow, timing, and workforce size can be adjusted to improve workforce productivity.

One of the factors of production is capital and according to the theory of constraint, the cost of maintaining a given level of capacity is a critical measure. How different organizational structure their capital can have a significant effect on their profitability.

Using theory of constraint, this study brings together all the key aspects of operations management and provides a measure to improving organization's profitability.

2.3 Review of Empirical Studies

Empirical studies were reviewed to evaluate the role of production planning on the Profitability of consumer goods firms. The review considered production planning proxies (inventory turnover, capital structure, and workforce productivity) and Profitability.

2.3.1 Empirical Studies on Inventory Turnover and Profitability

Manufacturing organizations require raw materials for their production processes. They also have to store their finished goods before transferring them to their distributor or final consumers. Sometimes processes are also decoupled using inventory to even out fluctuations in the production process. Accumulation of inventory may result in a loss for the company. Perishable raw materials may become obsolete before finding their way into the production system. Also, work-in-progress inventory may require some additional cost to preserve before finalizing production. Final products require storage capacity, which is an additional cost for the company. All these concerns necessitate the need for controlling inventory in a production system. Most FMCG companies with dynamic demand patterns require efficient and optimized inventory management techniques.

In Tehran Market, a study examined the association between working capital management and Profitability at companies in the food industry that trades on the Tehran Stock Exchange. From 2006 to 2011, using a sample of 33 companies for five years period, the study found a negative association between inventory turnover and Profitability using correlation and regression analysis. Inventory turnover is linked to lower Profitability in businesses. The study's findings cannot be easily generalized because it is limited to the Tehran market, with a different economic topography than Nigerian enterprises. A study of FMCGs in Nigeria may produce mixed results⁴⁷.

In the research work on the “mediating effect of knowledge of inventory management and performance”, a strong correlation was observed between the inventory management knowledge and the performance of micro-enterprises. The size of an enterprise was also a significant factor in adopting inventory management practices. It was observed that gap in the knowledge of inventory practices in a micro-enterprise limits growth and performance of such an enterprise. The research was limited to micro-enterprises in Malaysia. It is, however, worthwhile to explore inventory management practices in FMCG companies in Nigeria. The knowledge of inventory management practices is essential in performance. This will guide management in setting the right policy for managing inventory based on the company's production characteristics and strategic plan⁴⁸.

In addition, a study investigated the impact of inventory control on industrial productivity. Out of 285 questionnaires, 270 were employed in the study, including a questionnaire and an interview. The researchers discovered that inventory control had a considerable impact on the productivity of certain manufacturing enterprises using a Pearson correlation study. They concluded that inventory management is critical to the success of any firm. On the other hand, the study relied

on primary sources, which are more subjective. Using secondary sources of information from the report across some years will allow further generalization¹⁷.

An empirical study on “production planning and Profitability of selected manufacturing enterprises in Nigeria”. The research used “flour Mill of Nigeria Plc, Dangote Flour Mill Plc, and Honeywell Flour Mill Plc” as case studies. According to the report, Production Planning is critical for supplying clients with better and more cost-effective goods for a smaller expenditure. The data was analyzed using the Ordinary Least Square (OLS) technique with time series. The study's findings suggest that the estimated coefficient of the constant term for the firms is significant. They concluded that turnover (sales) leads to an increase in inventory, which raises production. Although this study used FMCGs firms, a sample of three firms is too small to generalize to all FMCGs in Nigeria. For generalization, a higher sample size is needed⁴¹.

Another study in Indonesia looked at the impact of inventory turnover on Profitability. Between 2013 and 2017, they used a sample of 8 basic chemical industry sectors from the Indonesia Stock Exchange. Step regression was used in the investigation, and it was discovered that Inventory Turnover does not affect Profitability. Because the study is limited to the Indonesian market, the findings cannot be generalized. A study in Nigeria could produce a different result⁴⁹.

For the period 2009 to 2018, study on the influence of inventory Ratio and Asset Turnover Ratio on Profitability using ROI discovered that inventory Ratio had a significant impact on Profitability using primary data from 85 respondents (ROI). The study concluded that the turnover ratio affects the Profitability of businesses. On the other hand, the study relied on primary data, which is more subjective than secondary data. A study based on data from the audited account could have a different result²⁵.

A study used Polish food industry sub-sectors to investigate the causal link between inventory performance and Profitability. From 2005 to 2017, the study considers the inventory mix, which comprises raw and other material stocks, “work-in-progress, finished products, and commodities”. This study found that an increase in inventory management efficiency is positively connected with financial performance, as assessed by the return on operating assets, using panel regression models. Because the study is limited to Polish companies, the findings cannot be easily generalized. A study in Nigeria could produce a different result⁵⁰.

Another study in Nigeria contributed to the body of knowledge by examining the relationship between inventory turnover management and the Profitability of Nigerian conglomerate enterprises. From 2007 to 2016, a sample of six conglomerate firms was employed in the study. The evidence that inventory turnover management influences Nigerian conglomerate companies' Profitability is inversely related to the Profitability of the listed conglomerate firms in Nigeria was discovered using Feasible generalized least square (FGLS) regression. According to the study, inventory turnover has a negative impact on a company's profitability. The study focuses on conglomerate companies, with a sample size of only six. A study of FMCG in Nigeria could yield a different result⁵¹.

Farooq used the return on asset, equity, and net profit margin ratios to study the impact of inventory turnover on firm Profitability. From 2006 to 2015, a sample of 79 firms from Pakistan's cement, sugar, and automobile industries. The study indicated that the inventory turnover ratio does not affect the return on asset and net profit margin ratio when using the Generalized Method of Moment (GMM). Because the study is limited to Pakistani businesses, the findings cannot be easily generalized. A study in Nigeria could produce a different result⁵².

In investigating the factors driving inventory turnover by segment and their interaction with other financial ratios using data from 421 manufacturing companies in Korea from 2010 to 2018, inventory turnover ratios showed an adverse connection with gross margin. Still, there were no significant relationships with other financial variables designated for growth and Profitability. The study's findings cannot be easily generalized because they are limited to Korean enterprises operating in a different economic environment than Nigerian companies. A study of FMCGs in Nigeria may produce diverse results⁵³.

A time-series study from 2017 to 2017 with a total sample of 18 enterprises per year conducted on how inventory turnover affects Profitability in automobile businesses listed on the Indonesia stock exchange showed that ROA determines Profitability. It also revealed that inventory turnover does not positively influence ROA. The study's findings cannot be easily generalized because they are limited to Indonesian enterprises operating in a different economic environment than Nigerian companies. A study of FMCGs in Nigeria may produce diverse results⁵⁴.

Another study in the US used a sample of publicly traded restaurant organizations from 1999 to 2015 to examine the association between inventory turnover and company performance. The study found evidence of a link between inventory turnover and corporate financial performance. However, because this research was conducted in an established market, it cannot be applied to a developing market like Nigeria. A study in Nigeria could have different results²⁶.

In the study conducted on inventory management and performance of SMEs in the manufacturing sector of Harare, it was discovered that SMEs used Just-In-Time approach to managing inventories. The inventory management strategies were a crucial part of SMEs decisions because it has significant impact on the financial performance. However, this study focused on SMEs that lacked the capacity for computerized technologies for managing

inventories. A study into the FMCG industry in Nigeria with technological capacity may show the financial impact of an efficient inventory management⁵⁵.

Inventory is a vital part of current assets in the manufacturing which is taking an increased importance. Companies are capturing inventory on their balance sheet as current assets as a strategy to managing their investment in fixed asset. However, inventory control management relies on workforce. Thus, companies are required to train their workforce for efficient running of the inventory management activities¹⁷.

A study conducted on small businesses' growth in Bangladesh shows the importance of inventory management. No business can grow sustainably without efficient inventory management. The research study shows that there are positive and significant effects of inventory management on the profitability of the small businesses in Bangladesh. However large organizations may not present the same impact on profitability. There is therefore a need to examine if the same correlation exists in FMCG industry in Nigeria⁵⁶.

In another study conducted on listed hospitality businesses in Nigeria, it was discovered that inventory management has a positive impact on the Earnings Per Share of the company. Organizations are expected to manage their inventories effectively, however there are inefficiencies that affects the performance of organizations negatively. The study examined a panel data that spanned ten years and found that there is a significant relationship between inventory management and profitability in the hospitality companies in Nigeria. This study is however focused on the hospitality companies which in a way gets raw material input from FMCG companies. A study into FMCG in Nigeria would provide more insight into the effect of inventory management on profitability⁵⁷.

A study conducted on using a manufacturing company as a case study in Saudi Arabia shows that there is a relationship between inventory management and financial performance. The study made a distinction between inventory control and inventory management. Inventory control is seen from the actual stock tracking, recording and reconciliation while inventory management focuses more on the management and reporting. However, the study identified inconsistencies in inventory record and management that impacts negatively on the profitability of the company. These inconsistencies were identified in scheduled cycle count activity, inadequate staff monitoring and supervision, misplaced or stolen stocks and inefficient communication approach in inventory management. The study recommended a structural approach to managing inventory. A detailed responsibilities and procedure should be developed for managing inventory and the process of stock counting to be cross functional for accurate record update⁵⁸.

A study conducted on the Effect of Inventory Control Techniques on the Profitability of Manufacturing Firms used one of the FMCG companies in Nigeria as a case study. The study focused on the techniques used in managing and controlling inventories and the effect on the profitability of manufacturing firms in Nigeria with a special focus on Champion Breweries Plc. Uyo, Akwa Ibom State, Nigeria. The study used a mixed method. The primary data was collected through questionnaire and secondary data was extracted from the financial performance report for a period of 4 years. The result showed that the stock valuation method used, and inventory cost management of the company have direct impact on the profitability. However, the company studied was not using Just In Time method of inventory control. Use of computerized inventory control method would improve the company's profitability⁵⁹.

Another case study conducted in the FMCG industries examined the Inventory Management Effect on Profitability of the Food and Beverages Sector of Nigeria. Goods in transit, raw

material and finished goods were analyzed as critical parts of inventory management. A positive impact but less or insignificant effect on profit after tax was observed using multiple regression analysis on 10-year secondary panel data from Nestle and Cadbury financial reports. The result may be different when secondary data from more companies in the FMCG industries is examined. The study however, recommended improvement in inventory management practices to improve profitability and operating cash flow⁶⁰.

2.3.2 Empirical Studies on Workforce Productivity and Profitability

In recent times, it is believed that the success of an organization is directly proportional to the ability of its workforce. Thus, for an organization to be successful or highly profitable in the highly and globally competitive space, it must have a reliable and highly dedicated workforce. The study on determinant on employee productivity submit that in today's globally competitive market, employee productivity determines the revenues and profits of the organization.

A study investigated the determinants of employee productivity in listed manufacturing firms in southwestern Nigeria. The descriptive survey research design was used, while a simple random sampling technique was used to select 394 respondents. The results showed that the majority of the respondents had average productivity levels. The study further revealed that management and organizational factors were identified as having the greatest influence on employee productivity⁶¹.

Another study on organizational learning and employee and loyalty revealed that the success of any business is directly affected by the performance of the employees within the organization, whether they are dealing directly with customers, thus organization's workforce is the most important factor for success or organizational profitability⁶².

A study investigated organizational performance management practices among employees in the Garissa County government, Kenya. The study adopted a descriptive and exploratory research design while a stratified sampling technique was used to classify the respondents and simple random sampling was used to select 347 respondents from a population of 2611 respondents. Questionnaires are used to elicit information from the respondents. The findings revealed that a relationship exists between organizational performance management practices and employee productivity. Employee productivity is significant to the success and achievement of set objectives. As a result, no organization can succeed without a skilled workforce. In addition, the believe that the productivity of their employees is a good reflection of the ability of many organizations to achieve their set goals⁶³.

A study examines the effect of employee relations on employee performance and the organization's performance. The study adopted a cross-sectional survey research design, and a stratified random sampling technique was used to select a sample size of 387 respondents. Data was collected using structured questionnaires and interviews. The findings showed that the organizations were aware of the benefits of maintaining good employee relations and corrective actions were taken to minimize poor employee relations. There is a lot of agitation for good workforce relationships, which is believed to help increase their commitment, and this will lead to productivity. Organizations cannot perform better and achieve their objectives if there is a bad relationship between employees and employers⁶⁴.

A study on the impact of employees' benefits on organizational performance in manufacturing firms in Nigeria using long linearization regression techniques on a secondary data over the period of 2011–2015 concluded that employee benefits, when strategically structured, enhance the profitability of manufacturing companies in Nigeria. Hence, it is advised that most

organizations have good incentives for their workforce, which is one way of motivating them for productivity. Corporations should intensify efforts to adequately provide employees with all available incentives to accelerate their competitive advantage to outperform various competitors both locally and their foreign counterparts⁶⁵.

Thus, a good reward system and feedback are ways of increasing workforce commitment and productivity. Employee commitment is necessary for every organization to have extraordinary performance on a long-term basis. Employees who have a high commitment, will contribute their energy and time to achieve the organization's goals and values⁶⁶.

Also, study on the significance of employee engagement and individual well-being on organizational performance in Nigeria with data collected with semi-structured questionnaires and interviews from 48 sampled employees of a top manufacturing company. The result showed that employee engagement and individual well-being have a significant effect on efficiency and effectiveness. Thus, the workforce is believed to be the most important factor in increasing productivity in an organization. The survival of organizations in today's highly competitive business environment is dependent on maximizing profits from their current capabilities⁶⁷.

It is believed that workforce productivity can also be influenced by the reward system. Thus, a study was conducted on the reward system and organizational performance in the manufacturing industry in South-South, Nigeria. The study population consists of five manufacturing firms. Data was collected through questionnaires. The finding revealed that the reward system had a significant effect on organizational performance. As a result, it was determined that the reward system should be aligned with organizational performance⁶⁸.

In a study examined the effect of performance management on employee productivity in the Southeast of Nigeria. The study adopted descriptive survey research, while a sample size of 366 was drawn from a population of 2081. Simple percentages, descriptive statistics, and multiple regression analysis were used in testing the hypotheses. The findings revealed that feedback appraisal had a significant influence on employee productivity performance. Also, performance evaluation has a significant effect on employee productivity⁶⁹.

Another study investigated employee engagement and organizational performance of public enterprises in Nepal. The study adopted a descriptive survey research design. The respondents were level employees from 49 different campuses. Data was collected through 115 sets of structured questionnaires. Descriptive and inferential statistics tools were used to analyse the data. The result showed that employee engagement was positively related to organizational performance with a liking for workforce diversity. Thus, it is revealed that some factors may also propel productivity. However, all these factors are also related to the workforce capabilities⁷⁰.

In study conducted on the relationship between the employee, firm size, and profitability within the manufacturing industries in the United States, 97 out of 109 industries studied showed a decline or no relation between profitability and size while 11 industries show that increase in workforce size increases profitability. They discovered that Profitability is inversely associated with the number of employees for enterprises of a specific size evaluated in terms of total assets and sales. However, the study shows that relationship between size and profitability is industry specific and because this research was carried out in an established market, it cannot be applied to a developing market like Nigeria. A study in Nigeria could produce a different result⁷¹.

A combination of qualitative and quantitative research approaches was used to investigate the effects of workforce diversity on employee performance. Respondents were selected from rural

local governments in Zimbabwe's Mashonaland West Province. Data were collected from a total of 169 respondents via questionnaires and interviews. The study used theme analysis and regression to discover that the workforce in local governments was diverse in terms of age, gender, educational attainment, political affiliation, experience, and length of service. Based on nationality, homogeneity among the workforce was discovered. Employee performance was inversely related to gender diversity, while age diversity was not statistically significant. The study's findings are difficult to generalize because they are limited to Zimbabwean enterprises operating in a different economic environment than Nigerian ones. Research of FMCGs in Nigeria could produce diverse results⁷².

A study investigated human resource (i.e., workforce) allocation in knowledge-based organizations in the quaternary service sector and presented an optimization model for allocating various skillsets and seniority levels to projects delivered across multiple geographies. The model chooses projects to accept or to reject, as well as how many resources to hire (or lay off) for each skillset, seniority, and geography combination to maximize the profitability of a pipeline of projects. The study discovered that the model converges to optimal solutions using a simple non-linear approach⁷³.

The impact of company size on the profitability of listed manufacturing companies in Sri Lanka was explored using annual reports from 2014 to 2017 for a sample of 20 companies. ROA and NPM are two indications of a company's profitability. They discovered that business size had no significant impact on the profitability of the listed manufacturing enterprises in Sri Lanka using correlation analysis and regression analysis approaches. The study's findings are difficult to generalize since they are limited to the Colombo market, with a different economic topography than Nigerian enterprises. Research of FMCGs in Nigeria could produce diverse results⁷⁴.

A study used quantitative methodology to determine the impact of workforce diversity on firm performance as measured by the profitability of 35 companies listed on the Zimbabwe Stock Exchange, using panel data collected between 2009 and 2015. Returns per share and gross profit were found to have a favourable and significant impact on profitability when assessed by board gender and executive diversity. The study's findings are difficult to generalize because they are limited to Zimbabwean enterprises operating in a different economic environment than Nigerian ones. Research of FMCGs in Nigeria could produce diverse results⁷⁵.

Another study looked at the impact of workforce planning on organizational performance in two private manufacturing enterprises in Lagos State's Apapa neighbourhood. This study used a survey research methodology. A sample size determination table was used to choose 300 copies of the questionnaire to be distributed, of which 166 were recovered and used for data analysis. The acquired data were analyzed using descriptive and inferential methods, and the hypotheses were tested using Pearson's moment correlation and regression analysis. The study discovered that organizational performance is influenced by personnel planning⁷⁶.

Thus, from the studies, workforce productivity is a great tool in increasing organizational profitability. The success or growth of an organization depends on the productivity of its workforce.

2.3.3 Empirical Studies on Capital Structure and Profitability

One of the strategic decisions for any management is aligning financial policy with operational requirements. Without adequate capital, a business cannot fund its operation as a going concern. A study contributed to the body of knowledge by analyzing the impact of financial leverage measures on deposit-money bank financial performance on the Nigerian Stock Exchange. From 2006 to 2015, the study used a sample size of thirteen (13) people throughout ten years. The

ordinary least square multiple regression techniques were used to break down financial leverage into debt and equity ratios. The data revealed that using debt enhances financial performance and managerial efficiency since managers must make more profit to pay interest while being profitable. The study is limited to Nigerian banks, making it insufficient to generalize to FMCGs listed on the stock exchange⁷⁷.

Over 14 years from 2000 to 2013, the study on the impact of funding mix on commercial bank performance looked at a sample of ten commercial banks. The findings demonstrated that the debt-to-equity ratio has a positive and substantial impact on ROE. In contrast, the debt-to-equity ratio has a negative and significant impact on financial performance as measured by ROA. The limitation of this study is the domain, as the study focused on commercial banks with distinct characteristics with FMCGs in Nigeria⁷⁸.

Also, in Pakistan, a study investigated the impact of capital structure on non-financial enterprises listed on the Pakistan Stock Exchange's financial performance. From 2009 to 2015, a sample of 20 non-financial firms was employed in the study. The study's outcomes, which used ordinary least squares, revealed that equity debt has a substantial impact on ROE but a negligible impact on NPM and ROA. They concluded that the sort of capital structure used by a company affects its financial performance. The study is limited to Pakistan Stock Exchange⁷⁹.

The impact of capital structure on financial performance for nine infrastructure companies over ten years from 2007 to 2017 reveals that the companies under examination have a modest debt-to-equity capital structure. The conflicting results could have resulted from the choice of the analysis technique. A total of 9 prominent infrastructure businesses were chosen from a population of 34 listed Infrastructure - General companies in India for the study. Ratio analysis

and a correlation matrix were used to analyze their data. The association between capital structure and business financial performance was equivocal⁸⁰.

A study investigated the influence of capital structure and expansion on the profitability of Cambodian domestic, commercial banks from 2005 to 2013 using a sample size of ten (10) people. The link was evaluated using a panel least squares (PLS) method, and the results revealed that debt to equity had a significant negative influence on financial performance as measured by return on assets (ROA) and return on equity (ROE). However, the findings were limited to Cambodian domestic and commercial banks⁸¹.

The study conducted on the “impact of capital structure on the financial performance” of insurance businesses in Ghana revealed a favourable and statistically significant effect on financial performance and the debt-to-equity ratio. The findings revealed that successful insurance companies are increasingly reliant on debt. However, the study focused on insurance firms in Ghana⁸².

Using Agricultural firms in Nigeria, a study analyzed the impact of financial leverage on the financial performance of quoted agricultural firms in Nigeria. The study used a sample size of three quoted firms in the agricultural sector in Nigeria from 2005 to 2017. The study discovered that the total debt-equity ratio significantly influences financial performance as measured by return on equity. The study, therefore, concluded that debt financing is a financing option for quoted firms in the agriculture sector in Nigeria. The study focused only on agricultural firms in Nigeria, making it not sufficient to generalize for Nigeria's consumer goods firms⁸³.

Another study in Nigeria investigated the capital structure and financial performance of quoted insurance businesses in Nigeria. From 2002 to 2016, the study examined a sample of (22) insurance firms throughout 14 years. The researchers conducted correlation analysis to discover

that the debt-to-asset ratio and financial performance assessed by return on equity have a weak link. According to the findings, a firm's capital is essential in determining variation in its return on equity value. The study focuses on insurance companies. A study of FMCG in Nigeria could yield a different result⁸⁴.

Another study was conducted in Nigeria using a sample of 10 listed manufacturing firms in Nigeria from 2007 to 2016. By employing regression as an analysis tool, the study discovered that capital structure has significant and non-significant effects on performance variables. However, the sample size limits the study by utilising 10 out of 61 listed manufacturing firms. Although the ten firms are from consumers goods as specified in the methodology, increasing the sample size may yield a different outcome⁸⁵.

A study in Malawi was conducted using data from six banks from 2005 to 2016. They discovered evidence that the debt-equity ratio has no impact on profitability measured by return on assets but positively impacts return on equity using the Arellano and Bover General Method of Moments estimator to estimate a dynamic panel model of the relationship between capital structure and bank profitability. On return on assets, the square of debt-equity ratio is positive and significant, while on return on equity, it is insignificant. Debt has a favourable impact on bank profitability in Malawi. However, this study concentrated on the Malawi financial sector and cannot stand for FMCGs firms in Nigeria⁸⁶.

Another study used a sample of 130 management consulting firms in Sweden from 2012 to 2016. Total debt to assets and short-term and long-term debt to assets are the critical components of leverage. Several statistical models are used in the study, including Robust Fixed Effects. Leverage has a significant negative association with profitability, according to statistical analysis. The study's findings are difficult to generalize because they are limited to Swedish companies

operating in a different economic environment than Nigerian enterprises. Research of FMCGs in Nigeria could produce diverse results⁸⁷.

The effect of capital structure on business profitability was undertaken in India from 2008 to 2017, using a sample of 50 companies listed on the National Stock Exchange of India. Using ROA and ROE as the effects of total debt and total equity ratios on profitability, the study discovered that capital structure positively impacts profitability. They concluded that capital structure has a considerable favourable impact on a company's profitability. The study's findings are difficult to generalize because they are limited to Indian enterprises, which operate in a different economic environment than Nigerian ones. Research of FMCGs in Nigeria could produce diverse results⁸⁸.

A study of 64 South Asian companies from 2010 to 2016 revealed that capital structure is beneficial to boosting the value of a firm because the more debt employed, the greater the tax deduction due to interest charges. As a result, the company's profits will rise, and the company's valuation will increase as well. The study's findings are difficult to generalize because they are limited to South Asian enterprises operating in a different economic environment than Nigerian companies. Research of FMCGs in Nigeria could produce diverse results⁸⁹.

Further study in Nigeria focused on the consumer products sector of the economy. The data were analyzed using the multiple regression of the Ordinary Least Square (OLS) analytical technique. The study's findings revealed that capital structure has a negative and minor impact on company performance in Nigeria's consumer goods sector. The long-term debt-to-total asset ratio had a negative and negligible influence on asset returns. In contrast, the total debt-to-equity ratio had a negative and insignificant impact on asset returns. As a result, the study concluded that capital structure is not a significant factor in company performance⁹⁰.

Another study using Consumers goods firms in Nigeria, Usman, evaluated the link between capital structure and the consumer products industry's financial performance in Nigeria. The study's population comprised consumer products businesses registered on the Nigerian Stock Exchange, with a sample size of six (6) companies. A sampling strategy was utilized throughout five years from 2012 to 2016. The study's found that short-term debts and long-term debt have no substantial impact on the financial performance of listed consumer products companies in Nigeria. Equity has also been proven to substantially impact the financial performance of listed consumer products companies in Nigeria⁹¹.

A study using US manufacturing firms examined the connection between capital structure and profitability from 2009 to 2018, utilizing a sample of 15 companies. The outcome demonstrates that the capital structure significantly impacts the underlying organization's total profitability. The study found that TDE and TDTA negatively correlated with profitability. The study concluded that capital structure has a significant association with the profitability of U.S. manufacturing enterprises. However, this study focuses more on a developed market, which cannot be generalized for emerging economies. A study on Nigeria FMCGs firms may yield a different outcome⁹².

In a study that investigated the impact of capital structure on the performance of some Nigerian banks, a sample of ten (10) banks, cross-sectional time-series secondary data encompassing the years 2012 to 2018 was collected. Multiple linear regressions and Pearson moment correlation were applied. According to the correlation data (ROA and ROE), capital structure is inversely connected with financial success. The results of panel regression demonstrated that, despite being considerable, debt to equity had a negative influence on ROA and ROE. The study focused on the banking industry, which is distinct from the FMCG industry. A study of FMCG in Nigeria could yield a different result³⁵.

A study using a developed market like London Stock Exchange investigated the impact of capital structure on the profitability of non-financial enterprises listed in the FTSE 100 and FTSE 250 Indexes. The dependent variables in T Models were ROA, ROE, and Gross Profit Margin, whereas the independent variable was Debt (Long term debt, Short term debt, and Total debt). The simple linear regression study used the OLS, fixed effects, and random effects approach. The study revealed that capital structure has no impact on profitability. The study focused on the developed market. A study of FMCG in Nigeria could yield a different result⁹³.

Another study used panel data regression techniques and a sample of six (6) selected conglomerates in Nigeria for the period 2008 to 2017. The study discovered that financial leverage had a considerable impact on financial performance proxies such as ROA, except for the debt-to-equity ratio, which has a negligible effect (ROA). The study focuses on conglomerate companies instead of fast-moving consumer goods companies. A study of FMCG in Nigeria could yield a different result⁹⁴.

Further study in Nigeria over ten years looked at the capital structure and profitability of manufacturing enterprises listed on the Nigerian stock exchange (2008- 2017). According to the data, short-term debt has a negligible beneficial impact on earnings following. Long-term debt has a sizeable favourable effect on after-tax profit. The study found that short-term debt has a negative impact on manufacturing business profitability in the country, whereas long-term debt finance has a positive impact on profitability⁹⁵.

Also, in Southeast Asia, investigated the impact of capital structure on the profitability of electrical firms. The study analyzed 48-panel data from the yearly financial report from 2009 to 2016 using a multivariate regression model represented by pooled least square. The study discovered a negative link between debt to equity and profitability (ROE) but a negligible

negative impact on ROA. The study's findings are difficult to generalize because they are limited to South Asian enterprises operating in a different economic environment than Nigerian companies. Research of FMCGs in Nigeria could produce diverse results⁹⁶.

An additional study from Nigeria Market investigated the impact of capital structure on consumer goods firm profitability in Nigeria during eight years from 2011 to 2018, utilizing data from ten (10) randomly selected listed companies on the Nigeria Stock Exchange. The study found that DAR is positively significant on ROA. In contrast, DER is not statistically significant, and SDTA is negatively significant. The study concluded that capital structure influences the profitability of the Nigerian Stock Exchange's consumer goods sector. However, they only used ten consumer products companies and did not consider any other production planning variables⁹⁷.

The relationship between capital structure and company profitability was examined in Vietnam from 2013 to 2018. The panel data of the research sample included 488 non-financial listed companies on the Vietnam stock exchange. ROE, ROA, and EPS are used to calculate the Generalized Least Square (GLS). Capital structure is represented by short-term obligations, long-term liabilities, and total liabilities to total assets. Capital structure has a statistically significant negative effect on company performance. However, the study focused on Vietnam Stock Market⁹⁸.

From 2007 to 2017, a study investigated the impact of capital structure and financial performance of listed insurance businesses in Jordan. There are three types of debt financing: short-term debt, long-term debt, and equity financing. The study's findings imply that capital structure impacts the profitability of Jordan's publicly traded insurance companies. The study also discovered a strong link between long-term debt to total assets and profitability metrics such as ROA, ROE and Tobin's Q. Short-term debt, on the other hand, has a considerable positive link

with ROE and ROA, according to the finding. The study's findings are difficult to generalize because they are limited to Jordanian enterprises operating in a different economic environment than Nigerian ones. Research of FMCGs in Nigeria could produce diverse results⁹⁹.

In Nairobi, a study used unbalanced panel data from a sample of 53 non-financial firms listed on the Nairobi Securities Exchange to investigate the effect of capital structure on the financial performance of non-financial firms listed on the Nairobi Securities Exchange from 2010 to 2017. TDE, TETA and TDTA were used to evaluate listed non-financial firms' capital structure. Both detailed and simple regression analyses are available. According to the study, leverage has a significant positive influence on the financial performance of non-financial firms listed on the NSE. According to the report, firms should aim to increase their leverage because it has a statistically significant positive impact on the financial performance of non-financial firms listed on the NSE. Because the study's findings are limited to the Nairobi market, which has a diversified economic landscape that includes Nigerian businesses, they are difficult to generalize. A study of FMCGs in Nigeria could provide a variety of conclusions¹⁰⁰.

The impact of “human capital, capital structure, and firm profitability” on 48,673 Vietnamese construction companies were studied and revealed that when business profitability is measured in terms of ROA and ROE, the results show that employing more debt in the capital structure improves the firm's performance, but this effect is diminishing. Furthermore, there was evidence that human capital had a favorable impact on the outcome of corporate activities. The study's findings are difficult to generalize because they are limited to Vietnamese enterprises operating in a different economic environment than Nigerian ones. Research of FMCGs in Nigeria could produce diverse results¹⁰¹.

Another study examined the impact of capital structure on profitability using a sample of 12 banks in Malawi. The impact of capital structure on bank profitability in Malawi was investigated using Arellano Bovver's general method of moment estimator. The study looked at profitability in terms of ROA and ROE and concluded that debt-equity did not affect ROA. There is no such thing as an ideal capital structure. However, the study is limited to Malawi banks firm¹⁰².

A study on the impact of capital structure on Islamic and conventional bank profitability was carried out between 2006 and 2016, and a sample of ten banks was obtained. The fixed-effects model was employed in this study. The capital structures of both types of banks were comparable, except for the size of the banks, which differed significantly. Furthermore, capital structures of both conventional and Islamic banks were found to be negatively related to ROA. On the other hand, both conventional and Islamic banks' capital structures were favorably related to ROE. Furthermore, two explanatory variables were positively connected with EPS for Islamic and traditional banks, while two were negatively correlated. The existence of prominent capital structure theories (pecking order theory and trade-off theory) for both conventional and Islamic banks in Pakistan was demonstrated in this study, and the validity of economies of scale. The study is limited to Pakistan Market¹⁰³.

From 2009 to 2018, a study researched on capital structure using eight companies in the Saudi Arabian basic materials sector. According to the findings, the study discovered that short-term debt to total assets ratio (SDA) and profitability have a negative association¹⁰⁴.

A study used the pecking order theory to examine the relationship between key performance indicators (“ROA, ROIC, change in market capitalization, and price-to-book ratio”) and the capital structure of companies in the pharmaceutical industry in the United Kingdom from 2009

to 2019. The effect of capital structure on financial indicators of company performance was determined and analyzed using panel data regression and the Wald test. The study looked at 185 pharmaceutical businesses in the United Kingdom. Long-term debt had a favourable impact on the price-to-book ratio and market capitalization change. Furthermore, short-term debt has a negative impact on market capitalization change, ROA, and ROIC. The investigation results are only partially consistent with the pecking order theory. However, this study focuses more on a developed market, which cannot be generalized for emerging economies. A study on Nigeria FMCGs firms may yield a different outcome¹⁰⁵.

Annualized panel data for a sample of 15 listed organizations from various sectoral categories were utilized in a study on the impact of capital structure measures on the performance of manufacturing firms in Nigeria from 1999 to 2018. The study discovered that short-term debt, long-term debt, and size have a substantial impact on performance proxy ROE and Tobin's Q, but ROA has a negative impact on short-term debt, long-term debt, and size. The Pecking Order Theory is supported by the findings of the study, which show that Short-term loans heavily finance Nigerian enterprises. However, the study randomly selected 15 firms out of a large sample of 63 manufacturing firms in Nigeria. Thus, the sample is too small to generalize for the entire manufacturing firms where FMCGs are located¹⁰⁶.

A study explored the influence of capital structure on the performance of the Oil & Gas and Manufacturing sectors in the United States and the disparities in their dynamics. The study used secondary data from the New York Stock Exchange (NYSE)/NASDAQ for ten years, from 2010 to 2019. The inquiry used the panel least square estimation approach and sectoral analysis on the data acquired to evaluate the specified hypotheses. The findings demonstrate that debt structure enhanced business performance, a significant rise in such leverage tends to lower firm performance for all of the firms studied. However, this study focused on a developed market,

which cannot be generalized for emerging economies. A study on Nigeria FMCGs firms may yield a different outcome¹⁰⁷.

A study on the BSE market utilized correlation and multiple regression analysis to examine the impact of capital structure on the financial performance of 20 BSE-listed pharmaceutical businesses from 2016 to 2020. The study's findings demonstrate a negative association between capital structures such as Debt Equity Ratio and Profitability Ratios as well as a positive relationship between Equity Ratio. Furthermore, ROE does not statistically influence the capital structures as a profitability measure. The findings of the study are difficult to generalize because they are limited to BSE pharmaceutical firms operating in a different economic environment than Nigerian ones. Research of FMCGs in Nigeria could produce diverse¹⁰⁸.

Using IT industries, a study examined the role of financial structure on profitability in Pakistan for a ten (10) years period using the top ten IT companies. The debt-to-asset and debt-to-equity ratios are capital structure factors. NPM, ROA, ROE and ROCE were used as the profitability variables. The study utilized regression analysis and correlation analysis and discovered that the debt ratio influences the Net Profit Ratio. The study's findings are difficult to generalize because they are limited to Pakistan enterprises operating in a different economic environment than Nigerian ones. Research of FMCGs in Nigeria could produce diverse results¹⁰⁹.

A further study in Nigeria looked at the impact of debt-equity financing on firm performance in Nigeria. The study used the variables of equity financing (EF) and debt-equity financing (DEF) to quantify debt-equity financing, while return on equity was used to measure firm performance (ROE). According to the study's findings, debt-equity financing has a significant and favourable effect on a firm's performance in Nigeria. According to the results, debt-equity financing

increases a company's profitability over time. The study focused on the banking industry, which is distinct from the FMCG industry. A study of FMCG in Nigeria could yield a different result¹¹⁰.

A study investigated the impact of capital structure on commercial banks' financial performance in Ethiopia. In Ethiopia, sixteen private commercial banks were used. According to the study, the capital structure significantly impacts operating and net profit. However, such a relationship does not exist in the case of ROA, ROE and ROCE. Their findings concluded that capital structure significantly impacts operational and net profit but not on return on asset, equity, or capital employed. The study's findings are difficult to generalize because they are limited to Ethiopian banks operating in a different economic environment than Nigerian ones. Research of FMCGs in Nigeria could produce diverse results¹¹¹.

Between 2014 and 2019, a study investigated the impact of leverage and capital on the profitability of selected Saudi Arabian banks using pooled regression analysis, which revealed a positive association between the various profitability factors and the Debt-to-Equity Ratio. The Total Debt Ratio has a positive link with ROA and ROE and a little negative relationship with EPS. In contrast, the Tier 1 capital ratio has a positive relationship with ROA and ROE and a minor negative relationship with EPS. The study's findings are difficult to generalize because they are limited to Saudi Arabian banks operating in a different economic environment than Nigerian ones. Research of FMCGs in Nigeria could produce diverse results¹¹².

Using Oil and Gas firms in Nigeria, a study looked at Nigerian oil and gas companies' capital structure and financial performance. The study used an expo-facto research design, with the population consisting of all 12 listed oil and gas companies in Nigeria, of which ten were randomly picked. The data for the study was acquired from the financial reports of the sampled organizations and spanned ten years, from 2010 to 2019. The panel data were subjected to a

regression analysis that included pooled OLS estimation, fixed effect estimation, and random effect estimation. The total debt ratio was found to have a negative impact on ROA. The study focused on the oil and gas industry, which is distinct from the FMCG industry. A study of FMCG in Nigeria could yield a different result¹¹³.

2.3.4 Empirical Review on Production and Manufacturing Companies

In a study titled maintenance performance evaluation and downtime analysis of manufacturing equipment in a food manufacturing company. In food manufacturing, maintenance of manufacturing equipment is one of the most important essentials for an efficient manufacturing as this sector continuously face challenges that makes maintenance very critical due to the nature of manufacturing, thus as a result food manufacturing companies must add or modify their maintenance strategies in order to keep production running efficiently. The aim of this study is to carry out a maintenance performance evaluation and downtime analysis in a food manufacturing company and suggest areas for further improvement. In this study, an empirical case study was carried out in order to evaluate the maintenance performance and downtime analysis. Overall equipment effectiveness and Pareto analysis were used to carry out a maintenance performance evaluation and downtime analysis on the manufacturing equipment using three years historical data obtained from the food manufacturing company as an industrial case study. The study found that the average overall equipment effectiveness is 55.30% which is a low value when compared with Overall Equipment Effectiveness world standards, meaning that the manufacturing organisation is operating in an average condition and there is a required urgent improvement of maintenance policies and strategies, otherwise it will be difficult for the manufacturing organisation to sustain it. Thus it is necessary that in order to improve productivity, the manufacturing organisation under study should look into its manufacturing strategies so that urgent improvement of maintenance policies and strategies can be implemented and adopted¹¹⁴.

A study evaluated navigating and merging human and technology perspectives in production planning and control. Contemporary manufacturing companies are navigating industrial digitalization anticipating increased production efficiency and competitiveness in a volatile environment. This study focuses on the implementation processes of digital tools for production planning and control (PPC), i.e., advanced planning and scheduling (APS) software, in relation to the application of analog planning with physical flow boards. Digital tools can support understanding the consequences of production changes and variations, hence facilitating adaptable and resilient manufacturing. However, technological changes can be daunting, and effective implementations require dynamic capabilities to remain competitive in elusive environments. The aim is to study the implementation processes of APS software to understand the requirements of fruitfully moving from analog planning to next-generation digital tools for decision support in PPC. The paper presents an explorative case study, at a manufacturing company within the energy sector. The interview study took place over 9 months during 2020–2021, investigating current and retrospective aspects of the case across 2019–2021. The case study comprises 17 in-depth interviews with a range of company employees, e.g., logistics managers and functions responsible for digitalization development. The results highlight the challenges of implementing and especially trusting digital tools for PPC. To realize the value of digital tools for PPC, it is argued that it is imperative to simultaneously apply a human-centric perspective in decision making to ensure trustworthy, sustainable, and resilient human-data-technology nexus implementations towards smart manufacturing¹¹⁵.

A study was conducted on relationship between inventory management efficiency and profitability. A regression analysis shows that lower inventory-sales-ratio is associated with higher profit margin. The study concluded that Inventory management has been common practice in business for a long time. Supply Chain Management is a relatively new concept, but

inventory management is at the heart of the concept. By examining the financial data of 1,289 firms over three fiscal years, the initial result led to examine the relationship between profitability and inventory management efficiency, and the study finds that better inventory management efficiency is positively related to firm profitability¹¹⁶.

A study the export competitiveness of food manufacturing of Republic of Serbia during the period 1996-2016. The analysis of export competitiveness was realised by using the following indicators: Revealed comparative advantage (RCA), Competitiveness growth index (RCA1), Index of net business performance (RCA2), Index of contribution to the trade balance (CTB), Grubel-Lloyd index (GLI) and Michaely index (MI). The results show that RCA values were positive in all years, which speaks of comparative advantage of this industry on the domestic market. Since the RCA1 values were higher than one, they revealed export competitiveness. The positive values of RCA2 during the period 2005-2016 bear witness of contribution of food manufacturing in foreign trade balance of Serbian economy. The average value of CTB index was 3.998 and its positive annual values showed that the contribution of food manufacturing in the total trade balance was positive. The change of GLI values pointed to the loss of ability of the sector to create surplus of national trade balance. Positive annual values of MI confirmed the competitiveness of food manufacturing, but also its insufficient specialization¹¹⁷.

In a study titled The Malaysian government has given numerous incentives to small and medium enterprises (SMEs), including those in the food manufacturing sector, in an attempt to boost their performance. This study aims to assess the effects of these incentives, particularly financial and tax incentives, on the performance of SMEs in the Malaysian food manufacturing sector. The study was conducted using structure, conduct, and performance (SCP) paradigm on secondary data from 140 companies over a period of five years (2013 – 2017). Correlation analysis was done to explore the relationship between each explanatory market variables included in the SCP

paradigm. The study found that financial and tax incentives gave different effects on the performance of SMEs in the Malaysian food manufacturing sector during the study period. Financial incentive shows a weak positive significant correlation with advertising-to-sales ratio (ASR), return on assets (ROA) and market share (MS) ratio while showing negative significant correlation towards capital intensity (CAP). On the other hand, tax incentive shows a strong significant positive correlation with MS and weak significant positive correlation with CAP, ROA and return on sales (ROS). This shows that financial incentive strongly correlates with SMEs' performance, whereas tax incentive is associated with market structure and conduct of SMEs in the Malaysian food manufacturing sector. The study therefore recommended that the government should consider providing extra assistance to SMEs in entering the sector as entry barriers for the sector is relatively high. Focus can be given in increasing financial incentives at a more competitive rate as it can reduce debt or increase the firm's equity or aid firms in acquiring assets, which are crucial for efficient and effective production of processed food. Allocation of tax incentives should be reviewed as it does not have a strong correlation with firms' performance. Also, with more efficient and effective policies in the government's financial and tax incentives, more allocation can be channeled to other areas that have direct implications to the citizen. Additionally, with better policies, more jobs will be created in the market, and a highly competitive market will lead to a production of higher quality products that can be enjoyed by the consumers¹¹⁸.

A study assessed instructional planning and productivity in public secondary schools in Ondo State, Nigeria. stakeholders' concern about the dwindling quality of teachers' instructional tasks and students' academic performance in Nigeria secondary schools could be attributed to the perceive inadequacies in instructional planning. This study therefore investigated teachers' instructional planning and productivity in public secondary schools in Ondo North Senatorial

District of Ondo State, Nigeria. Descriptive survey research design was adopted, and 600 teachers and 30 principals were sampled using multi-stage and simple randomly sampling techniques. Data were collected using Instructional Planning Questionnaire (IPQ), and Teachers' Productivity Questionnaire (TPQ). Three research questions and two hypotheses guided the study. The research questions were answered using descriptive statistics while the hypotheses were tested at 0.05 level of significance using Pearson Product Moment Correlation (PPMC). Results indicated a moderate level of teachers' instructional planning (Mean = 2.97); teachers demonstrated high performance in the preparation of lesson notes, content knowledge, classroom management and record-keeping while the least performed tasks included the use of instructional materials, learners' assessment, performance feedback and review of academic activities. Teachers' instructional planning has significant relationship with instructional task performance [$r = 0.896$ $p < 0.05$]. The study concluded that teachers perform instructional planning at a moderate level while concerted efforts are needed to boost productivity. It was recommended that the state ministry of education and relevant professional bodies should organize capacity training seminars/workshops to improve teachers instructional task performance in secondary schools¹¹⁹.

A research was conducted to enhance the understanding of how Lean distributed manufacturing (LDM) characteristics affect the resilience of manufacturing companies by drawing upon the experience of food manufacturing companies operating in the UK. Lean distributed manufacturing (LDM) is being considered as an enabler of achieving sustainability and resilience in manufacturing and supply chain operations. The study develops a conceptual model to analyse the impact of LDM on the operational resilience of food manufacturing companies. A triangulation research methodology (secondary data analysis, field observations and structured interviews) is used in this study. In a first step, LDM enablers and resilience elements are

identified from literature. In a second step, empirical evidence is collected from six food sub-sectors aimed at identifying LDM enablers being practised in companies. The analysis reveals that LDM enablers can improve the resilience capabilities of manufacturing companies at different stages of resilience action cycle, whereas the application status of different LDM enablers varies in food manufacturing companies. The findings include the development of a conceptual model (based on literature) and a relationship matrix between LDM enablers and resilience elements¹²⁰.

A study was conducted on level of development, foreign direct investment and domestic investment in food manufacturing. Whilst the literature on the complementarity and substitutability of foreign direct investment (FDI) on domestic investment (DI) is not uncommon, the facet of food manufacturing is non-existent. This paper fills this void by investigating the effect of FDI on DI in the food manufacturing sector for developing, economies in transition and developed countries. Using an unbalanced panel data of 49 countries from 1993 to 2016, from FAOSTAT, estimated by the system generalised method of moments (GMM), the Wald statistics for the short and long-run effects of FDI on DI were computed for the development groups. Developed economies experienced a crowd-out effect of FDI on DI in the short run, whilst the others experienced no significant effect. In the case of the long run, food manufacturing sectors of all three development groups exhibited a crowd-out effect. The effect in the long run for all development groups together is a crowd-in. Analysing all country groups together could mask the results of the various country groups. A review of investment policies to priorities FDI entry mode that favour domestic investment is needed. Improvements of the investment regulatory and administrative efficiency among others are recommended¹²¹.

Equipment management capability is crucial to the transformation and upgrading of manufacturing enterprises. Past studies ignore its significance and have not assessed

manufacturing performance from the perspective of capability maturity yet and still want evidence from empirical test. For addressing this research gap, we combine research methods of qualitative and quantitative to define equipment management capability for exploring and verifying the relationship between equipment management capability maturity and manufacturing performance. Results of this study from 136 valid questionnaires indicate that capabilities of strategy, personnel and IT infrastructure have direct positive effects on manufacturing performance. Among them, equipment management strategy takes organisational & process and IT infrastructure as mediating variables, which have indirect positive influence on manufacturing performance. Meanwhile, organisational & process takes IT infrastructure as mediating variable which has indirect positive influence on manufacturing performance. Our work opens the black box of equipment management capability system and provides theoretical guidance for improving manufacturing performance¹²².

A study investigated the production planning and control of bottlenecks by operations shifting in medium scale industry. Manufacturing firms primarily aim at maximizing profit by way of meeting the customer demands with respect to quantity, quality, cost and time through optimum utilization of available resources such as; manpower, inventories, plant and facilities etc. The study concluded that operation shifting brings an important dimension to management philosophy and provides an interesting challenge to the traditional ways of looking at an organization's profitability. Adopted within a wide variety of organizations and settings, it appears that organizations using Operation shifting) have determined that it can help them achieve a number of management objectives, including continuous improvement. Sometimes, due to various bottlenecks the demand is not fulfilled. It is possible to improve performance of manufacturing system by improving throughputs, reduction in WIP inventories; improve on time

delivers and better utilization of constraint resources. Operation shifting on bottlenecks is applicable to any kind of industry for improving scheduling planning¹²³.

A study analysed the implementation of production planning and scheduling on data mining approach. Planning and production include determining the level of activity, turnover, and final profit in a corporation, as well as minimum and maximum stock levels. Raw material management in a manufacturing organization requires specific care and scrutiny in order to achieve uninterrupted production cycles and better operational performance. Maintaining an acceptable stock level can also enhance the amount of available operating capital that can be put to better use. Material management is defined as the coordination of efforts (planning, managing, organizing, and directing) aimed at achieving efficiency in a manufacturing organization's procurement, transportation, stocking, and utilization of inputs. The effectiveness and efficiency of material management have a direct impact on the organization's overall success. The findings of the study demonstrate the effectiveness of data mining approaches as powerful tools to assist management in making decisions. Using particular determined input parameters, one may clearly predict the future goals and states of the industrial control system based on data from previous managed operations. Managers must have a thorough understanding of the system's behavior in order to exert complete control over it. Managers must understand the interoperability of the parameters used to make system decisions, as well as the influence they have on system performance¹²⁴.

The manufacturing sector in the UK is currently undergoing a significant supply chain transformation and managers are re-evaluating supply chain location decisions to minimise the disruptions caused by Brexit. This entails manufacturing offshoring and back-shoring once again being considered as strategic decisions and companies ought to make informed choices with respect to where they source or manufacture their products. This study aims to contribute to an

improved understanding of the backshoring phenomenon in the UK. Eight case studies of backshoring have been analysed and compared using a theoretically informed framework. The results show that back-shoring can stem from both misjudgments of previous offshoring decisions as well as changes in the demand pattern in the home country. Unlike offshoring decisions being mainly cost-oriented, strategic shift aimed at increasing the value perceived by the customer have a pivotal role in the back-shoring decision. Furthermore, skill shortage is the main barrier for the implementation of back-shoring strategies in the UK and requires companies' attention prior to its repatriation¹²⁵.

A research was conducted on the impact of additive manufacturing on the product-process matrix. The relationship between volume, variety, and process choice is a fundamental tenet of manufacturing research and practice, and through the product-process matrix managers balance trade-offs between the traditionally dichotomous objectives of flexibility and cost in process selection. In this paper, we examine the adherence of Additive Manufacturing systems to traditional trade-offs, and identify circumstances where they deviate from these established norms. Using engineering philosophy we develop an extension of the product-process matrix to accommodate both variety and customization measures, which are used to evaluate case study research, conducted with five major Additive Manufacturing companies. Fifteen case studies inform the research, drawn from a broad range of industry sectors. A qualitative approach was taken, using semi-structured interviews and process observation. The study demonstrates that Additive Manufacturing systems can support both alignment and disjunction to established theory. For many cases, a general conformance to the traditional product-process matrix 'diagonal' is evidenced. However, several cases show significant deviation, demonstrating the achievement of both variety and volume for both batch and line production. Through a detailed

exploration of the focal cases, we highlight the characteristics of both products and Additive Manufacturing systems that can help overcome traditional trade-off constraints¹²⁶.

In a study titled information and communication technology and quality of products of food manufacturing firms. There is a growing appreciation of the consequence of Information and Communication Technology (ICT) in the day-to-day activities of man. Theoretical and empirical postulations view ICT as both a means and an end for development. This study therefore sets out in investigating the effects of Information and Communication Technology on the quality of products of food manufacturing firms with South-South region of Nigeria as case study. Questionnaire was designed using Likert's scale of five-point to elicit information from 3750 respondents. The dependent variable is the quality of product of the food manufacturing firms which were measured by perception of respondents. The independent variables are tools of ICT (Computers, Internet, Television and Radio, Video and Audio devices, Social-media). The result with R² of 0.823 revealed a significant coefficient of determination as such the independent variables explained about 82 percent of the variation in the dependent variable. F calculated (100.175) is greater than the F-tabulated (2.8786) which means that the overall estimate has a good fit and also implies that the independent variables are simultaneously significant. The study concludes that there exists significant positive relationship between ICT and quality of product of the food manufacturing firms. Hence, maintenance of quality also means setting standards via ICT which will serve as guideline in the assurance of protection and safety of consumers in addition to improving future processing¹²⁷.

A study assessed the operational impacts of chief supply chain officers in manufacturing firms. Many firms have elevated their supply chain management decision-making responsibilities through the creation of 'Chief Supply Chain Officer' (CSCO) positions. This is widely attributed to the recognition that superior supply chain operations can generate a competitive advantage.

Prior studies have found that firms with CSCOs outperform firms without CSCOs along many financial dimensions. However, these prior efforts did not examine the pathways by which these improvements occur. This study addresses this gap in the literature by investigating whether supply chain characteristics of manufacturing firms differ within firms with CSCOs. To explore this, the study investigated the relationship between CSCOs and operational dimensions of supply chain performance using data from the 10-year period between 2008 and 2017. The study found that the presence of a CSCO in a firm is associated with shorter cash conversion cycles, lower levels of operational slack and larger buffers of inventory during periods of high market instability¹²⁸.

A study examined the impact of operations and IT-related industry 4.0 key technologies on organizational resilience. Industry 4.0 is one of the primary paradigms of the current industrial context. Despite the widespread research on this topic, an analysis of its key technologies' impact on company performance and resilience is not available. Hence, this work proposes a conceptual model for investigating the influences among Industry 4.0 key technologies (IT-related and Operations-related technologies), organizational resilience (in terms of internal and external) and performances in Italian companies. The study distinguished company performance, referring to companies' results in the past, from organizational resilience, which investigates future survival chances. Using structural equation modelling, a second-order construct has been used to test the hypothesized relationships. The results show that the implementation level of Industry 4.0 IT-related key technologies positively impacts organizational resilience and perceived performance. These results can assist company managers and decision-makers in increasing organizational resilience by effectively implementing Industry 4.0 technologies¹²⁹.

In a study titled measurement of technical efficiency using the DEA and SFA methods. At present, there is limited research on the state of the transport manufacturing industry in Malaysia.

This article presents an analysis on the technical efficiency (TE) of the Malaysian transport manufacturing industry using the established parametric and non-parametric approaches of Data Envelopment Analysis (DEA) and Stochastic Frontier Analysis (SFA), respectively based on Department of Statistics Malaysia (DoSM) data of 611 firms between 2005 and 2010. The results showed that within the DEA approach, the Variable Return to Scale (VRS) model gave higher average efficiency than the Constant Return to Scale (CRS) model, whereas the Translog function was found to be superior to the Cobb-Douglas function in the SFA approach. Overall, high efficiency values were found in both the parametric and non-parametric methods and the results were consistent. Spearman's coefficients showed weak correlations between the DEA and SFA approaches, with inconsistencies among the samples. Limited comparisons, however, could be made based on subsectors. Although inconsistencies were found in both approaches to identify firms with best and worst performances, the methods could still be useful in measuring TE through a careful selection of the input and output variables, depending on the context, objectives, and environment of the measurement¹³⁰.

A research on Iranian food manufacturing and processing industries was conducted. Food rheology is a prominent analytical procedure to investigate food products quality. The rheology in food products is posed in some aspects especially raw material quality, type and combination of ingredients and technologies employed. Current cluster study of Iranian food manufacturing and processing industries targeted food manufacturing and processing practices regarding to input, output materials stream, energy consumed, number of employees, land area used and their combinations pertaining on running technologies as well as facilities applied in industries individually. The t-test analysis (Statistical analysis) revealed a significant difference among parameters such as employee, power, water and land (pvalue $\leq .000$) except fuel for about 57 Iranian food manufacturing and processing industries. Therefore, obtained results can be

employed as a reference in the field of Iranian food manufacturing and processing practices and new technologies employed can be compared with running technologies¹³¹.

A study explored the level of innovation in the fast moving consumer goods (FMCG) manufacturing SMMEs sectors and identify the causes of low innovation in the industry, and examine to what extent these factors influence the effectiveness of SMMEs manufacturers innovation strategies, as well as to design a new innovation strategic approach to overcome innovation problems in the economic growth of fast moving consumer goods SMMEs manufacturers. The study is aimed at determining the level of innovation and factors contributing to low innovation in fast moving consumer goods (FMCG) SMMEs manufacturers hindering their economic performance. Mixed approach of quantitative and qualitative questionnaire was used for primary data collection. Sample consists of 120 FMCG manufacturing SMMEs. Statistical Package for Social Sciences (SPSS) (23.0) was employed for data analysis. This study concludes that the level of innovation in South African FMCG SMMEs manufacturers is low and there is the feeling among the respondents that the level of innovation needs special skills and improvements, with regards to restructuring the manufacturing process and strategy; improving the skills development and training of workers; improvement in research and development areas; and increasing finance skills, knowledge and education¹³².

A study examined a theoretical discussion on centralized vs decentralized production planning in ETO environments. The characteristics of ETO production call for further analysis to investigate the implications of traditional (deterministic) systems of planning i.e., centralized, and hierarchal, compared with decentralized systems. Accordingly, this study delineates the potential implications of centralized and decentralized planning approaches in the context of ETO. Hence, the contradictory pressure for either decentralized or centralized approaches promote one-sided solutions accentuating the crucial significance of a theoretical discussion. Our analysis suggests

that implementing decentralized systems should engender flexibility, transparency and responsive, which in turn can strengthen the impact of production planning on project delivery. In contrast, implementing centralized systems is likely to stifle the impact of production planning due to the rigidity, sequential interdependence, and the top-down nature of this approach. As such, our study provides opportunities for extending extant theory on centralized and decentralized production planning within ETO contexts, while providing a tentative framework for ETO practitioners that can be applicable when decisions concerning an (re)evaluation of production planning systems are to be made¹³³.

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2.4 Conceptual Framework

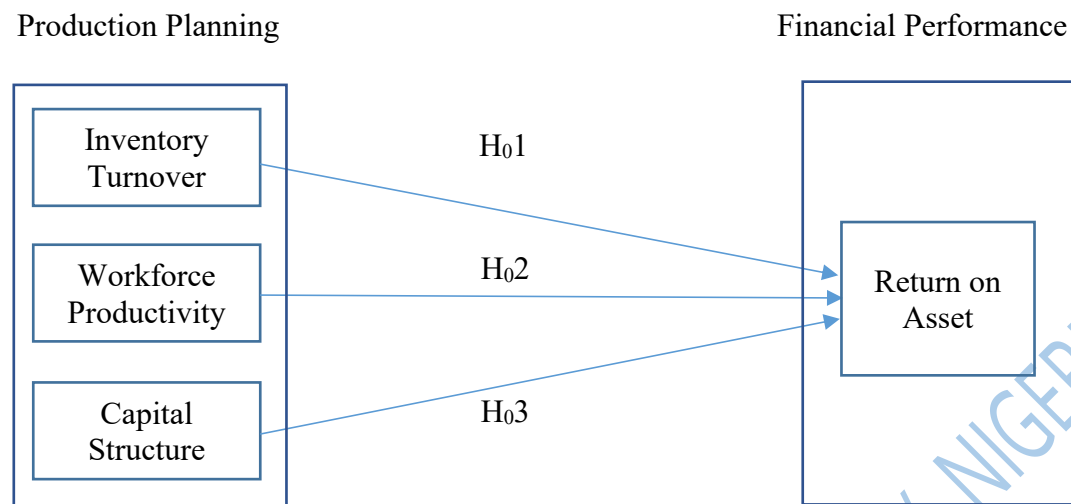


Figure 2.2: Diagram Representation of Production Planning and Financial Performance

Source: Researcher's Computation, 2021.

2.5 Summary of Gaps in Literature Reviewed

Several studies on inventory turnover produced different results on the impact on an organisation's financial performance. These studies focused on developed countries like America, Europe, Korea, Poland and emerging economies like Indonesia and other Asian countries. Some studies show a significant effect on the Return on Assets for most organisations, while others show that inventory turnover does not impact financial performance. For instance, in the study conducted in Indonesia on Growth Opportunity to Company's Profitability, it was found that inventory turnover ratio had partly no effect on Return on Assets and Return on Equity. In contrast, inventory turnover has a considerable impact on Net Profit Margin¹³⁴. In another case study conducted based on evidence from the Polish food industry on the effect of inventory management on Profitability, inventory management efficiency is positively connected with financial performance⁵⁰. Another study conducted on the Analysis of inventory turnover as a

performance measure in the manufacturing industry in Korea indicated that the inventory turnover ratio adversely affects the gross margin⁵³.

A study conducted in America on the effect of inventory turnover on financial performance in the US restaurant industry revealed a significant impact of inventory turnover on corporate financial success⁵⁵. Also, a review of related studies in Nigeria shows the effect of inventory turnover on Profitability. For instance, the study on inventory control and financial performance of listed conglomerate firms in Nigeria indicated that turnover management is inversely related to Profitability⁵¹. Many of the literature on inventory turnover is limited to developed countries in America, Europe and Asia. Available literature in Africa and Nigeria focuses more on general inventory management. Hence this study will fill the gap by examining how inventory turnover affects the Profitability of FMCG in Nigeria.

Workforce force productivity is an essential factor in measuring an organisation's performance. However, there appears to be limited literature examining the workforce on productivity and Profitability. Some of the literature studied different aspects of the workforce and linked them to organisational performance. For instance, in the study conducted on an assessment of workforce diversity on employee performance in rural district council in Zimbabwe, it was found that employee performance was inversely related to gender diversity. In contrast, age diversity was not statistically significant. Another study conducted in Zimbabwe on the impact of workforce diversity on the Profitability of firms listed on The Zimbabwe Stock Exchange showed that gender and executive diversity have a positive and significant effect on Profitability.

One of the studies conducted in Nigeria on the influence of workforce planning on organisational performance in the manufacturing industry in Lagos found that Organisational performance is influenced by personnel planning. Despite the importance of human capital assets in organisational performance, there is a shortage of literature on workforce productivity and

Profitability in the manufacturing industry in Nigeria. Therefore, this study will fill the gap by providing further studies linking workforce productivity with Profitability.

Several studies have been conducted on the capital structure and financial performance of organisations in Nigeria and around the world. These studies have produced different results for different industries. In the study conducted on the capital structure and firm financial performance in manufacturing firms, the capital structure was shown to have significant and non-significant effects on performance variables. However, the sample size limited the study, utilising 10 out of 61 listed manufacturing firms⁶⁷. Another study considered the impact of capital structure on the performance of commercial banks in Nigeria. The findings showed that the debt-to-equity ratio has a positive and substantial impact on Return on equity.

In contrast, the debt-to-equity ratio has a negative and significant impact on financial performance as measured by Return on assets. This study's limitation is the domain that focused on commercial banks with distinct characteristics from the FMCGs in Nigeria⁶⁰. Study conducted on the impact of financial leverage on the financial performance of quoted agriculture firms in Nigeria showed that the Total-debt-equity ratio has a significant positive influence on financial performance as measured by Return on equity⁶². In Ghana, a study was conducted on the effect of capital structure on the Profitability of Insurance companies. The findings showed debt-to-equity ratio has a positive and significant impact on financial performance⁶¹. Another study conducted on the effect of Capital structure on the financial performance of selected food and beverages industries in Nigeria shows that Total debt-to-equity has a positive and insignificant impact on the financial performance, as seen in the profit after tax⁶⁴. While this study is closer to the Fast-Moving Consumer Goods industry; the study used a sample of three firms, which is not

enough to generalise. A similar study focused on the Consumer Goods sector in Nigeria showed that Debt-to-Asset is positively significant on Return on Asset.

In contrast, Debt-to-Equity is not statistically significant, and Short-Term debt to Asset is negatively significant⁷⁸. However, the study did not consider other production planning variables. Hence the need to increase the sample size and take other production planning variables into account, focusing on FMCG firms listed on the Nigerian Stock Exchange.

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Chapter Three

Methodology

This chapter presents the methods and procedures used to study the effect of production planning and control on the profitability of listed fast-moving consumer goods companies in Nigeria. It covers the research design, the population, sample of the study and sampling technique, source, and data collection methods. The data analysis technique is imperative in testing the relationship between the dependent and independent variables and the various justifications for the methods and procedures adopted in this study.

3.1 Research Design

The study employed an ex-post facto research design to explain the relationship between Production Planning and Profitability of Selected Fast-Moving Consumer Goods Companies in Nigeria. An ex-post facto research design establishes relationships between quantitative variables using historical data. It makes use of the already occurred fact. Therefore, it is sufficient and suitable for determining the relationship between Production Planning (Inventory turnover, workforce productivity, and capital structure) and profitability.

3.2 Population of the Study

The study population comprises twenty-one (21) consumer goods firms listed on the Nigerian Stock Exchange floor as of 31st December 2020.

3.3 Sample and Sampling Technique

Using the standard statistical formula for determining sample size for a small population

$$\text{Sample Size} = \frac{[z^2 \times p(1-p)]}{e^2} \div 1 + \frac{[z^2 \times p(1-p)]}{e^2} \times N$$

N = population size of 21, z = z-score of 1.96 which is 95% confidence interval, e = margin of error of 0.05% and p = population proportion of 50%, the sample size was calculated to be 20. However due to the nature of the study, the purposive sampling technique was used to determine the final sample population. The study selected eight (8) FMCGs in Nigeria based on two filter criteria. The first criteria are firms with declining or inconsistent profitability, and the second criteria are firms with published annual reports from 2011 to 2020. The study selected Cadbury Nigeria Plc, Dangote Sugar Plc, Nestle Nigeria Plc, International Brewery Plc, Nigeria Breweries Plc, PZ Plc, Champion Plc, and Guinness Nigeria Plc.

3.4 Description of the Research Instrument

The research used secondary data from the audited annual report of the firms from 2011 to 2020. The variables were extracted from the firm's financial statement and notes to account. The study variables are impracticable to manipulate across the sample population, thus requiring secondary data. Furthermore, the information on these variables is available in the companies' financial statements, thus making it cost-effective and time efficient. The research period selected is 2011 to 2020 to cover the country's different economic phases and provide sufficient observations for study.

3.5 Validation of the Research Instrument

Validity shows the extent to which the instrument used measures the study's variables. Every measurement used in this study on the variables will be extracted from the audited report, defined below. These data do not require validation.

The dependent variable is profitability, and the independent variables (Inventory turnover, workforce productivity, and capital structure) proxy production planning.

Profitability represented as PROF is a dependent variable measured as the ratio of profit after tax to total asset^{1,2}.

Inventory Turnover represented as INVT is an independent variable measured as the ratio of Cost of Goods Sold to the average inventory^{2,3}.

Workforce Productivity represented as WKFZ is an independent variable measured as the Log of Revenue to average numbers of employee⁴.

Capital Structure represented as CASTR is an independent variable measured as the ratio of total debt to total equity⁵.

Inflation represented as INFL is a control variable that measures the annual inflation rate of the economy^{6,7}.

3.6 Reliability of the Research Instrument

The study will use published information from the company's audited account. By using the audited annual report, the information provided is considered reliable.

3.7 Administration of Research Instrument and Method of Data Collection

The research study collects data for the sampled company from the audited reports published by the Nigerian Stock Exchange from 2011 to 2020.

3.8 Method of Data Analysis

The descriptive and inferential analysis will examine the impact of production planning on the profitability of listed fast-moving consumer goods companies in Nigeria. The descriptive analysis is to help make clear the nature of the data. The descriptive analysis will disclose the mean value, standard deviation, minimum, and maximum value of the individual variables used in the study. Pearson Correlation analysis shows the nature, direction, and extent of the relationship between and among the dependent and independent variables.

On the aspect of inferential statistics, ordinary least square multiple regression is the principal data analysis technique. Multiple regression analysis is chosen for the study due to its ability to predict and explain the expected variation in production planning and profitability. However, the choice of appropriate multiple regression techniques depends on the nature of the data to be analyzed. Consequently, the panel data multiple regression techniques are used for this study since the dataset has both time series and cross-sectional attributes. The dataset comprises time series attributes from 2009 to 2020. The data is for a twelve (12) period for the whole studied firms. The technique employed and the panel nature of the data necessitates post estimation test to satisfy the assumption of OLS regression and post-estimation test for panel analysis decision.

Diagnostic and Robustness Test

- i. **Normality Test:** Ordinary least square regressions assume that the residuals are normally distributed. To see whether the data were normally distributed, the researchers used the Jarque- Bera test. The Jarque-Bera test is used to determine whether the residuals are naturally distributed. The significance standard for the decision rule was set at 5%, and a p-value of zero indicates that the residual is normally distributed.
- ii. **Multicollinearity Test:** Another principle of OLS regression is that the explanatory variables have little to no multicollinearity. The multicollinearity tests any negative association between the independent variables that could throw off the regression results. The researchers used the variance inflation factor (VIF) and tolerance value to perform a multicollinearity test. A VIF value of more than 10 or a tolerance value of more than 0.10 indicates high multicollinearity⁸.
- iii. **Heteroskedasticity:** Breusch-Pagan test for heteroskedasticity is used in this analysis. The data must be homoscedastic for OLS regression to work. The assumption is that the

variance of error terms is identical around the values of the independent variables. Thus, homoscedasticity of the residuals is the null hypothesis with a significance level set at 5%.

- iv. **Panel Effect Model:** Due to the panel nature of the data, the study will run for the fixed-effect model and the random model effect, using the Hausman specification test.

Model Specification

Dependent Variable (Y) – Profitability

Profitability is a measure of the ratio of profit after tax to total asset

Independent Variables (X) – Production Planning

The independent variable is measured by the following:

- i. Inventory Turnover
- ii. Workforce Productivity
- iii. Capital Structure

Inventory Turnover is the ratio cost of goods sold to the average inventory

$INVT = \text{cost of goods sold} / \text{average inventory}$

Workforce Productivity is the ratio of total sales to workforce size

$WKFZ = \text{total sales} / \text{workforce size}$

Capital Structure is the ratio of total debt to total equity

$CASTR = \text{Total Debt} / \text{Total Equity}$

Functional Model

$PROF = f(INVT)$

$PROF = f(WKFZ)$

$$\text{PROF} = f(\text{CASTR})$$

$$\text{PROF} = f(\text{INVT}, \text{WKFZ}, \text{CASTR})$$

Mathematical Model

$$Y = f(X)$$

$$Y = \text{Profitability (PROF)}$$

$$X = \text{Production Planning (PP)}$$

$$X = f(x_1, x_2, x_3, \mu)$$

$$X = x_1 + x_2 + x_3 + \mu$$

Where:

$$x_1 = \text{Inventory Turnover (INVT)}$$

$$x_2 = \text{Workforce Productivity (WKFZ)}$$

$$x_3 = \text{Capital Structure (CASTR)}$$

f = functional dependency of the relationship

$$\mu = \text{Random Variable (error term)}$$

$$\text{Therefore } Y = f(x_1, x_2, x_3, \mu)$$

$$Y = f(x_1 + x_2 + x_3 + \mu)$$

$$\text{PROF} = f(\text{INVT} + \text{WKFZ} + \text{CASTR})$$

Econometric Model

$$\text{PROF} = \alpha + \beta X + \mu$$

$$\text{PROF} = \alpha_n + \beta_n \text{PP} + \mu_n$$

$$\text{PROF} = \alpha + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \mu$$

$$\text{PROF} = \alpha + \beta_1 \text{INVT} + \beta_2 \text{WKFZ} + \beta_3 \text{CASTR} + \mu$$

Where

α - The intercept when $\beta = 0$

β - The Coefficient of Variable

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Endnotes

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Chapter Four

Results and Discussion of Findings

This chapter focuses on the presentation, analyses, and interpretation of the results obtained from the tests conducted on the data obtained for the study. It presents the result of the research question. The chapter is separated into sections, discussing the descriptive statistic, correlation analysis, diagnostic check on the various regression assumptions, and post-diagnostic tests. The fourth and final section ends with testing the study's hypotheses and discussing significant findings.

4.1 Data Analysis

The study used secondary data obtained from the company's annual reports of 8 of the 21 listed FMCGs in Nigeria. Models of the study were specified with the inclusion of the variable measurement, and the STATA13 package was used for the analysis.

The descriptive analyses of the variables are presented in Table 4.1, where minimum, maximum, mean, and standard deviation of the data collected for the variables in the study are described.

Table 4.1: Descriptive Statistic

Variables	Obs	Mean	Std dev.	Min	Max
PROF	80	0.068	.091	-.197	.265
INVT	80	5.684	4.249	0.575	38.598
WKFP (000)	80	74012.34	45049.42	8971.583	244750.2
LWKFP	80	11.022	0.654	9.10	12.41
CASTR	80	2.09	5.54	-4.487	47.923
INF	80	12.01	2.96	8.06	16.52

Source: Field Survey, 2022

Table 4.1 shows the detailed account of the descriptive analysis of the variables. The profitability variable reveals a mean value of 6.8% and a standard deviation of 9.1%. The positive value for the mean of 0.068 indicates that the selected FMCGs in Nigeria are efficient in generating profit from operations. The standard deviation suggests that the sampled firms have similar trends in profit generation, however, the wide dispersion of the individual PROF from the mean indicated variance in their individual profitability. The table further reveals that PROF has a minimum loss return on assets of -19.7% and the highest recorded PROF of 26.5% during the study period.

4.1.1 Presentation of Research Questions

Research Question One: What effect does inventory turnover have on the return on assets to measure the Profitability of listed FMCG companies in Nigeria?

The results from the analysis presented in Table 4.1 revealed that inventory turnover has a mean value of 5.68 and the standard deviation of 4.249 respectively. The average value shows that the inventory turnover ratio for the selected FMCGs in Nigeria for 10 years ranging from 2011 to 2020 is 5.68times. This suggests that the selected firms, on average, will sell and replenish their

inventory roughly every one or two months. This indicates that they are efficient in controlling their inventory. Further, the standard deviation of 4.249 reveals a common trend among the selected FMCGS firms as it shows a low variation from the mean. The lowest and the highest value is 0.575 and 38.595, respectively.

Research Question Two: To what extent does workforce productivity affect the net profit of listed FMCG companies in Nigeria?

As presented in Table 4.1, the analysis of workforce productivity reveals an average value of N74million, which discloses that the ratio of the firm revenue to the employee is N74 million. This is the revenue that the sample firms' employees, on average, can generate during the study period. The standard deviation is approximately N45.million, which reveals that all the firms have a similar pattern of money each employee generates for their firms. Hence, their workforce productivity is identical across the firms during the study period. The minimum and the maximum value of WKFP are approximately N9million and N244.8 million, respectively. The natural logarithm of the ratio (LWKFP) reveals a mean value of 11.02, the standard deviation of 0.65, minimum and maximum values of 9.10 and 12.41, respectively.

Research Question Three: How does capital structure impact the return on assets of listed FMCG companies in Nigeria?

Table 4.1 also discloses that capital structure measured by total debt to total equity ratio has an average value of 2.09 and a standard deviation of 5.54, indicating wide fluctuation in the data from their mean. The mean value suggests that, on average, the debt in the firms is two (2) times their equity, which means that the firms have more debt in their capital structure. The table also reveals that the least value of CASTR is -4.487, and the maximum value is 47.923. the least value of -4.487 suggests a severe debt issue in some firms, implying that their total assets cannot

cover their debt. The range (52.910) corroborates the wide dispersion revealed by the average value.

Finally, Table 4.1 reveals that the macroeconomic control variable inflation has an average value of 12.01 % and a standard deviation of 2.96%. The average value implies that, on average, during the study, the inflation rate in Nigeria is 12.01%. The table also reveals a minimum and maximum value of 8.06 and 16.52%, respectively.

The correlation matrix is used to reveal the association between each two sets of variables in the regression model. Any variables with a less than 0.80 correlation coefficient are considered less harmful and can be incorporated in the same regression model since there is no interdependency among the independent variables¹. Also, it is expected that there should be a strong association between the dependent and independent variables.

Table 4.2 Correlation Analysis

Variable	PROF	INVT	WKFP	CASTR	FSZ
PROF	1.000				
INVT	0.068	1.000			
WKFP	0.514	-0.259	1.000		
CASTR	-0.055	-0.027	0.113	1.000	
INF	-0.177	0.363	0.178	0.035	1.000

Source: Field Survey, 2022

Table 4.2 reveals the relationship between the dependent variables (PROF) and independent variables with their respective correlation coefficient. The correlation matrix table revealed that the correlation coefficient between PROF and inventory turnover is 0.068. The result suggests that inventory turnover has a positive and low correlation with the profitability of the selected listed FMCGs firms in Nigeria. The positive correlation is an indication that any increase in the inventory turnover of the sampled listed firms will increase profitability.

Furthermore, the Table 4.2 reveals that the correlation coefficient between PROF and is WKFP is 0.514. The result suggests that workforce productivity has a positive and moderate relationship with profitability. This indicates that increased workforce productivity will improve the profitability of the selected listed FMCGs firms in Nigeria.

In addition, Table 4.2 reveals a negative and weak coefficient of -0.055 between capital structure and profitability. This means the capital structure (CASTR) has a negative and weak correlation with the profitability of the selected FMCGs firms in Nigeria.

Furthermore, the correlation value between inflation and profitability revealed a value of -0.177. The result suggests that inflation has a negative and weak correlation with the profitability of the selected listed FMCGs firms in Nigeria. The negative correlation shows that an increase in the sampled listed firms' inflation will decrease profitability. On the relationship among the independent variables, Table 4.2 shows that the independent variable among themselves display a weak connection. The highest correlation is between inventory turnover and inflation with a correlation coefficient of -0.363, which is still below the benchmark of (+-) 0.80, suggesting that the independent variables have no multicollinearity¹. This will further be supported by the regression multicollinearity test conducted using variance inflation factors and tolerance value.

Robustness tests are carried out to test the validity of the statistical inference of a linear regression model. The robustness tests conducted for this study include model specification test, normality of residual, multicollinearity test, and heteroskedasticity test. However, the Hausman specification test was conducted to test the existence of the panel effect and the preferred model selection.

Table 4.3: Normality Test of Data

MODEL	Variables	Obs	Pr(Skewness)	Pr(Kurtosis)	adj chi2(2)	Prob>chi2
PROF	Residual	143	0.638	0.473	0.75	0.687

Source: Field Survey, 2022

One of the assumptions of classical ordinary least square regression is the assumption of normality residual. The test's null hypothesis is that the residual is normal at a 5% significance level. The Jacque Bera test reveals a P-value of 0.687, greater than 5%, indicating that the residual is normally distributed.

Table 4.4: Multicollinearity Test

Variables	VIF	Tolerance Value
INVT	1.21	0.829
WKFP	1.09	0.913
CASTR	1.01	0.987
FS	1.16	0.860
Mean VIF	1.12	

Source: Field Survey, 2022

The classical assumption of the OLS regression model assumes the explanatory variables are not perfectly correlated (absence of multicollinearity). Tolerance less than 0.1 and the VIF value 10 and above imply the presence of multicollinearity in the estimates¹. However, the results from Table 4.4 below evidence that there is no existence of excessive correlation among the independent variables because the least tolerance value (TV) is 0.829 while the maximum variance inflation factor (VIF) is 1.21

Table 4.5: Heteroskedasticity Test

Test	Chi2	P-value
Breusch- Pagan or cook – Weisberg to test	0.12	0.725

Source: Field Survey, 2022

Another assumption of classical ordinary least squares is the homoskedasticity of the residual. The null hypothesis is that the variance of error terms is similar across the values of the independent variables. For this study, a heteroskedasticity test was carried out using Breusch-Pagan/Cook-Weisberg test. The null hypothesis is that the data is homoscedastic, conducted at a 5% significance level. The Breusch- pagan / Cook-Weisberg test in Table 4.5 shows that the chi2 value is 0.12 and the p-value of chi2 is 0.725, which is not significant as the P-value exceeds 5% indicating that there is no issue of heteroskedasticity. Thus, the residual is homoskedasticity, and the assumption is satisfied.

Table 4.6: Hausman Specification Test

Test	Chi2	P-Value
Hausman Specification Test	3.06	0.548

Source: Field Survey, 2022

Due to the panel nature of the data, the study conducted the Hausman Specification Test to determine if the panel effect is random or fixed. The result shows that at a 5% level of significance, the χ^2 is 3.06 and the $\text{prob} > \chi^2$ is 0.548, which is not significant at less than 5% level. The significant p-value shows that the Hausman test favours the random effect model. Hence, the study conducts a panel test.

Table 4.7: Panel Effect Test

Test	Chi2	P-value
Breusch and Pagan Lagrangian multiplier test for random effects	41.38	0.000

Source: Field Survey, 2022

The Breusch and Pagan Lagrangian multiplier test for random effects was carried out on the null hypothesis, and the result shows no panel effect. Table 4.7 discloses a chi-square of 41.38 and a significant P-value of 0.000 (less than 5% level of significance). This indicates that there is a panel effect. The study selects random effect regression as an ideal model for interpretation. In other to improve the robustness of the inferences, the study adopts a more robust random effect regression model (with Discrol-Kraay standard error).

In this section, the regression results of production planning and profitability are presented and analyzed below:

Table 4.8: Robust Random Effect Regression Model

Variables	Coefficients	Robust Standard error	T-statistic	P>T
INVT	0.013	.006	2.30	0.047*
WKFP	0.056	.021	2.72	0.026*
CASTR	-0.003	.000	-6.43	0.000*
INF	-0.007	0.003	-2.38	0.041*
CONST	0.855	0.201	-2.42	0.039*
F-STAT	320.99			0.000
R ² Within	34.39			

Source: Field Survey, 2022

Table 4.8 presents the random effect regression result selected for the study based on the Hausman and LM tests. The R² overall reveals a value of 34.39%, indicating that the production planning variables and the control variable inflation can explain the variations in the profitability of the selected FMCGs firms in Nigeria to a percentage of 34.39%, while the remaining percentage is explained by other factors not captured in the model. The F-Stat chi-square of the robust model is 320.99 with a P-value of 0.000, which reveals that the model is fitted at a 5% significant level and the variables have a joint effect on the profitability of the selected listed FMCGs in Nigeria.

4.1.2 Presentation of Hypotheses

The hypotheses are tested independently below:

H₀₁ - Inventory turnover has no significant effect on the profitability of listed FMCG companies in Nigeria.

The result of the fixed effect regression on PROF in table 4.8 for inventory turnover shows a P-value of 0.047, which is significant at a 5% level of significance, showing that inventory turnover has a significant effect on profitability. Therefore, the study rejects the null hypothesis (H₀₁) that states that Inventory turnover has no significant impact on the profitability of listed FMCG companies in Nigeria.

H₀₂ - The workforce's productivity does not significantly influence the profitability of listed FMCG companies in Nigeria.

Further, the regression analysis in Table 4.8 shows that the workforce's productivity has a p-value of 0.024, which is significant at a 5% level of significance, indicating that the workforce's productivity has a significant effect on the profitability (PROF) of the sampled firms. Thus, the study rejects the null hypothesis (H₀₂) that states that the workforce's productivity does not significantly influence the profitability of the selected listed FMCG companies in Nigeria.

H₀₃ - Capital structure does not significantly impact the profitability of listed FMCG companies in Nigeria.

The result in table 4.8 shows that Capital structure has a P-value of 0.000, which is significant at a 5% level of significance, indicating that Capital structure has a significant effect on profitability (PROF). Therefore, the study rejects the null hypothesis (H₀₃) that states that

Capital structure does not have a significant impact on the profitability of listed FMCG companies in Nigeria.

4.2 Discussion of Findings

Objective one of this study examines the effect of inventory turnover on the return on assets to measure the profitability of listed FMCG companies in Nigeria. The data analysed in this study indicates that inventory turnover has a positive and significant effect on return on asset ROA of selected FMCGs in Nigeria. This is evidenced from the coefficient of .013 and the P-value of 0.047 from Table 4.8. This implies that an increase in inventory turnover will enhance profitability. It suggests that a one-unit increase in inventory turnover will lead to a 0.013 increase in the firms' profitability measured by ROA. Thus, the firms' efficient management of inventory levels will increase profitability. Maintaining high inventory turnover is beneficial to improving the firm's profitability. When firms manage their inventory efficiently, it is quickly converted into product and sold. This higher turnover earns the company a higher profit. Proper planning of inventory management is therefore essential to the profitability of FMCGs in Nigeria. The finding is in line with the theory of constraint, which explains that a company maximizes profitability by increasing the throughput while reducing inventory and operating expenses. Further, the finding supports the prior studies that found inventory turnover to be advantageous to improving the company's profitability^{2,3}. It is pointed out that Inventory control management benefits firms by facilitating material storage and retrieval, improving sales effectiveness, and lowering operating costs thereby, enhancing profitability⁴. However, it is contrary to the finding by some prior extant literature that discovered that inventory turnover negatively influences profitability^{5,6}.

The second objective of this study investigates the extent at which workforce productivity affect the net profit of listed FMCG companies in Nigeria. The findings revealed that increasing workforce productivity improves the profitability of the selected FMCG firms in Nigeria. Analysis presented in this study shows that workforce productivity has a positive coefficient of 0.056 and a P-value of 0.026, significant at a 5% significance level. The finding implies that any increase in the workforce productivity will increase the profitability of the sampled firms by 0.056. this means that higher workforce productivity improves the profitability of the listed selected FMCGs in Nigeria. This positive consequence implies that when employees are productive, they either do more work in less time or work for fewer hours—these aids in the reduction of operating costs. As a result, smaller labour is required to provide the same output, increasing profitability. This result is in line with prior studies' theory of constraint. It also corroborates the studies that found that workforce productivity enhances the profitability of firms^{7,8}. However, the finding contradicts the study that discovered that employee size has an inverse effect on performance⁹.

Objective three of this study enquires how capital structure impacts the return on assets of listed FMCG companies in Nigeria. The results to this show that capital structure measured by total debt to equity is negative and significant, influencing the profitability of selected listed FMCGs in firms in the Nigeria Stock Exchange during the period under review. This is evidenced by the sign of the coefficient, which is -0.003, and the p-value of 0.000, which is significant at a 5% significance level. This further revealed that an increase in the debt in the capital structure will affect profitability negatively. This by implication suggests that higher debt in the capital structure would likely decrease the firms' earnings due to additional interest expense incurred on debt. This result is consistent with the pecking order theory, which specifies that a negative relationship exists between debt and profitability. A firm does not need to depend much on

external finance. Also, the findings are in line with the prior studies that found that an increase in debt in the capital structure would cause a decline in the firms' profitability^{10,11}. However, some prior studies contradict pecking order theory with evidence that capital structure enhances the profitability of the firms^{12,13,14}.

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Endnotes

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Chapter Five

Conclusion

5.1 Summary of Findings

This study examined the effect of production planning on the profitability of selected FMCGs companies in Nigeria for ten years from 2011 to 2020. Specifically, the study seeks to examine the effect of inventory turnover on the profitability of selected FMCGs companies in Nigeria, assess the influence of workforce productivity on the profitability of selected FMCG companies in Nigeria, and evaluate the effect of capital structure on the profitability of selected FMCGs companies in Nigeria. The study measured profitability as return on asset (ROA).

The study found evidence that inventory turnover has a positive and significant influence on the profitability of the listed selected FMCGs firms in Nigeria. Improvement in inventory management improves the profitability of FMCG firms. By implication, it suggests that management need to ensure higher inventory turnover to keep profit level high in the FMCGs firms in Nigeria

The research findings on workforce productivity show a positive and significant influence on profitability. It provides practical implications for management to improve profitability and long-term performance by paying attention to and improving workforce productivity.

The evidence showed that capital structure has a negative and significant influence on profitability. It reduces the profitability of the sampled FMCGs in Nigeria. Hence, the management needs to maximise profitability by evaluating the debts covenants.

5.2 Conclusion

Profitability growth is very essential to the long-term survival of any organization. It is a key metric that management and stakeholders evaluate to ensure value of assets are not eroded overtime. After careful review of the results and discussion, as well as relevant literature, the study concludes as follows:

The study discovered that inventory turnover enhances the profitability of listed FMCGs in Nigeria. Hence. It concludes that inventory management as indicated by inventory turnover improves the profitability of listed FMCGs in Nigeria.

Further, the study found that workforce productivity positively affects productivity. Thus, it concluded that improved workforce productivity enhances the profitability of listed FMCGs in Nigeria.

Finally, the study also concludes that capital structure with higher total debt to total equity will negatively influence the profitability of listed FMCGs in Nigeria. This results from the cost involved in servicing both debts and the inflationary effect.

5.3 Recommendations

In line with the findings and the conclusions of this study, the following recommendations were made.

- i. FMCG companies' management in Nigeria should focus on strategic inventory management to improve operations efficiency and turnover. Methods such as lean manufacturing, economic order quantity, and total quality management should be adopted

in inventory management. Accuracy of demand forecast, and aggregate planning is essential and should be made visible to the management.

- ii. The study proposes improvement in workers' productivity through proper incentive mechanisms, provision of a good working environment, use of technology and continuous manpower training and planning.
- iii. The study recommends that managers of the listed selected FMCGs in Nigeria develop measures to strike a balance between debt and equity finance and seek debts with better interest costs to improve profitability.

5.4 Contribution to Knowledge

This study contributes to the existing literature by utilizing several production factors and a large sample size to examine the effect of production planning on the profitability of selected FMCG firms in Nigeria using secondary data. Additionally, the study is one of the few that uses secondary data to assess the influence of employee productivity on the profitability of FMCG companies in Nigeria.

5.5 Suggestion for Further Studies

This study focuses on production planning variables such as capital structure, workforce productivity, and inventory turnover. Other variables of production planning, such as demand forecasting, aggregate material planning, facility layout etc., can be considered in further research. Also, the study can be carried out in other manufacturing industries such as healthcare, agriculture, and others.

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Appendix

Raw Data

YEAR	ID	PROF	INVT	WKFP	LNWKFP	CASTR	INF
2011	1	0.10906	8.568	37401.92	10.52948	1.028815	10.84
2012	1	0.086038	9.508863	35921.31	10.48909	1.003882	12.22
2013	1	0.139677	11.54828	33609.73	10.42257	0.799239	8.48
2014	1	0.052487	10.57106	36031.39	10.49215	1.496971	8.06
2015	1	0.040585	8.728715	35536.65	10.47832	1.313091	9.01
2016	1	-0.01044	6.645882	41237.15	10.62709	1.567933	15.68
2017	1	0.010555	4.549564	58860.22	10.98292	1.420474	16.52
2018	1	0.0299	4.6243	65406.33	11.08837	1.171641	12.09
2019	1	0.037874	5.198172	73370.91	11.20328	1.123061	11.4
2020	1	0.028058	5.21962	71242.1	11.17384	1.451059	15.75
2011	2	0.101677	4.264467	164445.8	12.01034	0.764765	10.84
2012	2	0.129997	4.085862	162167	11.99638	0.702862	12.22
2013	2	0.155404	6.008984	78699.97	11.2734	0.537646	8.48
2014	2	0.122407	5.75599	141085	11.85712	0.662295	8.06
2015	2	0.118681	5.502022	152347.4	11.93392	0.606833	9.01
2016	2	0.080703	4.755848	244750.2	12.40799	1.358874	15.68
2017	2	0.192909	3.219831	154660.9	11.94899	0.976312	16.52
2018	2	0.144688	2.742296	92053.5	11.43013	0.665642	12.09
2019	2	0.121652	3.817908	99311.92	11.50602	0.677881	11.4
2020	2	0.120991	3.746295	72280.44	11.18831	1.06923	15.75
2011	3	0.214391	6.236935	44781.2	10.70954	2.348916	10.84
2012	3	0.237596	7.12134	53560.07	10.88856	1.602362	12.22
2013	3	0.205662	8.187023	59572.1	10.99494	1.66555	8.48
2014	3	0.209766	7.890383	63843.65	11.06419	1.951116	8.06
2015	3	0.199109	7.71025	64206.93	11.06987	2.136654	9.01
2016	3	0.046731	6.777589	78241.28	11.26755	4.492115	15.68
2017	3	0.229719	4.528645	110927.5	11.61663	2.27117	16.52
2018	3	0.264935	6.478437	121752.2	11.70974	2.232434	12.09
2019	3	0.236242	5.52767	128001.5	11.7598	3.244609	11.4
2020	3	0.159279	3.926789	128219.8	11.7615	7.403083	15.75
2011	4	0.009365	4.146148	27522.69	10.22277	2.747917	10.84
2012	4	0.07919	3.687567	32765.1	10.39712	1.113633	12.22
2013	4	0.098463	4.303288	42411.3	10.65517	1.455899	8.48
2014	4	0.086395	4.101872	39771.84	10.59091	1.162441	8.06
2015	4	0.064514	4.601041	42314.13	10.65288	2.456228	9.01
2016	4	0.079229	4.399662	43987.46	10.69166	2.410436	15.68
2017	4	0.00601	2.387755	25226.39	10.13565	4.918346	16.52
2018	4	-0.01246	4.063553	53628.65	10.88984	7.824539	12.09
2019	4	-0.07611	5.122352	59323.85	10.99077	47.92299	11.4
2020	4	-0.03318	5.878786	65701.52	11.09288	1.455921	15.75

2011	5	0.178392	5.412107	62516.1	11.04318	1.751393	10.84
2012	5	0.149991	5.803451	78616.74	11.27234	1.714172	12.22
2013	5	0.17044	5.834371	84073.09	11.33944	1.249568	8.48
2014	5	0.121598	5.325082	87392.54	11.37817	1.03439	8.06
2015	5	0.106687	5.068531	77814.61	11.26208	10.01326	9.01
2016	5	0.077296	5.975033	86051.33	11.3627	6.459795	15.68
2017	5	0.086248	0.575093	109915.3	11.60747	1.148327	16.52
2018	5	0.049969	0.686854	117407.5	11.67341	1.332913	12.09
2019	5	0.042104	5.401621	104127.1	11.55337	1.282725	11.4
2020	5	0.016933	5.863072	112711.1	11.63258	1.757896	15.75
2011	6	0.060822	4.528844	22553.23	10.02363	0.647161	10.84
2012	6	0.012402	4.63045	35879.96	10.48793	0.574475	12.22
2013	6	0.044212	4.450494	52496.75	10.86851	0.582569	8.48
2014	6	0.077194	4.802358	55695.71	10.92766	0.872481	8.06
2015	6	0.045085	4.358216	60037.82	11.00273	0.809546	9.01
2016	6	0.006932	4.168229	52276.34	10.8643	0.664911	15.68
2017	6	0.030608	2.086428	48036.6	10.77972	1.143418	16.52
2018	6	0.021864	1.927386	63361.89	11.05662	1.209638	12.09
2019	6	0.008992	1.770078	46779.9	10.75321	0.901898	11.4
2020	6	-0.10031	1.975951	41735.5	10.63911	1.489322	15.75
2011	7	-0.17156	8.007753	10538.82	9.262821	-4.48376	10.84
2012	7	-0.1966	8.081902	8971.583	9.101817	-2.98227	12.22
2013	7	-0.12892	8.152477	12410.95	9.426335	-2.98285	8.48
2014	7	-0.07866	8.069048	17947.74	9.79522	0.634016	8.06
2015	7	0.007468	7.104144	20478.63	9.927137	0.450391	9.01
2016	7	0.053245	6.35492	30674.19	10.33118	0.298582	15.68
2017	7	0.051297	6.037681	35651.59	10.48155	0.240109	16.52
2018	7	0.025156	5.364185	33312.99	10.4137	0.321526	12.09
2019	7	0.015345	6.927178	42498.02	10.65721	0.367239	11.4
2020	7	0.013968	7.15764	49660.61	10.81297	0.413468	15.75
2011	8	0.194387	4.092554	99970.19	11.51263	1.289469	10.84
2012	8	0.138395	3.559617	89820.9	11.40557	1.670235	12.22
2013	8	0.097998	38.59754	85459.55	11.3558	1.629517	8.48
2014	8	0.072346	4.473936	79826.11	11.28761	1.936601	8.06
2015	8	0.063764	5.247925	86430.26	11.36709	1.52882	9.01
2016	8	-0.01472	5.06167	75872.79	11.23681	2.288297	15.68
2017	8	0.013173	4.297544	132407.8	11.79364	2.400744	16.52
2018	8	0.043833	4.479346	177830.6	12.08859	0.749722	12.09
2019	8	0.034104	4.133154	168587.7	12.03521	0.805432	11.4
2020	8	-0.08726	2.753362	126978.1	11.75177	0.973566	15.75

Result Output

```
----- (R)
/___/ /___/ /___/
___/ /___/ /___/ 13.0 Copyright 1985-2013 StataCorp LP
Statistics/Data Analysis StataCorp
MP - Parallel Edition 4905 Lakeway Drive
College Station, Texas 77845 USA
800-STATA-PC http://www.stata.com
979-696-4600 stata@stata.com
979-696-4601 (fax)
```

Notes:

1. (/v# option or -set maxvar-) 5000 maximum variables

```
. edit
```

```
. *(8 variables, 80 observations pasted into data editor)
```

```
. su prof invt wkfp lnwkfp castr inf
```

Variable	Obs	Mean	Std. Dev.	Min	Max
prof	80	.0683997	.0913932	-.1965952	.2649347
invt	80	5.684203	4.248654	.5750931	38.59754
wkfp	80	74012.34	45049.42	8971.583	244750.2
lnwkfp	80	11.02218	.654003	9.101817	12.40799
castr	80	2.092545	5.544259	-4.483759	47.92299
inf	80	12.005	2.962231	8.06	16.52

	prof	invt	wkfp	castr	inf
prof	1.0000				
invt	0.0675	1.0000			
wkfp	0.5136	-0.2594	1.0000		
castr	-0.0546	-0.0277	0.1130	1.0000	
inf	-0.1765	-0.3627	0.1781	0.0346	1.0000

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. reg prof invt wkfp castr inf

Source	SS	df	MS	Number of obs =	80
Model	.241176059	4	.060294015	F(4, 75) =	10.80
Residual	.418688799	75	.005582517	Prob > F	= 0.0000
				R-squared	= 0.3655
				Adj R-squared	= 0.3317
Total	.659864858	79	.00835272	Root MSE	= .07472

prof	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
invt	.0229266	.0168705	1.36	0.178	-.0106812	.0565344
wkfp	.0842265	.0134456	6.26	0.000	.0574414	.1110115
castr	-.0018287	.0015262	-1.20	0.235	-.004869	.0012116
inf	-.0071037	.0030589	-2.32	0.023	-.0131973	-.00101
_cons	-.807333	.1592377	-5.07	0.000	-1.124551	-.4901154

. vif

Variable	VIF	1/VIF
invt	1.21	0.829250
inf	1.16	0.860669
wkfp	1.09	0.913865
castr	1.01	0.986966
Mean VIF	1.12	

. hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity

Ho: Constant variance

Variables: fitted values of prof

chi2(1) = 0.12

Prob > chi2 = 0.7253


```
. est store fe
```

```
. xtreg prof invt wkfp castr inf, re
```

```
Random-effects GLS regression           Number of obs   =    80
Group variable: id                     Number of groups =     8

R-sq:  within = 0.1679                 Obs per group:  min =    10
      between = 0.5163                   avg           =   10.0
      overall  = 0.3439                   max           =    10

                                           Wald chi2(4)    =   18.81
corr(u_i, X) = 0 (assumed)              Prob > chi2     =   0.0009
```

prof	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
invt	.0134947	.0154264	0.87	0.382	-.0167405	.0437298
wkfp	.0564355	.0177042	3.19	0.001	.0217358	.0911351
castr	-.0027653	.0013066	-2.12	0.034	-.0053261	-.0002044
inf	-.0065818	.002495	-2.64	0.008	-.0114718	-.0016918
_cons	-.4903132	.198471	-2.47	0.013	-.8793093	-.1013171
sigma_u	.05371217					
sigma_e	.05823917					
rho	.45962878	(fraction of variance due to u_i)				

```
. est store re
```

```
.
```

. hausman fe re

	Coefficients			
	(b) fe	(B) re	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
invt	.0119897	.0134947	-.001505	.0033407
wkfp	.0445574	.0564355	-.011878	.009456
castr	-.0027924	-.0027653	-.0000271	.0002274
inf	-.0062137	-.0065818	.0003681	.0004096

b = consistent under Ho and Ha; obtained from xtreg

B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(4) = (b-B)'[(V_b-V_B)^(-1)](b-B)
= 3.06
Prob>chi2 = 0.5476
(V_b-V_B is not positive definite)

. xttest0

Breusch and Pagan Lagrangian multiplier test for random effects

prof[id,t] = Xb + u[id] + e[id,t]

Estimated results:

	Var	sd = sqrt(Var)
prof	.0083527	.0913932
e	.0033918	.0582392
u	.002885	.0537122

Test: Var(u) = 0

chibar2(01) = 41.38
Prob > chibar2 = 0.0000

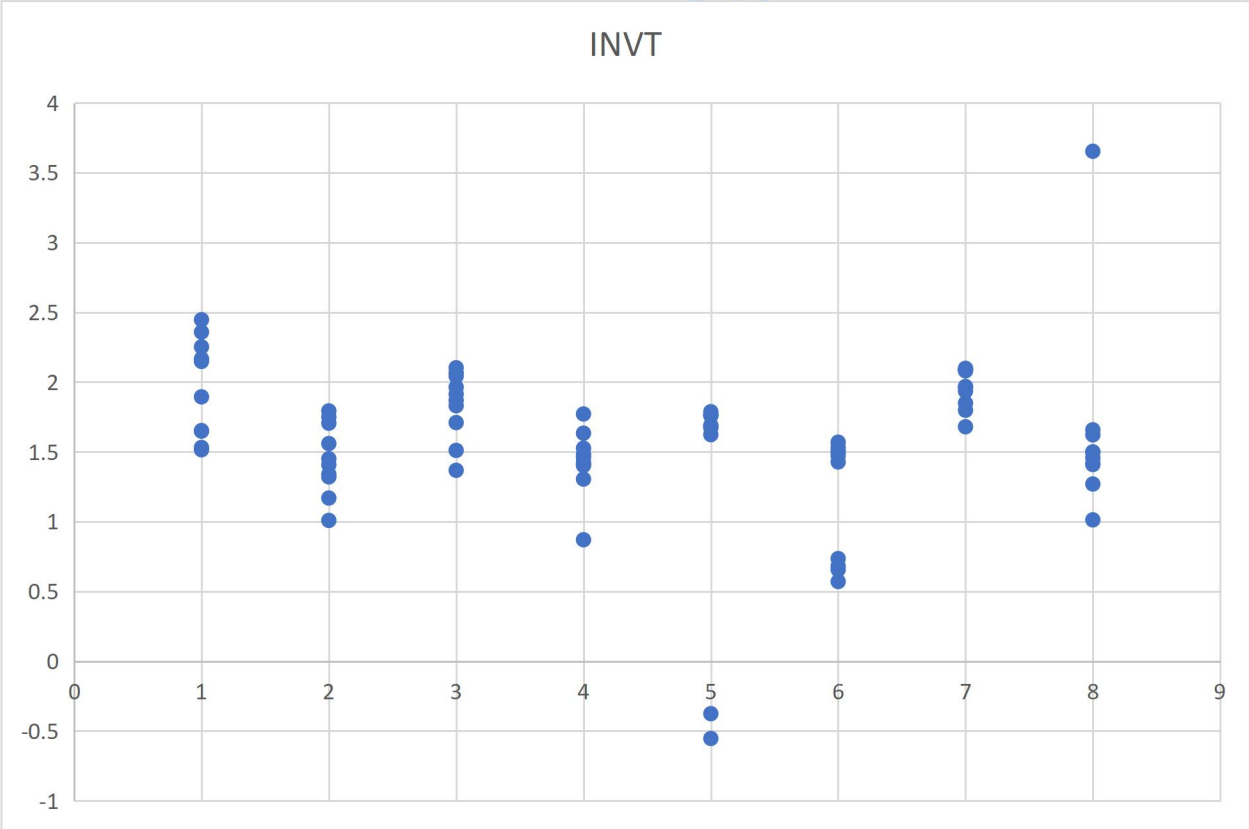
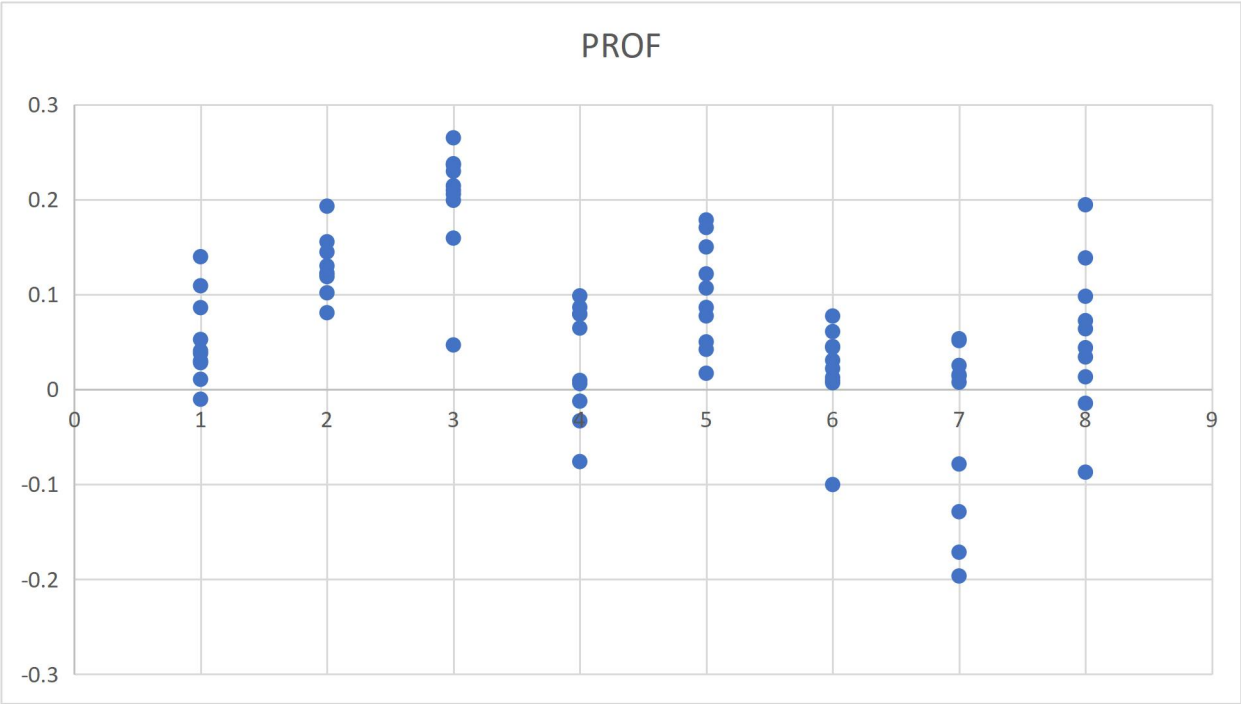
. xtscd prof invt wkfp castr inf, re

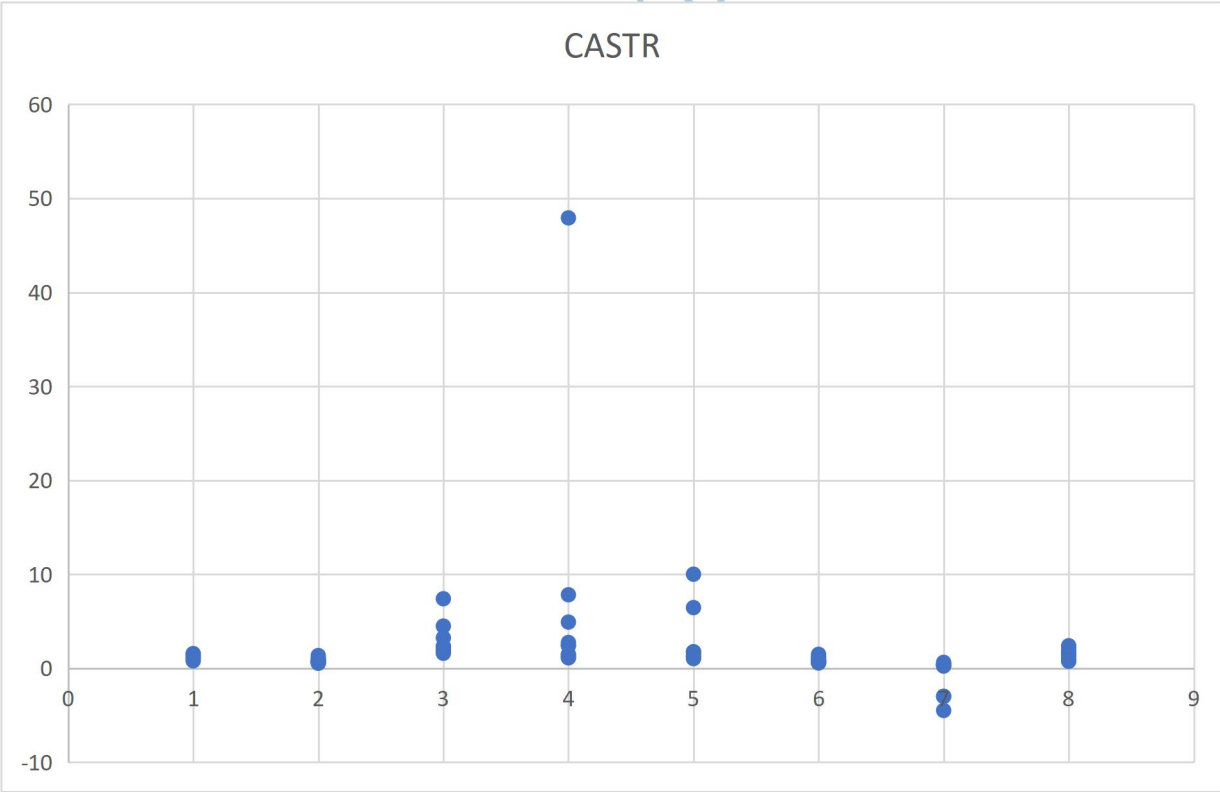
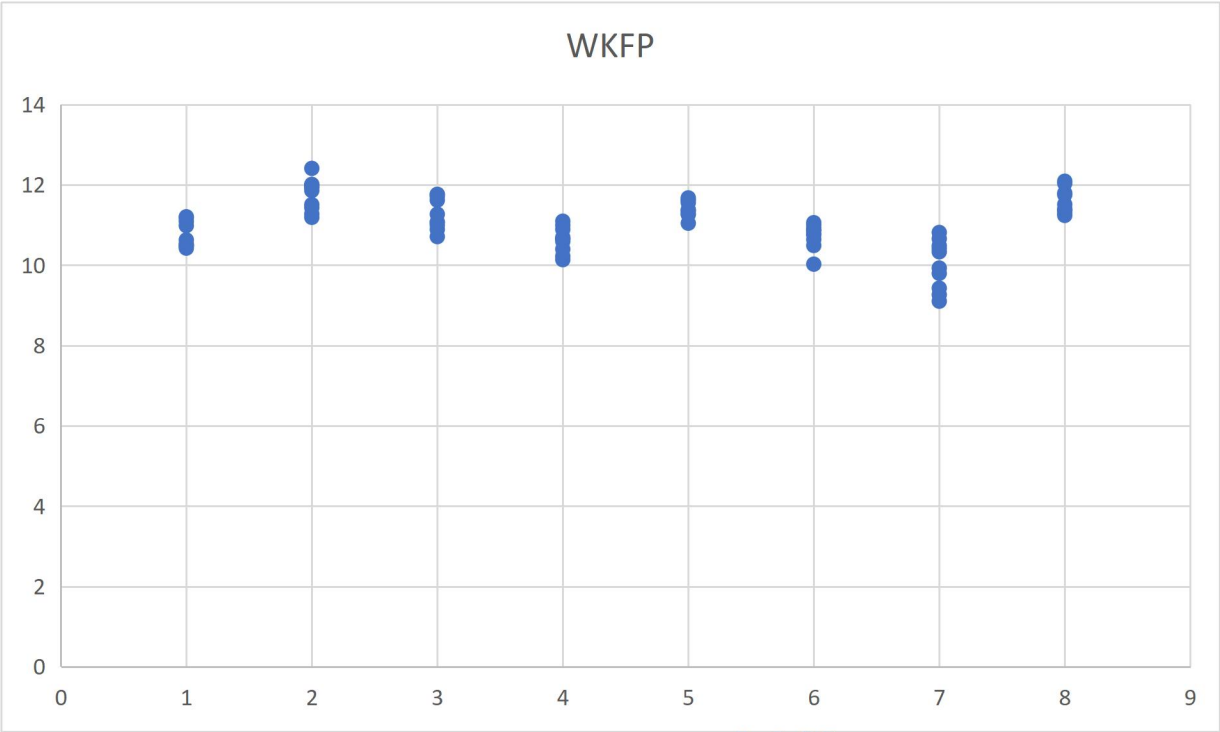
```

Regression with Driscoll-Kraay standard errors   Number of obs   =    80
Method: Random-effects GLS regression           Number of groups =    8
Group variable (i): id                          Wald chi2(4)    =  320.99
maximum lag: 2                                  Prob > chi2     =   0.0000
corr(u_i, Xb) = 0 (assumed)                    overall R-squared = 0.3439
  
```

prof	Drisc/Kraay				
	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
invt	.0134947	.0058659	2.30	0.047	.0002252 .0267642
wkfp	.0564355	.0207576	2.72	0.024	.0094785 .1033925
castr	-.0027653	.0004298	-6.43	0.000	-.0037374 -.0017931
inf	-.0065818	.0027649	-2.38	0.041	-.0128364 -.0003272
_cons	-.4903132	.2029928	-2.42	0.039	-.9495147 -.0311117
sigma_u	.05371217				
sigma_e	.05823917				
rho	.45962878	(fraction of variance due to u_i)			

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Biodata

A. Personal Data

Full Name: Adeolu Ayodeji ADELODUN
Address: No. 4, General Popoola Street, Onikoko Close, Agodi GRA, Ibadan
E-mail: adeolu_aa@hotmail.com
Phone No: +2347058441020
Date of Birth: April 30, 1980
Place of Birth: Atiba LG, Oyo State
Nationality: Nigeria
Next of Kin: Adelodun Titilayo
No. 4, General Popoola Street, Onikoko Close, Agodi GRA, Ibadan

B. Educational Background

Educational Institutions Attended with Dates and Qualifications

- MSc. Production and Operations Management – Lead University, Ibadan (In view)
- BSc. Information Systems and Management – University of London, UK 2010
- Adv. Diploma Industrial Automation – Engineering Institute of Technology, Aus. 2012
- HND Electrical Electronic Engineering – The Polytechnic, Ile Ife 2018
- OND Electrical Engineering – The Polytechnic, Ibadan 1998
- S.S.C.E – Wesley College of Science, Elekuro, Ibadan 1997

C. Working Experience with Dates

- EFTPrints Ltd (Founder/Board Member) 2015 – Till Date
- Sasol Petrochemicals Pty, South Africa (Process Controller) 2005 – 2008
- Gulf Piping Company Ltd, United Arab Emirate 2008 - 2009

D. Membership of Academic and Professional Bodies

- i. Member, International Institute of Business Analysis (IIBA)
- ii. Member, American Society for Quality

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University Compliance Certificate

This is to certify that this thesis written by Adeolu Ayodeji Adelodun with matriculation number LCU/PG/001562 in the Department of Management and Accounting, Faculty of Management and Social Science, Lead City University, Ibadan is in compliance with the approved University format and style.

Signature

Date

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