

# Effective Supply Chain Management: A Strategic Tool for Profitability Enhancement in the Competitive Marketing Environment (An Empirical Evidence in the Nigerian Food and Beverage Industry 2005 - 2014)

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## Abstract

To compete successfully in today's fierce and challenging business environment, companies need to focus on supply chain management components that have impact in enhancing profitability. The study examined Effective Supply Chain Management: A Strategic tool for Profitability Enhancement in the Competitive Marketing Environment ( An Empirical Evidence in the Nigerian Food and Beverage Industry 2005-2013). The problem x-rayed here stems from the huge cost burden and poor performance of industries in Nigeria which was made manifest by its low Profit After Tax and poor contribution of 6% to the Gross Domestic product (GDP) and also holding the fact that many firms have gone extinct from the marketing environment and only four companies (Honeywell flour mills Plc, Flour mills of Nigeria Plc, Northern Nigeria Flour Mill Plc and Lafarage Dangote Flour Mill Plc) control 50% of the entire flour mills market share among the 22 surviving firms. The major objective of this study is examining the relationship between Supply Chain Management cost components and Profitability of Food and Beverage industry in Nigeria and their impact on firm's survival as measured by the Profit After Tax (PAT) and other source document. Specifically, the objectives were to; examine the nature of relationship existing between supply chain management and profitability of the flour mills, ascertain if the volume of Goods in Transit affects the profitability of the flour mills and ascertain the supply chain management strategy/model adopted by the selected flour mills. Data collected from Annual reports of various issues were analyzed using inferential statistics such as Pearson correlation model and simple regression analysis. The results of the findings showed firms after investing heavily in their supply chain component does not reflect significantly in their profitability. The study concludes that there is a significant relationship between Effective SCM and Profitability growth, that to ensure sustainable supply chain management operation which will ensure increased profitability in the industrial sector, Supply Chain operational inefficiencies ultimately will have adverse effects upon profits. Turning the situation round, difference in the efficiency of the inventory control for a given level of flexibility affects the level of investment required in inventory. The less efficient is the inventory control, the greater is the investment required. Excessive investment in inventories increase cost and reduce profits, thus, the effects of inventory control of flexibility and on level of investment required in inventories represent two sides of the same coin. This will also help in reducing the high cost burden which lies on the ability to reduce production cost Various recommendations were made which includes that production firms should adopt the SCM integration model that was specified in the study, to become competitive strategic weapon in such a way that it enhances their sales and profitability and also should adopt the Supply chain strategy/models that was developed in this study as it will best align with their operations and target customers, supply chain operations must abandon fragmented approaches.

## INTRODUCTION

The business terrain in which firms operate has witnessed tremendous change in the past in terms material sourcing, customer satisfaction, inventory management and overall profitability. The level of globalization, which entails that many organizations find themselves operating in a highly competitive international market and the use of highly advanced strategy and technologies have challenged the very basic principles and ideologies of business management and marketing Management. To compete in a global environment, therefore, organizations have had to change in order to sustain growth and break new frontiers. As a result, most industries have transformed completely from manual processes to complicated, automated and computerized technologies and strategies (Minoli, 2005).

Firm's have to keep abreast of their supply chain cost component and its relationship with their profitability because to a reasonable extent, their continued growth wholly depends on these factors. SCM integrates functions with primary responsibility of linking major business functions and processes within and across companies into a cohesive and high performing business model. It includes all the logistics management

activities noted above, as well as manufacturing operations. It drives coordination of processes and activities within and across marketing sales, product design, finance and information technology. Supply chain management is a major issue in many industries as firms realize the importance of creating an integrated relationship with their suppliers and consumers. Managing the supply chain has become a way of improving competitiveness by reducing uncertainty of material handling and enhancing customer service. SCM is a cross-functional approach that includes managing the movement of raw materials into an organization, certain aspects of the internal processing of materials into finished goods, and the movement of finished goods out of the organization and toward the end consumer. As organizations strive to focus on core competencies and becoming more flexible, they reduce their ownership of raw materials sources and distribution channels. These functions are increasingly being outsourced to other firms that can perform the activities better or more cost effectively. The effect is to increase the number of organizations involved in satisfying customer demand, while reducing managerial control of daily logistics operations. Less control and more supply chain partners led to the creation of the concept of supply chain management. The purpose of supply chain management is to improve trust and collaboration among supply chain partners, thus improving inventory visibility and the velocity of inventory movement.

Main functions of Supply Chain Management are as follows:

- Inventory Management
- Distribution Management
- Channel Management
- Payment Management
- Financial Management
- Supplier Management
- Transportation Management
- Customer Service Management (Palmer, 2000).

Supply chain occurs where two or more parties are linked by a flow of resources. The parties involved in a supply chain do not need to be two different firms; they can be different departments, divisions or even key people within an organization. The concept of supply chain is concerned with managing coordinated information and material flows, plant operations and logistics. It provides flexibility and agility in responding to consumer demand shift without cost overlay in resource utilization. The fundamental premise of this philosophy is; Synchronization among multiple autonomous business entities represented in it (David, 2010). That is, improved coordination within and between various supply-chain members. Increased coordination can lead to reduction in lead time and costs, alignment of interdependent decision-making processes and improvement in the overall performance of each member as well as the supply chain (David, 2004).

Supply chain management is a system of organization of people, technology, activities, information and resources involved in moving a product or service from suppliers to customers. Supply chain activities transforms natural resources, raw materials and components into finished product that is delivered to end users (Anyanwu, 2000). Supply chain management professionals ensure that the desired product is available to the customer in the right condition and quantity and at the right time, place, and cost. To perform this function efficiently, firms need to coordinate logistics, transportation, warehouse location and operation, inventory management, packaging and other functions in a cost effective manner. In this age of globalization, supply chain management professionals actively operate at the hub of an organization, interacting regularly with all other departments in the firm, including sales and marketing, finance, and operations, and with suppliers and customers located around the world. The focus of Supply Chain Management is on the application of models to increase the efficiency of organizations.

Supply chain management is the management of materials and information flow in a firm to provide the highest degree of customer satisfaction at the lowest possible cost (Palmer, 2012). It requires the commitment of supply chain partners to work closely to coordinate order generation and order fulfillment. They thereby create an extended enterprise spreading far beyond the producer's location. Also SCM is the process of obtaining and managing of products or services needed to operate a business or other types of organizations. Elements of supply management include the actual products, information, budgets and employees. The SM procedures are to keep cost stable and use resources effectively to increase the profits and efficiency of the business or organization (Business Dictionary, 2012).

Nigeria may have the largest domestic market in Africa and may be attracting greater Foreign Direct Investment (FDI) than ever before, but its manufacturing sector has been experiencing downturn. When flour production started in the country, there was a general consensus that it was necessary for the country's ambitious industrial programme at the time. Flour production was seen as very important to the transfer of technology in Nigeria (Alu, 2011).

There was the argument that the difference between developed and developing countries at the time

was Industrialization, underlined by technology and infrastructure. To industrialise therefore, one must have the technology and the required infrastructure (Leadership, 2001).

The establishment of Food and Beverage factories in Nigeria was also thought to be very critical to the exploitation of local raw materials which the country had in abundance. Government of the day had told whoever cared to listen that industrialization was critical for economic growth. Unfortunately, over the years, a combination of power problems, poor infrastructure, and poor knowledge of Supply chain management, importation of cheap but sometimes better substitutes, policy inconsistencies- especially on tariffs, poor customer satisfaction, delay in lead-time and response time, poor platform for Microeconomic efficiency and uncompetitive business environment have led to the decline of Food and Beverage operations and general manufacturing (NigeriaGallary, 2012).

The Nigerian flour milling industry which is a sub-sector of the Food and Beverage industry comprises of 22 milling stations owned by 11 milling groups in Nigeria. The dominant players in the industry are; Flour Mills of Nigeria Plc, Dangote Flour Mills, Ideal Flour Milling group (comprising of Ideal flour mills, Nigeria Eagle Flour Mills, Niger Delta Flour Mills, Port-Harcourt Flour Mills and Grand Moulin's du Benin) Crown Flour Mills, currently in Merger and Acquisition talks with Interstate Flour Mills and Mix & Bake Flour Mills, Honeywell Flour Mills, and Standard Flour Mills. Flour milling is one out of all the other product categories that command wide spread patronage across all the zones of the country (CSLS, 2011). Flour milling appears to be one of the few agro based industries, which has withstood the harsh Nigerian economic environment; however capacity utilization is averaged below 40% (BGL, 2008). There are a few industry characteristics which magnify the differences from other business sectors. These include operations management and Supply Chain Management.

First of all, revenue and profits are driven solely by market share and efficiency, therefore success is determined mainly by the ability of a company to ensure superior capacity utilization. In addition, the Nigerian Flour Industry has developed into an oligopoly with few firms able to set product prices contrary to the expectations of the Flour Millers Association. The success of firms in this industry depends on their ability to gain market share and run an optimized supply chain management outfit, and this can only be achieved bases on increased capacity and aggressive marketing of products. The industry is marred by low profit margins, as a result of very high cost burdens, so the ability of a company to reduce production costs while increasing product output would largely determine market gain.

Most of the firms in the Flour Mill industry are in the mature stage of their life cycle. The capacity of the industry far exceeds current flour demand in Nigeria. Capacity utilization is currently at about 40% (CSLS, 2011). There is overcapacity in the industry as capacity far outweighs the demand for flour. The industry is highly competitive; this has led to price cutting, customized bread shapes for aesthetic appeal and increase in bread sizes to attract the consumer who has a wide variety of bread to choose from. This industry is definitely a buyers' market. Every flour miller is trying to produce more to sell more to break even or seek out a profit. The number of millers exceeds the demand within the country. This has led to lower returns on average per miller. The major players in the industry are Flour Mills of Nigeria Plc, Honeywell Flour Mills Plc, Lafarge Dangote Flour Mills Plc and Northern Nigerian Flour Mills Plc. They make up about 50% of the market leaving the other 18 flour mills to battle for about 50% of the market share. Most of the flour mills operating in the country are localized in nature which enables them to remain afloat because majority of their customer base are within the neighborhood (Sterling Capital, 2013).

## **OBJECTIVES OF THE STUDY**

The major objective of this study is examining the relationship between Supply Chain Management cost components and Profitability of Food and Beverage industry in Nigeria and their impact on firm's survival as measured by the Profit After Tax (PAT) and other source document. Specifically, the objectives were to;

- i. Examine the nature of relationship existing between supply chain management and profitability of the flour mills.
- ii. Ascertain if the volume of Goods in Transit affects the profitability of the flour mills.
- iii. Ascertain the supply chain management strategy/model adopted by the selected flour mills.

The following null Hypotheses will be tested in this study;

- a)  $H_{01}$ : Supply Chain Management has no significant effect on Firms profitability.
- b)  $H_{02}$ : supply chain management cost has no significant effect on the level of profitability of the flour mills

## **THEORITICAL REVIEW**

### **Overview of the Flour Mill Industry in Nigeria**

The flour milling industry comprised of 22 players segmented on the basis of their installed capacity. The top

four players have an installed capacity of approximately 15,360 metric tones per day and control over 50% of the market. The main raw material in the flour milling industry is wheat, with just about 3% of domestic input; the remaining 97% are imported from outside the country. The surge in the prices of wheat at the international market has adversely affected the operations of flour milling companies in Nigeria. However, with bread becoming the staple food in most homes, the demand for flour and consumption of bread is expected to continue to rise. Also as a result of the increase in the number of fast food restaurants, the demand for bread, pastries, sandwiches and other flour based products is on the increase (Sterling Capital, 2013).

The key success factor for players in the industry is the ability to gain market share and this can be achieved by increased capacity and aggressive marketing of products in addition to good distribution network. The industry is marred by low profit margins as a result of high cost burdens, as such the ability of a company to reduce production costs, while increasing product output would largely determine profitability. The industry suffers from infrastructures, high operation cost, exchange rate volatility and stiff competition. As a strategy to encourage local production of inputs, government has implemented import substitution policy through tax and tariff protection. However, this has further impacted on production costs, leading to further reduction in margin. Some of the measure recently put in place by government includes the following; - Tariff Protection - to encourage local manufacturers, FG imposed a 60% import duties on flour, while only a 10% import duty is payable on raw wheat. - Cassava inclusion policy - Local flour millers have been mandated to include a minimum of 5% cassava flour into wheat flour (BGL, 2013).

The last few years have seen flour consumption increase in the country. Given the demographic composition of Nigeria and rising income levels as well as the changing trends, it is expected that demand for flour based products will grow in the foreseeable future. We expect medium to long term profitability to be based on brand quality, economies of scale, strategic integration, increased capacity and expansion drive going forward. Flour milling companies consists of four main producers quoted on the Nigerian Stock Exchange which includes; Lafarge Dangote Flour Mills Plc, Flour Mills of Nigeria Plc, Honeywell Flour Mill Plc and Northern Nigeria Flour Mill Plc. Quoted flour milling companies have a total installed capacity of 15,360 metric tones per day (CSLS, 2007).

#### **Profit and profitability**

Sometimes, the terms 'Profit' and 'Profitability' are used interchangeably. But in real sense, there is a difference between the two. Profit is an absolute term, whereas, the profitability is a relative concept. However, they are closely related and mutually interdependent, having distinct roles in business. Profit refers to the total income earned by the enterprise during the specified period of time, while profitability refers to the operating efficiency of the enterprise. It is the ability of the enterprise to make profit on sales. It is the ability of enterprise to get sufficient return on the capital and employees used in the business operation.

As Weston & Brigham (2006) rightly notes "to the financial management profit is the test of efficiency and a measure of control, to the owners a measure of the worth of their investment, to the creditors the margin of safety, to the government a measure of taxable capacity and a basis of legislative action and to the country profit is an index of economic progress, national income generated and the rise in the standard of living", while profitability is an outcome of profit. In other words, no profit drives towards profitability. Firms having same amount of profit may vary in terms of profitability. That is why Khan *et al.*, (2003), has rightly stated, "Profit in two separate business concern may be identical, yet, many a times and it usually happens that their profitability varies when measured in terms of size of investment".

#### **UNDERSTANDING SUPPLY CHAIN MANAGEMENT**

Global supply chain forum sees SCM as the integration of key business processes across the supply chain for the purpose of creating value for customers and stakeholders (Lambert, 2008). A supply chain is a network that includes vendors of raw materials, plants that transform those materials into useful products, and distribution centers to get those products to customers (Carlson, 2005). Without any specific effort to coordinate the overall supply chain system, each organization in the network has its own agenda and operates independently from the others. However, such an unmanaged network results in inefficiencies. For example, a plant may have the goal of maximizing throughput in order to lower unit costs. If the end demand seen by the distribution system does not consume this throughput, there will be an accumulation of inventory. Clearly, there is much to be gained by managing the supply chain network to improve its performance and efficiency (Collins, 2003).

A supply chain is a network of organizations performing various processes and activities to produce value in the form of products and services for the end customer (Christopher, 1992). The dual purposes of SCM are to improve the performance of an individual organization as well as that of the entire supply chain (Li, *et al.*, 2006). Bowersox & Closs (1996) argue that to be fully effective in today's competitive environment, firms must expand their integrated behaviour to incorporate customers and suppliers. This extension of integrated behaviours, through external integration, is referred to by Bowersox & Closs (1996) as supply chain management. Thus SCM integrates both information flow and the flow of goods seamlessly between trading

partners as an effective competitive weapon (Childhouse & Towill, 2003; Feldmann & Muller, 2003). The main reason and objective of SCM is to provide a strategic weapon to build up and enhance sustainable competitive advantage by cost reduction without compromising customer satisfaction (Mentzer, *et al.*, 2001).

### **The bullwhip effect of Flour Mills sector in Nigeria**

A problem frequently observed in unmanaged supply chains in the Flour Mills is the bullwhip effect. This effect is an oscillation in the supply chain caused by demand variability. This problem must be addressed in order to avoid the poorer service and higher costs that stem from it. An unmanaged supply chain is not inherently stable. Demand variability increases as one move up the supply chain away from the retail customer, and small changes in consumer demand can result in large variations in orders placed upstream. Eventually, the network can oscillate in very large swings as each organization in the supply chain seeks to solve the problem from its own perspective. This phenomenon is known as the bullwhip effect and has been observed across most industries, resulting in increased cost and poorer service (Hines, 2004).

#### **2.1.6.1 Causes of the bullwhip effect in the Flour Mills Industries**

Sources of variability in the Flour Mill industries in Nigeria can demand variability, quality problems, strikes, plant fires, etc. Variability coupled with time delays in the transmission of information up the supply chain and time delays in manufacturing and shipping goods down the supply chain create the bullwhip effect. The following can contribute to the bullwhip effect:

- Overreaction to backlogs of the Flour Millers
- Neglecting to order in an attempt to reduce inventory in the industry
- No communication up and down the supply chain
- No coordination up and down the supply chain
- Delay times for information and material flow in supply of wheat
- Order batching - larger orders result in more variance. Order batching occurs in an effort to reduce ordering costs, to take advantage of transportation economics such as full truck load economies, and to benefit from sales incentives. Promotions often result in forward buying to benefit more from the lower prices.
- Shortage gaming: customers order more than they need during a period of short supply, hoping that the partial shipments they receive will be sufficient.
- Demand forecast inaccuracies: everybody in the chain adds a certain percentage to the demand estimates. The result is no visibility of true customer demand.
- Free return policies (Lambert, 2008).

#### **Countermeasures to the bullwhip effect**

While the bullwhip effect is a common problem, many leading companies have been able to apply countermeasures to overcome it. Here are some of these solutions:

1. Counter measures to order batching: High order cost is countered with Electronic Data Interchange (EDI) and computer aided ordering (CAO). Full truck load economies are countered with third-party logistics and assorted truckloads. Random or correlated ordering is countered with regular delivery appointments. More frequent ordering results in smaller orders and smaller variance. However, when an entity orders more often, it will not see a reduction in its own demand variance - the reduction is seen by the upstream entities. Also, when an entity orders more frequently, its required safety stock may increase or decrease; see the standard loss function in the Inventory Management section (David, 2010).
2. Counter measures to shortage gaming: Proportional rationing schemes are countered by allocating units based on past sales. Ignorance of supply chain conditions can be addressed by sharing capacity and supply information. Unrestricted ordering capability can be addressed by reducing the order size flexibility and implementing capacity reservations. For example, one can reserve a fixed quantity for a given year and specify the quantity of each order shortly before it is needed, as long as the sum of the order quantities equals to the reserved quantity (David, 2010).
3. Counter measures to fluctuating prices: High-low pricing can be replaced with everyday low prices (EDLP). Special purchase contracts can be implemented in order to specify ordering at regular intervals to better synchronize delivery and purchase (Sherer, 2005).
4. Counter measures to demand forecast inaccuracies: Lack of demand visibility can be addressed by providing access to point of sale (POS) data. Single control of replenishment or Vendor Managed Inventory (VMI) can overcome exaggerated demand forecasts. Long lead times should be reduced where economically advantageous (Sherer, 2005).
5. Free return policies: These are not addressed easily. Often, such policies simply must be prohibited or limited and as the Nigeria Flour Millers should strive to address such policy (David, 2009).
6. Supply chain structure
7. The performance of a supply chain is measured in terms of profit, average product fill rate, response

- time, and capacity utilization (Johnson *et al.*, 2008).
8. Profit projections may improve if another parameter like promotional and operational expenses is relaxed, but one must consider the impact of all aspects of the relaxed parameter on profits. For example, if customers are lost because response time is too slow, then the profit projections may be artificially high.
  9. Average fill rate can be improved by carrying more inventories in order to reduce stock-outs. The optimal balance must be achieved between inventory cost and lost profits due to stock-outs. Response time often can be improved at the expense of higher overall costs. As with fill rate, the optimal trade-off should be found. If response time is sacrificed in order to achieve higher profits, sales forecasts may have to be modified if the elasticity of demand with respect to service is significant at the chosen service levels (Harland *et al.*, 2007).
  10. Capacity utilization should be high enough to reduce overhead sufficiently, but not so high that there is no room to grow or to handle fluctuations in demand. Problems often are encountered when capacity utilization exceeds 85%. Lower capacity utilization in effect buys an option for increased output in the future. Higher capacity utilization decreases downside risk since costs are reduced, but also limits the upside gain if future demand should outstrip supply (Kurtz, 2008).

### **SUPPLY CHAIN MANAGEMENT SOFTWARE**

This includes tools or modules used to executing Supply chain transactions, manage suppliers relationship and control associated business process. Supply chain event management (SCEM) is a consideration of all possible event and factor that can disrupt a supply chain. With SCEM possible scenarios can be created and solution devised (Jobber, 2007).

Supply chain management software (SCMS) is a business term which refers to a whole range of software tools or modules used in executing supply chain transaction, managing supplier relationships and controlling associated business processes (Gattorna, 2013). While functionality in such system can often be broad and it commonly by application includes;

1. Supply Chain Execution
  - Warehouse management
  - Transportation management
  - Logistics
  - Fleet management
2. Contract lifecycle
3. Demand planning
4. Order fulfillment
5. Product lifecycle management
6. Procurement systems
7. Sales and operations planning
8. Supply chain planning
9. Supplier relationship management
10. Strategic sourcing
11. Vendor managed inventory (Stadler & Kilger, 2008).

A requirement of many supply chain management software (SCMS) often include forecasting. Such tools often attempt to balance the disparity between supply and demand by enhancing business processes and using algorithms and consumption analysis to efficiently plan future needs. SCMS also often include integration technology that allows organizations to trade electronically with supply chain parties.

The ten most reviewed Supply chain management software systems include;

- i. Fishbowl
- ii. Qstrat
- iii. Uroute
- iv. Snap Fulfil
- v. Ramp Sytems
- vi. Procurify
- vii. eBid Systems
- viii. Made4net
- ix. Jda
- x. 3PL Central.

These softwares are available at Amazon online stores and other stores. While the SCMS market is relatively small when compared to other market, the vast disparity in functionality between different SCM programs makes buying decisions much more complicated. Some programs concentrate on business intelligence while others

focus on inventory control or transportation management and there are full-suite systems that do all of the above and more.

### **2.2.1 Benefits of supply chain management software**

The benefit that firms will derive from the functional application of SCMS includes;

- i. Increased efficiency: Supply chain management software is designed to enhance the efficiency of company's operation ranging from inventory check-in and storage to distribution and transportation. By making the processes electronic and/or automated, the time spent on these tasks drops considerably, which shortens the lead time.
- ii. Reduced huge cost burden: The resulting efficiency reduces labour cost. In addition, many of the intelligence features are specifically designed to identify cost waste and its elimination thereof. For instance, where raw materials can be sourced at a lower rates, how to combine modes of transportation to reduce transportation cost and investment or where to reduce inventory to maximize storage capacity.
- iii. Trend analysis and business intelligence: The intelligence features, in addition to helping control costs, can also help improve profitability in the industrial sector by identifying strongly performing products and guiding the users towards meeting market demand. While Supply chain solutions do come with a price, proper implementation will usually lead to a calculable return on investment (Profitability) over the period.

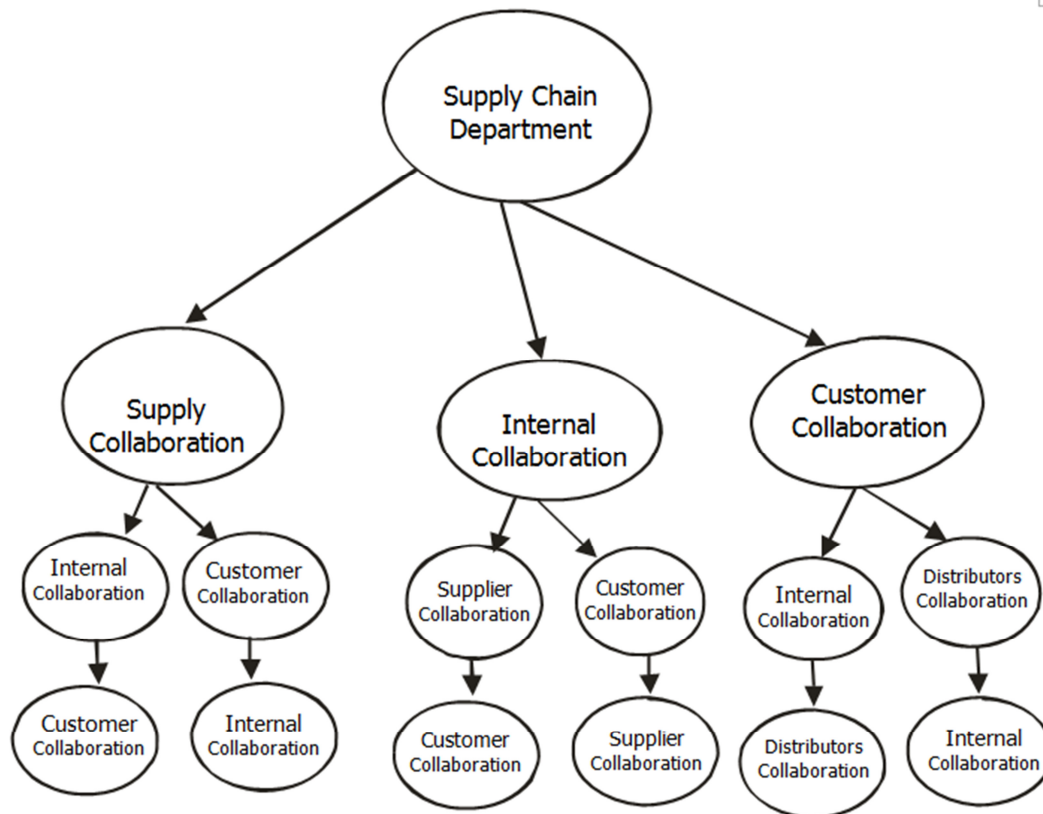
### **IMPORTANCE OF SUPPLY CHAIN MANAGEMENT**

Organizations increasingly find that they must rely on effective supply chain, or networks, to compete in the global market and networked economy. During the past decades (1990-2000), globalization, outsourcing and information technology have enabled many organizations, such as Nigeria Bottling Company Plc to successfully operate solid collaborative supply networks in which each specialized business partner focuses on only a few key strategic activities (Somuyiwa *et al.*, 2011). This inter-organizational supply network can be acknowledged as a new form of organization. However, with the complicated interactions among the players, the network structure fits neither "market nor hierarchy" categories (Powell, 1990). It is not clear what kind of performance impacts different supply network structures could have on firms, and little is known about the coordination conditions and trade-offs that may exist among the players. From a systems perspective, a complex network structure can be decomposed into individual component firms (Zhang & Dilts, 2004). Traditionally, companies in a supply chain network concentrate on the inputs and outputs of the processes, with little concern for the internal management working of other individual players. Therefore, the choice of an internal management control structure is known to impact local firm performance.

In the 21<sup>st</sup> Century, changes in the business environment have contributed to the development of supply chain networks. First, as an outcome of globalization and the proliferation of multinational companies, Joint venture, strategic alliances and business partnerships, significant success factors were identified, complementing earlier "Just-In-Time", "Lean manufacturing" and "Agile Manufacturing" practices. Secondly, technological changes, particularly the dramatic fall in information communication costs, which are significant component of transaction costs, have led to changes in coordination among the members of the supply chain network (Cox, 2004).

Many researchers have recognized these kinds of supply network structures as a new organization form, using terms like "Keiretsu", "Extended Enterprise", "Virtual Corporation" "Global production Network", and "Next generation manufacturing system". In general, such a structure can be viewed as "a group of semi-independent organizations, each with their capabilities which collaborate in ever-changing constellations to serve one or more markets in order to achieve some business goals, specific to that collaboration".

**Proposed Supply Chain management integration model for Nigeria Flour Mill industry**



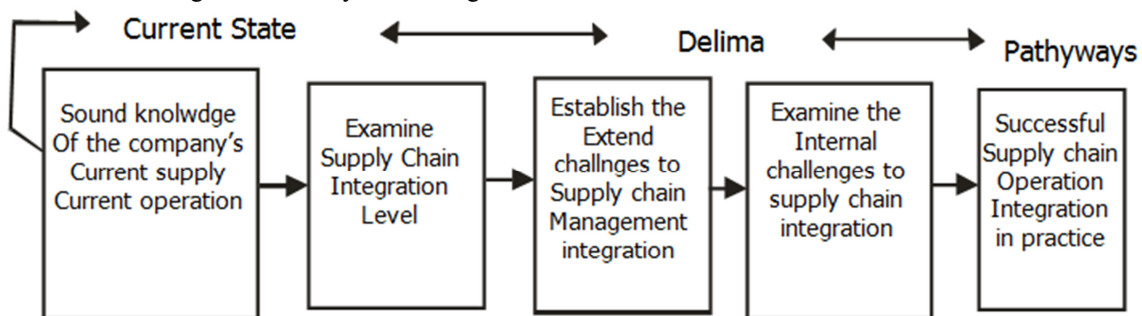
Source: Author

**Fig. 2: Proposed Supply chain management integration model for Nigeria Flour Mill industry**

The operations of Flour Mills in Nigeria shows that value stream faces higher uncertainty from demand angle rather from the supply dimension, a finding that contradicts the research of findings of Frohlich and Westbrook (2001) who concluded that companies tend to collaborate with customers first, before focusing on the supply side. From my critical examinations, there exists more than a single path to a sustainable seamless supply chain which can be seen from figure 2 above in the proposed model which consists of six distinct trails. The proposed model of supply chain integration can be used to attain a significant level of sustainable supply chain efficiency and effectiveness. At the top is the non-integrated supply chain stage. The flour mills that are at this non-integrated stage may choose to integrate internally or externally first. Once this stage is put in place, the other streams of integration areas are tackled until the sustainable seamless supply chain is attained. This will go a long way in reducing the huge cost burden that has hampered the industrial operations over the years.

**2.7.4 Supply chain integration guiding model for the manufacturing industry**

For successful implementing the model in figure 3, the company must make use of this guiding model so as to have full knowledge of what they are dealing with.



Source: Author

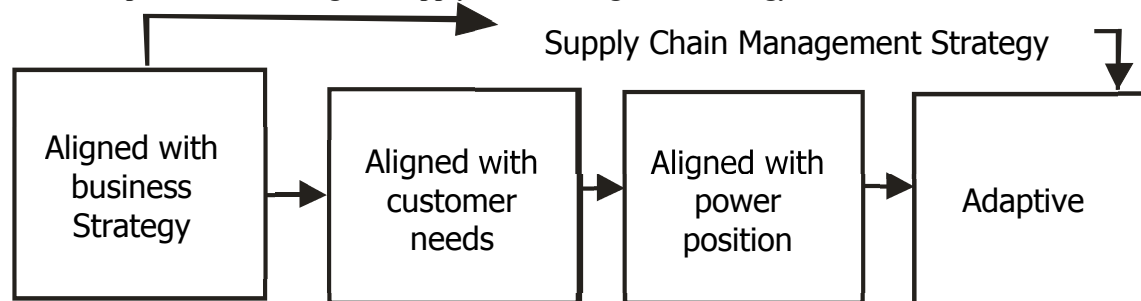
**Fig. 3: Supply chain integration guiding model for the manufacturing industry**

The model above simply shows the process for manufacturing firms and academia on the pathway towards putting in place and onward actualization of sustainable supply chain management integration in their



operations. Thereby, providing industrial players and academia with SCM sound integration guidance for each identified step. It shows the flow of a five stage process which starts from having sound knowledge of the company's current supply chain operations to the critical examination of the supply chain integration level in the company; establishing the external challenges thereof, then putting in place a successful Supply chain integrated operations in practice that will go a long way in reducing the lead time and also reduce the cost of production.

#### 2.7.10 Proposed criteria for good Supply chain management strategy



Source: Author

**Fig. 4: Proposed model for good supply chain management strategy**

The model above in figure 4, shows the sequential trails for choosing a good supply chain management strategy and it is made up of four stages. At the first stage which is aligning the SCM strategy with the overall business strategy, thereby defining the basis of competition. Followed by the alignment with customer needs and this entails ensuring that the overall market winning criteria is defined in terms of market offering and service level. Followed by alignment with power positions which entails bundling of sourcing volume with other flour mill segments, develop SCM operations to assume global presence and establishing/maintaining strong relationship with key customers. And finally, the adaptive stage which entails that the relationship among companies/department in the internal supply chain are adopted in line with the changing environment and the use of advance technology (SCM softwares) in the internal supply chain. These, if fully implemented will enhance the smooth operation of the predetermined business strategy and in the long run, ensure a sustainable supply chain in the company.

## 2.8 THEORIES OF SUPPLY CHAIN MANAGEMENT

Currently there is a gap in the literature available on supply chain management studies; there is no theoretical support for explaining the existence and the boundaries of supply chain management. Few authorities like Ketchen & Hult (2006), Halldorsson, *et al.*, (2004), Benton & maloni (2005) and Lavassani *et al.*, (2009) have tried to provide theoretical foundations for different areas related to supply chain by employing organizational theories. These theories include;

- 1) Resource-Based View (RBV)
- 2) Transaction Cost Analysis (TCA)
- 3) Knowledge-Based View (KBV)
- 4) Strategic Choice Theory (SCT)
- 5) Agency Theory (AT)
- 6) Institutional Theory (InT)
- 7) System Theory (ST)
- 8) Network Perspective (NP)
- 9) Materials Logistic Management (MLM)
- 10) Just-In-Time (JIT)
- 11) Material Requirement Planning (MRP)
- 12) Theory of Constraints (TOC)
- 13) Performance Information procurement system (PIPS)
- 14) Performance Information Risk Management System (PIRMS)
- 15) Total Quality management (TQM)
- 16) Agile Manufacturing
- 17) Time Based competition (TBC)
- 18) Quick Response Manufacturing (QRM)
- 19) Customer Relationship Management (CRM)
- 20) Requirement Chain Management (RCM)
- 21) Available-to-promise (ATP) and many more.

However, the unit of analysis of the most theories is not the system "Supply Chain", but another system such as the "firm" or the "Supplier/buyer relationship". Among the few exception, is the relational view which outlines a

theory for considering dyads and networks of firms as a key unit of analysis for explaining superior individual firm performance (Dyer & Singh, 2008).

**METHODOLOGY**

Secondary sources of data were used for this study; particularly the 2005 to 2013 annual reports of Honeywell Flour Mills Plc and Flour Mills of Nigeria Plc. They constituted the main sources of secondary data used in the study.

In order to analyze the data sourced for this study and achieve the objectives of the study some statistical and econometric tools were adopted. Objective one was analyzed using Pearson correlation analysis, objective two was analyzed using simple regression model while objective three analyzed using multiple regression analysis.

Pearson Correlation Model for objective one is stated as follows

$$r = \frac{n \sum XY - \sum X \sum Y}{\sqrt{[n(\sum X^2) - (\sum X)^2] - [n(\sum Y^2) - (\sum Y)^2]}}$$

Where:

r= correlation coefficient

x= cost of supply chain management in naira

y= profit after tax in naira

n= Number of years

For objective two, the simple regression models are specified thus;

$$y_1 = b_0 + b_1 x_1 + e_i \dots \dots \dots (2)$$

Where

y<sub>1</sub>= profit after tax in naira

x<sub>1</sub> = cost of Goods in Transit in naira

B<sub>i</sub> = the parameter

E<sub>i</sub> = the error term

**DATA PRESENTATION AND INTERPRETATION**

This section shows the data collected and is presented and analyzed using tables. The representation and analysis are done bearing in mind the research objectives/questions which guided the study and the hypotheses of the study. Data are presented and analyzed together for the both companies and the years involved. The Annual report document for nine study years formed the secondary data for the study.

**The nature of the relationship existing between the supply chain management and the profitability of Honeywell flour mill Plc.**

The Pearson’s correlation results of the nature of relationship existing between the supply chain management and profitability of Honeywell Flour mill as presented in table 4.7.

**Table 4.1: Analysis on nature of the relationship existing between the supply chain management and profitability of Honeywell flour mill Plc.**

	Profit after tax	Cost of supply cost
Profit after tax	1	
Cost of supply chain	0.823**	1

Note: \*, \*\* and \*\*\* Implies 10%, 5% and 1% significance level respectively.

Source: Computed from the annual report of Honeywell Flour Mills Plc various issues.

The correlation coefficient of 0.823 existing between the supply chain management and profitability of the flour mill shows that there is a strong positive significant relationship existing between the two variables. This result substantiates the initial result on the effect of supply chain management on the profit of Honeywell Flour mill Plc. The increase in the total resources committed to the supply chain management process translates to sustained profit growth. This is due to the fact that sound supply chain management entails meeting the needs and demands of both the suppliers and the customers as at when due, as well as other short term financials and sales obligations as the fall due. This fosters a good relationship between the management, her suppliers and customers leading to the ability to get raw materials as at when due at an affordable cost and the sales to customer at a good price leading to the profitability of the firm. This conforms with Kurtz (2008) who was of the view that as the supply chain component cost increases, profit level in turn increases.

**The nature of the relationship existing between the supply chain management and the profitability of Flour Mill of Nigeria Plc.**

The Pearson's correlation results of the nature of relationship existing between the supply chain management and profitability of Flour Mill of Nigeria Plc as presented in Table 4.8.

**Table 4.2: Analysis on nature of the relationship existing between the supply chain management and profitability of Nigerian flour mill Plc.**

	Profit after tax	Cost of supply cost
Profit after tax	1	
Cost of supply chain	0.478*	1

Note: \*, \*\* and \*\*\* Implies 10%, 5% and 1% significance level respectively.

Source: Computed from the annual report of Nigerian Flour Mills Plc various issues.

The correlation coefficient of 0.478 existing between the supply chain management and profitability of Nigerian flour mill plc shows that there is a weak positive and significant relationship existing between the two variables. The correlation coefficient was 0.83 of Honeywell flour Mills, this result substantiates the initial result on the effect of supply chain on the profit of Flour Mill of Nigeria Plc. Anyanwu (2003) opined that in an organizational or product life cycle, there are different growth stages and once the company gets to its peak, its turnover will become static or start declining. The increase in the total resources committed to the supply chain management process translates to weak profit growth, this is due to the fact that holding too much stock affects the health of the firm negatively. Nigerian flour mill plc from the results so far have gotten to that maturity stage in their life cycle and so high increase in the cost of supply chain management only translates to a low growth in their profitability trend.

**THE EFFECT OF VOLUME OF GOODS IN TRANSIT ON THE ORGANIZATION'S PROFIT.**

The results of the analysis of the effect of volume of Goods in transit on the profitability of Honeywell flour mills Plc is presented in table 4.9.

**Table 4.3: Analysis of the effect of volume of goods in transit on Honeywell Flour Mill Plc**

	B (Coefficient)	Std. Error	t-value
(Constant)	369.001	4169163.543	2.905**
GOODS IN TRANSIT	5.135	1.407	3.649**
F statistics	13.317**		
R <sup>2</sup>	0.236		
Adjusted R <sup>2</sup>	0.219		

Source: Computed from the annual report of Honeywell Flour Mills Plc various issues.

Note: \*, \*\* and \*\*\* Implies 10%, 5% and 1% significance level respectively.

The simple regression model was statistically significant at the 5% level. Based on the F-statistics which was significant at the 5% level, the model had good fit and was used for discussion. The R<sup>2</sup> value of 0.236 indicated that 23.6% of the total variation in the dependent variable (profitability) was accounted for by the independent variable (Goods in transit).

The variable Goods in transit was statistically significant at 5% and positively relating to the profit level of the flour mills. This finding conforms to that of Tseng and Lin (2005) that concluded that the volume of an organizational goods in transit and finished goods goes a long way in determining the growth of the company's profitability.

**The effect of volume of goods in transit on Flour Mill of Nigeria Plc**

The results of the analysis of the effect of volume of Goods in transit on the profit of Flour Mill of Nigeria Plc is presented in Table 4.4

**Table 4.4: Analysis of the effect of volume of goods in transit on Flour Mill of Nigeria Plc**

	B (Coefficient)	Std. Error	t-value
(Constant)	7.332	3.443	2.1295382**
GOODS IN TRANSIT	9.897	3.126	3.1660269**
F statistics	6.857**		
R <sup>2</sup>	0.437		
Adjusted R <sup>2</sup>	0.312		

Source: Computed from the annual report of Flour Mill of Nigeria Plc various issues.

Note: \*, \*\* and \*\*\* Implies 10%, 5% and 1% significance level respectively.

The simple regression model was statistically significant at the 5% level based on the F-statistics (6.857\*\*) which was significant at the 5% level, the model had good fit and was used for discussion. The R<sup>2</sup> value of 0.437 indicates that 43.7% of total variation in the dependent variable (Profitability) was accounted for

by change in the independent variable (Volume of Goods in transit).

Goods in transit were statistically significant at 5% and positively related to profit of the Flour Mill of Nigeria Plc. This conforms to that of Benton (2007) who found that the high volume of goods in transit helps in reducing handling cost and to an extent and reduces damages of finished products. Further more, this in turn affects the annual profit positively. This simply means that holding the fact that Flour Mill of Nigeria Plc has reached the peak/maturity stage of their growth in the marketing environment, that profit can still be increased strongly through high volume of Goods in transit as this will drastically reduce handling and storage cost of the company and in the long run translate to increased profitability.

#### THE EFFECT OF SUPPLY CHAIN MANAGEMENT ON THE PROFITABILITY OF FLOUR MILLS .

The effect of supply chain management cost on the profitability of the leading flour mills are presented in this section.

**Table 4.5: The effect of supply chain management cost on the profitability of Honeywell Flour mills .**

	B (Coefficient)	Std. Error	t-value
(Constant)	-697322.081	228744.701	-3.048**
Cost of supply chain	0.036	0.004	9.496***
F statistics	90.168***		
R <sup>2</sup>	0.677		
Adjusted R <sup>2</sup>	0.670		

Source: Computed from the annual report of Honeywell Flour Mills Plc various issues.

Note: \*, \*\* and \*\*\* Implies 10%, 5% and 1% significance level respectively.

From Table 4.5, the simple regression model was statistically significant at the 1% level. Based on the F-statistic this was significant at the 1% level and the R<sup>2</sup> value of 0.677 which indicated that 67.7% of the total variation in the dependent variable (Profitability) was accounted for by the independent variable (Cost of supply chain management). The Model was found to be correct and of good fit, it was therefore used for discussion.

The cost of supply chain was statistically significant at the 1% level and positively related to the profitability of the flour mill. This clearly means that the increase in the resources used to sustain the supply chain (i.e from raw material to the point of sales) will lead to increase in the level of profitability of the flour mill. The management of Honeywell flour mill will ensure the sustenance of the supply chain and this translates to increased profitability. This is in conformity to Palmer (2000) that opined that enhanced Supply chain management is a tool for increased profitability.

#### The effect of supply chain management on the profitability of Nigerian Flour mills Plc.

The results of the analysis of the effect of supply chain management on the profitability of Nigerian flour mills Plc is presented in table 4.6.

**Table 4.6: Analysis of the effect of supply chain management cost on the profitability of Flour Mill of Nigeria Plc.**

	B (Coefficient)	Std. Error	t-value
(Constant)	3065593.875	1715135.578	1.787*
Cost of supply chain	.011	.004	2.721*
F statistics	7.402*		
R <sup>2</sup>	0.228		
Adjusted R <sup>2</sup>	0.198		

Source: Computed from the annual report of Flour Mill of Nigeria Plc various issues.

Note: \*, \*\* and \*\*\* Implies 10%, 5% and 1% significance level respectively.

From Table 4.6, the simple regression model was statistically significant at the 10% level. Based on the F-statistic which was significant at the 10% level and R<sup>2</sup> value of 0.228 which indicated that 22.8% of the total variation in the dependent variable (profitability) was accounted for by the independent variable (Supply chain management cost), the model was found to be of good fit and was therefore used for discussion.

The cost of supply chain was statistically significant at the 10% level unlike that of Honeywell where it was at 1%, and positively related to the profitability result for Flour Mill of Nigeria Plc showed a weak margin and poor growth. This clearly means that increase in the resources used for sustainable supply chain ( i.e from raw material procurement to the point of sales) will lead to a lower increase in the level of profitability of the flour mill. Despite the weak or low increase, the management of Nigerian flour mills will strive to ensure the sustenance of their supply chain for this to result to increased profitability. This also conforms to Palmer (2000) holds that cost of supply chain management when handled effectively leads to sustainable supply chain which contributes to increased profitability.

The supply chain model adopted by the industry under study was critically analyzed and it was

ascertained that it contributes to the high cost burden currently experienced by operator in the industry and to that effect, the researchers proposed models that will help in enhancing their operation so as to achieve their organizational objective and they include;

- i. Supply Chain integration model for the Food and Beverage Industry
- ii. Supply Chain Integration guiding models
- iii. Systematic criteria for a good supply chain strategy and also specified numerous SC software that could help in effective and efficient operations.

## CONCLUSION

Generally, the implications of the findings of this work based on the objectives as analyzed conclude that;

The determinants of supply chain management strategy/model, based on the  $R^2$  of 0.991 shows that 99.1% of the total variation in the dependent variable (cost of supply chain management) was accounted for by variation in the independent variable included in the model. Work in progress, raw materials, cost of sales, administrative expenses, finished goods and Goods in transit was negatively determining to the cost of supply chain for both firms. Competitive advantage which translates to high margin of profitability will exist if several key attributes exists in the supply chain. Sound supply chain management ensures increased efficiency and productivity and also improves the company's competitive advantage and customer satisfaction. Maintaining a strategic supply chain management will also ensure collection of market intelligence and developing cost-reduction programs. From the analysis of the Component of Honeywell Supply chain component, it was ascertained that the two flour millers who happen to be among the four key players in the industry, adopt efficient supply chain strategy/model.

Also on the nature of relationship existing between the supply chain management and profitability of Honeywell flour mills plc, the correlation coefficient of 0.823 and 5% level of significant implies that there is a strong correlation existing between the dependent and independent variables. While the correlation coefficient of 0.478 exist between the supply chain management and profitability of Flour Mills of Nigeria Plc and at 10% level of significant indicating a weak but positive relationship between supply chain management and profitability.

Finally, on the effect of volume of Goods in transit on profitability of Honeywell flour mills, the simple regression was statistically significant at 5% based on the F-statistics value of 13.317\*\* with the  $R^2$  value of 0.236 indicating that 23.6% of the total variation in the dependent variable (Profitability) was accounted for by the independent variable (Goods in transit). While the simple regression model was statistically significant at 5% based on the F-statistics value and  $R^2$  value of 0.437 which implies that 43.7% of total variation in the dependent variable was accounted for by the independent variable (Goods in transit). The result of this analysis was more favorable in Flour mills of Nigeria Plc compared to Honeywell flour mills. High volume of goods in transit by Flour mills of Nigeria Plc enhanced their profit positively. Choosing the right supply chain cost to maintain at a particular time increased turnover and in turn boosted the profit of the company. The firms should strive for effective and efficient supply chain operation since if properly integrated yields profitable returns on investment while wrongly done cause a deficit of the company's wealth. A supply chain management strategies that worked for a particular firm may not actually work as exactly as thought for another firm. It was also ascertained that the selected firms adopts "efficient supply chain strategy/model" because of the nature of their products and its demand.

Thus, Honeywell flour Mills and Flour Mills of Nigeria Plc can increase its sales and profitability the more and also gain competitive advantage if they invest more on their supply chain management department, thereby devising ways to ensure steady supplies, equilibrium work-in-progress, Goods in transit and ensuring customer satisfaction the more. Besides, since high volume of goods in transit in the supply chain has been shown to be good, the flour mills may invest more on it than it does on other cost areas of Supply Chain Management strategy. Moreover, the researcher has advised that the raw material sourcing and handling aspect of the Supply Chain Management should be looked into and should be handled by professionals.

Companies should develop or adopt best efficient and effective supply chain software that will help in smooth manufacturing process that will be cost efficient and also reduce lead time in their operations.

Supply chain management is the hub on which industries can work on so as to contribute positively and with a high margin to the country's Gross Domestic Product (GDP). This is true because it was ascertained that effective and efficient supply chain operations translates into increased and sustainable profitability for the manufacturing industries.

Companies do not compete with each other, rather supply chain of those companies compete with each other, establishing partnership with key customers (distributors) and suppliers will help to establish a responsive supply base. Collaborative relationship with key distributors and suppliers are important. It will help anticipate change in capacity requirement, both in the short term for scheduling purposes and in the long term for asset investment decision.

## RECOMMENDATIONS

The following recommendations are made to ensure that sustainable supply chain management operation which will ensure increased profitability in the industrial sector. Supply Chain operational inefficiencies ultimately will have adverse effects upon profits. Turning the situation round, difference in the efficiency of the inventory control for a given level of flexibility affects the level of investment required in inventory. The less efficient is the inventory control, the greater is the investment required. Excessive investment in inventories increase cost and reduce profits, thus, the effects of inventory control of flexibility and on level of investment required in inventories represent two sides of the same coin. This will also help in reducing the high cost burden which lies on the ability to reduce production cost and they are as follows;

1. Profitability growth as one of the key preconditions to survive in the market is forcing companies to compete on global markets and at the same time defend domestic market share from their global competitors, the effect of that is increased complexity of supply chains, pressure to decrease cost burden and improve service level. To cope with the complexity and increase customer requirements, active management of the supply chain is a prerequisite.
2. Production firms most especially the Flour millers should integrate their supply chain management operations efficiently in such a way that it enhances their sales and profitability and also should adopt the Supply chain strategy/models that was developed in this study as it will best align with their operations and target customers.
3. Companies should develop or adopt best efficient and effective supply chain software that will help in smooth manufacturing process that will be cost efficient and also reduce lead time in their operations.
4. Raw materials should be stored at their point-of-use. Inexpensive raw materials should be stored in substantial quantities, while expensive ones should be managed with more attention as this will enhance operational flow time.
5. The firms should develop a more efficient and effective information infrastructure which will enhance order booking; finished goods inventory levels, planned shipment/logistics and raw materials accessibility.
6. While reducing demand uncertainty and decreasing lead times are necessary for increasing operational effectiveness, it is equally critical that rules and policies be established to effectively coordinate production and inventory.
7. Firms should have effective and efficient decision support systems and their business processes must be capable of explicating dealing with uncertainty.
8. The industrial sector should harmonize themselves in form of an interest group to influence the government in adequate provision and maintenance of infrastructural facilities that will eliminate the logistical dilemma that they encounter in their out-bound logistics.
9. Companies should strive to source their materials locally as this will help to relieve their alarming huge cost burden.
10. Finally, given the strategic nature of the supply chain function, the top supply management professional is usually members of the organization's senior management team. In this leadership role, supply chain management professionals must be knowledgeable and understand all areas of the business in order to develop strategies consistent with the organization's goals and successful business procedures. And also must have a clear understanding of the global business concept as this will help in maintaining a sound supplier and customer relationship. The companies should from time to time revisit and evaluate their SCM processes to ensure that customers are being satisfied and to ascertain if it predetermined objectives and goals are being achieved as this will go a long way in enhancing sustainable Supply chain competitive advantage.

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