

SUPPLY CHAIN ANALYSIS AND DESIGN IN NIGERIA BREWERY

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<p>Abstract</p> <p>Due to the great importance of supply chain, it is necessary for every company to focus on its supply chain analysis and design. The purpose of this thesis was to explore the core knowledge of how good design of supply chain improves the growth of a company and satisfaction of its customers.</p> <p>In order to achieve this goal of the thesis, Nigeria's brewery sector has been used for this project. With the industry being the biggest non-oil sector in Nigeria, this study helped in gaining understanding of how the brewery industry had great impact on Nigeria market with the help of their supply chain after the birth of their pioneer company Nigerian Breweries PLC six decades ago.</p> <p>Nigeria's brewery industry was one of the very important non-oil sectors and has contributed greatly to Nigerian economic growth in recent times. Different measures of productivity are used in manufacturing for the technical and other divisions. Productivity was measured in terms of plant operation efficiency and capacity utilization. Accomplishment of assigned responsibilities was used in terms of other division of the sector.</p> <p>This industry also benefited from hot and humid weather experienced in Nigeria. This factor had an impact on their volume growth and the presence of many branch offices all over the country aided the distribution of products to consumers.</p> <p>However, the poor infrastructure state and power supply worked against the industry which affects the brewery industry turnover. Cost pressures and higher finance expenses were also among their delicate area which affected their revenue growth and weak earnings.</p>			
Keywords Supply chain, Analysis, Design			

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APPENDIX 1 INTERVIEW: BREWING INDUSTRY'S CONTRIBUTION TO NIGERIAN
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1 INTRODUCTION AND THESIS OBJECTIVES

Supply chain can be defined as co-operation of various business entities which contain suppliers (acquire raw materials), manufacturers (creation of these raw materials to finished goods), distributors (circulate the finished goods to retailers) and retailers (sell it to final customers). These business entities are connected by transportation, storage facilities and they are incorporated through information, planning and integrated activities.

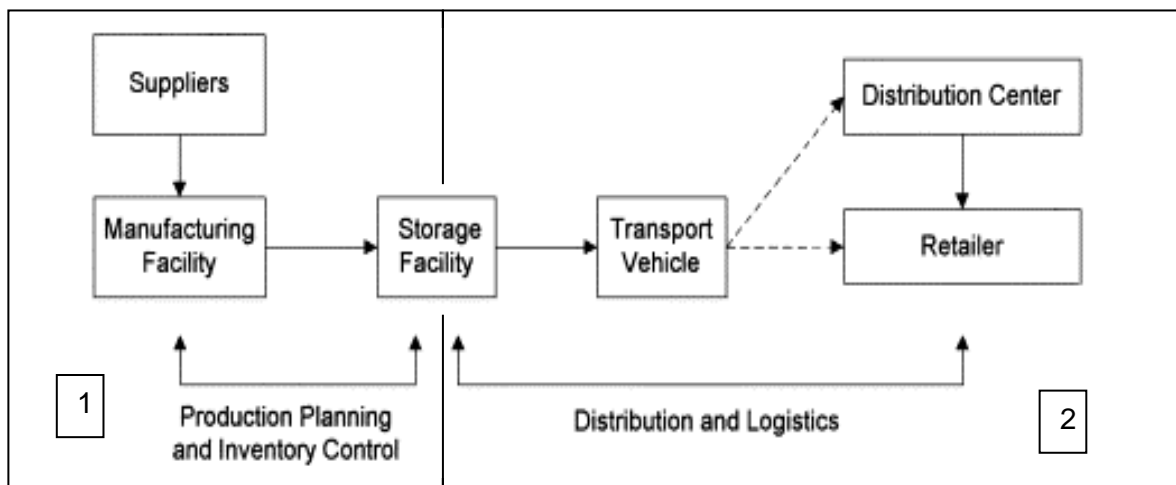


Figure 1.1. Supply chain process (Beamon, 1998).

As demonstrated in Figure 1, supply chain can be segmented into two main processes; (1) The production planning and Inventory control which comprises of the suppliers of the raw materials, manufacturer of the goods, then the storage facility and (2) The distribution and logistics which starts from the storage facility to the distributors and the retailers. These processes are combined together to form an efficient supply chain. The extent of impact of supply chain depends on the design procedure and management of these processes.

The objective of supply chain is to create an efficient product line i.e. the right product, the right price, the right store, the right quantity, the right customer and the right time. Efficient supply chain also helps in expanding width/depth of distribution, reduces the transportation cost, reduces warehouse cost, improve the quality of goods, minimizing the time and maximize overall value generated by the right timing and quality. (Beamon 1998, p. 281-294)

The purpose of this thesis is to analyze the supply chain pattern of Nigerian breweries and their logistics and to summarize the competitive advances and musts in supply chain in beverage business.

This thesis also covers Nigerian breweries industry outlook, their structure and footprint and their global capability as it is compared with the Finland brewery system.

Considering other necessary viewpoints, this thesis analyzes the key performance indicators which are used to evaluate the efficiency of a supply chain and its effectiveness, the inventory backing up system i.e. inventory replenishment and rendering, procurement and its importance.

Other viewpoints include the different types of risks which can occur in any stage of the supply chain and how it has been managed. This part is one of the most difficult occurrences that create problem for supply chain managers and affect the supply chain.

Talking about the supply chain, the SCOR method created by the Supply Chain Council (SCC) will also be introduced.

2 KEY PERFORMANCE INDICATORS

“Key performance indicators are used to measure the performance achievements of systems. They are important in such a way that they show how well an asset is meeting its stated purpose. They are therefore a valuable guideline for users, customers and senior management in assessing and comparing performance across time periods and across comparable systems” (Hastings 2010).

Supply chain performance measures formation is an important part of supply chain design and analysis. They are used to determine how effective an existing system is, or to compare several alternative systems. In addition, some performance measures are used to evaluate the supply chain efficiency and effectiveness. Supply chain performance measures can be divided into two main parts:

- i) Quantitative performance measures
- ii) Qualitative performance measures

2.1 QUANTITATIVE PERFORMANCE MEASURES

Quantitative performance measures came in nature of absolute and relative measures. According to G. Ambrose and P. Harris (2006, p. 58) absolute measures are simply a measurement of fixed values. They are expressed in finite terms that cannot be altered. On the other hand, relative measurement is measuring something compared to another thing, or estimating things proportionally to one another.

These are the types of performance measures in supply chain that can be directly described numerically. They may be sub-categorized into:

- a) Measures based on costs and profit. They include;
 - Cost Minimization: It is the most common objective. There is minimization of cost throughout the entire supply chain.

- Sales maximization: It is used to maximize the amount of sales or units sold
- Profits Maximization: It maximizes revenue and less costs.
- Inventory Investment Maximization: It maximizes the amount of inventory cost which includes product costs and holding costs.
- Supplier Performance: This is the rate of occurrence, suppliers deliver raw materials on time to the facility and in good condition.
- Return on Investment Maximization: It helps to maximize the ratio of net profit to capital that was employed to produce the profit.

b) Measures based on customers responsiveness: They are:

- Fill Rate Maximization: This is the maximization of the number of customer order filled on time
- Lead Time Minimizing: This minimizes the amount of time required from the beginning of manufacturing a product to its completion.
- Product Lateness Minimization: This minimizes the amount of time between the estimated product delivery date and the actual product delivery date.
- Function Duplication Minimization: It minimizes the number of business functions that are provided by more than one business entity. This simply means it helps to reduce repetition of functions.
- Customer Response Time Minimization: This minimizes the amount of time required from the time of order placement to the time or order received by the customer. (Beamon 1998, p. 281-294).

2.2 QUALITATIVE PERFORMANCE MEASURES

These can be explained as the types of performance measures that have no single numerical measurement but some aspects of them can be quantified.

They are:

- Flexibility: This is the extent to which the supply chain can react to random fluctuations in the demand pattern.
- Customer Satisfaction: This is the rate at which the customers are satisfied with the product or services been rendered. Customers satisfaction includes the pre-transactions satisfaction, transaction satisfaction and post-transaction satisfaction
- Effective Risk Management: This is the rate at which the effect of risk in supply chain is being minimized.
- Information and Material Flow Integration: This is the rate at which the functions in the supply chain spread information and transport materials (Beamon 1998, p. 281-294).

2.3 PERFORMANCE MEASURES USED IN SUPPLY CHAIN MODELLING

As earlier said, the formation of supply chain performance measures is an important part of supply chain design and analysis. These details reviewed in Chapter 2 tend to maximize one or more supply chain performance measures. The summary of these performance measures is illustrated in Table 1.

Table 1. Performance measures in supply chain modelling. (Beamon 1998, p. 281-294)

Basics	Performance Measure	Author(s)
Cost	Minimized cost	Camm, et. Al. (1997). Lee, et. al. (1997). Lee and Feitzinger (1995). Tzafestas and Kapsiotis (1994). Pyke and Cohen (1994). Pyke and Cohen (1993). Lee, et. al. (1993). Svoronos and Zipkin (1991). Cohen and Moon (1990). Cohen and Lee (1988). Ishii, et. al. (1988). Williams (1983). Williams (1981).
	Minimize average inventory levels	Altiok and Ranjan (1995). Towill and Del Vecchio (1994).
	Maximize profit	Cohen and Lee (1989).
	Minimize amount of obsolete inventory	Ishii, et. al. (1988).
Customer Responsiveness	Achieve target service level (fill rate)	Lee and Billington (1993). Lee, et. al. (1993). Towill and Del Vecchio (1994).
	Minimize stock out probability	Altiok and Ranjan (1995). Ishii, et. al. (1988).
Cost and Customer Responsiveness	Minimize product demand variance or demand amplification	Newhart, et. al. (1993). Towill, et. al. (1992). Towill (1991). Wikner, et. al. (1991).
	Maximize buyer-supplier benefit	Christy and Grout (1994).
Cost and Activity Time	Minimize the number of activity days and total cost	Arntzen, et. al. (1995).
Flexibility	Maximize available system capacity	Voudouris (1996).

3 PROCUREMENT, PURCHASING AND INVENTORY MANAGEMENT

“Procurement can be explained as a way of acquiring all the materials needed by an organization. It consists of related activities that get goods and other materials from the supplier to the organization like rental, leasing, contracting, exchange, gifts, borrowing as well as associated work of selecting suppliers, negotiating, agreeing terms, expediting, monitoring suppliers performance, arranging delivery, organizing transport, checking arrivals, clearing payments etc.” (Waters, 2009).

Purchasing can be defined as the actual buying of all the material needed by an organization. Purchasing is done by sending out the purchase orders.

3.1 IMPORTANCE OF PROCUREMENT

Procurement is a vital part of an organization supply chain because it deals with the flow of materials. Even though a successful procurement does not guarantee an organization a success, there are situations at which poor procurement leads to company's failure. Poor procurement has varieties of bad results like delivery of wrong materials, non-arrival of requested materials, delivering wrong quantities of materials, wrong time delivery and poor quality of materials.

As generally known, procurement is responsible for a lot of expenditure because of the average cost of goods in manufacturing is spent on material. In situations where workers are on short-term contracts, procurement also determines the recruitment of staff.

Procurement also helps to streamline processes, lower the prices and cost of material. Nowadays, procurement is given much attention and its importance is widely recognized.

3.2 PROCUREMENT STAGES AND STEPS

Procurement steps are carried out once an appropriate supplier has been found or chosen. It is the procedure that is carried out for purchase. Procurement begins when an organization requires the need for materials, then to the selection of suppliers for the materials, purchase arrangement and ends when the materials are delivered and paid for. Steps in a typical procurement cycle are illustrated in Table 2:

Table 2. Steps in typical procurement cycle (Waters. D. 2009).

User department	Procurement	Suppliers
<ul style="list-style-type: none"> Identify need 		
Request purchase →	<ul style="list-style-type: none"> Receive request 	
	Process	
	Request quotations →	<ul style="list-style-type: none"> Receive request
		Process
	<ul style="list-style-type: none"> Receive quotation ← 	Send quotation
Discuss →	Discuss and process	
	Send purchase order →	<ul style="list-style-type: none"> Receive order
		Process
		Ship goods and
	<ul style="list-style-type: none"> Receive and check ← 	invoice
<ul style="list-style-type: none"> Receive and check ← 	Transfer	
Authorize payment →	<ul style="list-style-type: none"> Arrange payment → 	<ul style="list-style-type: none"> Receive payment

1. The user department (Manufacturing department):

- Identifies the need for materials purchase
- Prepares specification and materials description
- Checks departmental budget and get approval for purchase
- Prepares and sends a purchase request to procurement

2. Then procurement:

- Receives, verifies and checks the purchase request

- Examines the requested materials, checks the current stocks for material or alternative products, examines make or buy options for the materials and after discussion with the user or manufacturing department, confirms the decision to purchase
- Sorts the list of possible suppliers from a long lists
- Sends a request for quotation

3. The suppliers: Each of them

- Examines the request for quotations
- Checks the customers details (status, credit etc)
- Checks how it could satisfy the order
- Sends quotation to the organization (With product details, prices and conditions)

4. Then procurement:

- Checks the quotations and carry out commercial evaluations
- Discusses technical aspects with the user department
- Reviews budget details and clearance to purchase
- Chooses best supplier based on the details supplied
- Discusses, negotiates and finalizes terms of conditions with the supplier
- Issues a purchase order for the materials(with terms and conditions attached)

5. The chosen supplier:

- Receives, acknowledges and processes the purchase order
- Organizes all operations needed for the materials supply
- Ships materials
- Sends invoice

6. Then procurement:

- Confirms the delivery
- Carry outs necessary follow-up and expediting
- Receives, inspects and accepts materials
- Notifies the user department of the received materials

7. The user department:

- Receives and checks the materials
- Authorizes transfer from budgets

- Updates inventory records
- Uses the needed materials

8. Then procurement:

- Arranges the payment of the supplier's invoice

The procurement process is so complex that it is not advisable to be used for purchasing of small or cheap products. It will be unreasonable if the cost of procurement is almost the same with the costs of materials or even more. Apart from the cost of procurement, procurement time taken should also be considered. The average number of days in the stages in procurement is analyzed below by a survey in the USA in 1976 using a traditional paper-based system.

Table 3. Stages in procurement.

Stages in procurement	Average days
From customer placing order, to supplier receiving it	1.9
From supplier receiving order, to finishing administration	2.1
From supplier finishing administration, to shipping order	2.2
From supplier shipping order, to customer receiving it	4.1
Total	10.3 (11 days)

Purchasing types depend on how rigorous the procedure is. It is necessary to consider the importance of materials rather than just the price. There are **non-critical materials** with little profits and risks to supply which needs basic and simple procedure for purchasing, **bottleneck materials** with little profit but more risks to supply which requires long-term contracts with alternative sources to avoid potential problems, **strategic materials** with higher profits which needs more formal relationship with suppliers over long term.

3.3 ECONOMIC ORDER QUANTITY

Economic order quantity is the optimal size for an order in a simple inventory system. It is a practical way of controlling many stocks with independent steady demand and it gives good guidelines for a wide range of situations.

Economic order quantity is done to minimize the variable inventory costs because orders are calculated to arrive just when the existing stock runs out. This gives the stock cycle a zigzag pattern as shown in Figure 3.1.

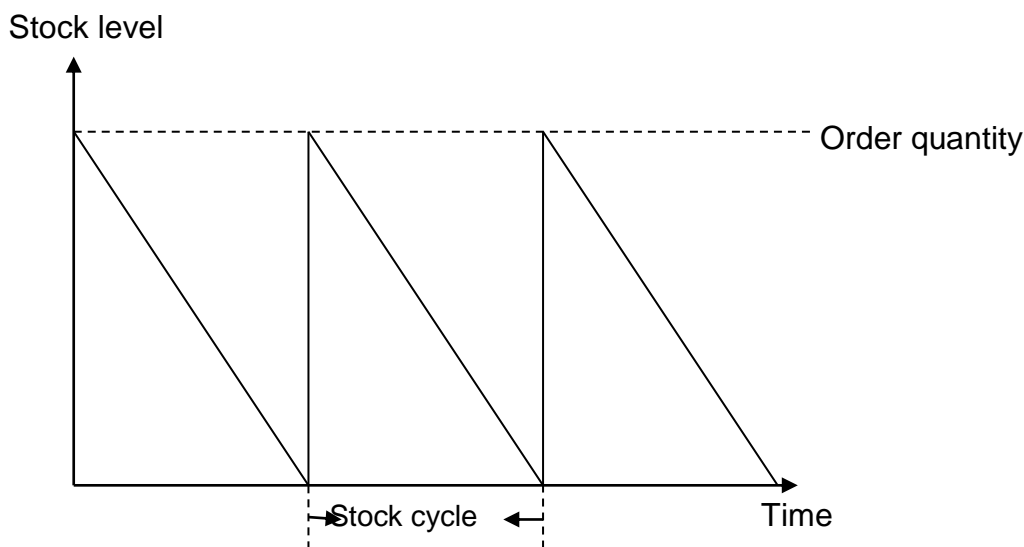


Figure 3.1. The stock cycle pattern.

With this type of system:

- No shortages are allowed
- The number of units bought each period is demand (D), multiplying this with the unit cost (U) gives the unit cost component (UD)
- The average stock level is half of the quantity (Q) (i.e. $Q/2$) and multiplying this by holding cost (H) gives the holding cost component ($HQ/2$)
- The average number of orders in each period is the division of demand by quantity (D/Q) and multiplying this by reorder cost (R) gives a reorder costs component (RD/Q)

The sum of all the cost components gives the cost per period:

Cost per period = Unit cost component (UD) + reorder cost component (RD/Q) + holding cost component ($HQ/2$) (Waters, D. 2009).

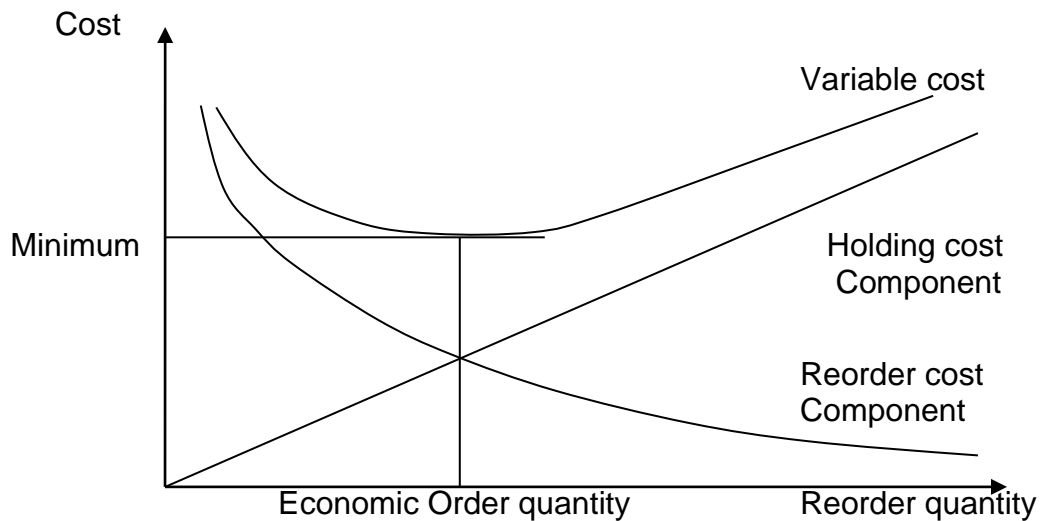


Figure 3.2. Economic order quantity.

Figure 3.2 shows that:

- Reorder cost component falls with respect to order size.
- The holding cost component rises linearly with the order size.
- Infrequent large orders gives high holding cost component and low reorder cost component and vice versa.
- Adding the two cost component gives a total cost curve that is an asymmetric 'U' shape with a distinct minimum.
- This minimum variable cost identifies the optimal order size.
- The minimum cost occurs when the holding cost component equals the reorder cost component ($RD/Q = HQ/2$).

This information can be used to calculate the economic order quantity.

$$\text{Economic order quantity (Q)} = \sqrt{2RD/H}$$

D = Demand per unit time

R = Reorder cost

H = Holding cost

REORDER LEVEL: This is used in timing of orders. There is a lead time which is between placing the order and their arrival in stock. Lead time can be defined as the time taken to process an order, forward it to the supplier. It allows the supplier to prepare the order for shipment, shipment of the goods, receive and check the materials and put them in stock. (Waters, D. 2009.)

In a situation where the lead time (L) is constant, the order should be placed in a time (L) earlier to make sure the delivery arrives just as the stock is running out. In finding this reorder point, it is necessary to monitor the amount of stock left and place an order when there is just enough to last the lead time. With constant demand (D), we have to place an order when the stock level falls to LD.

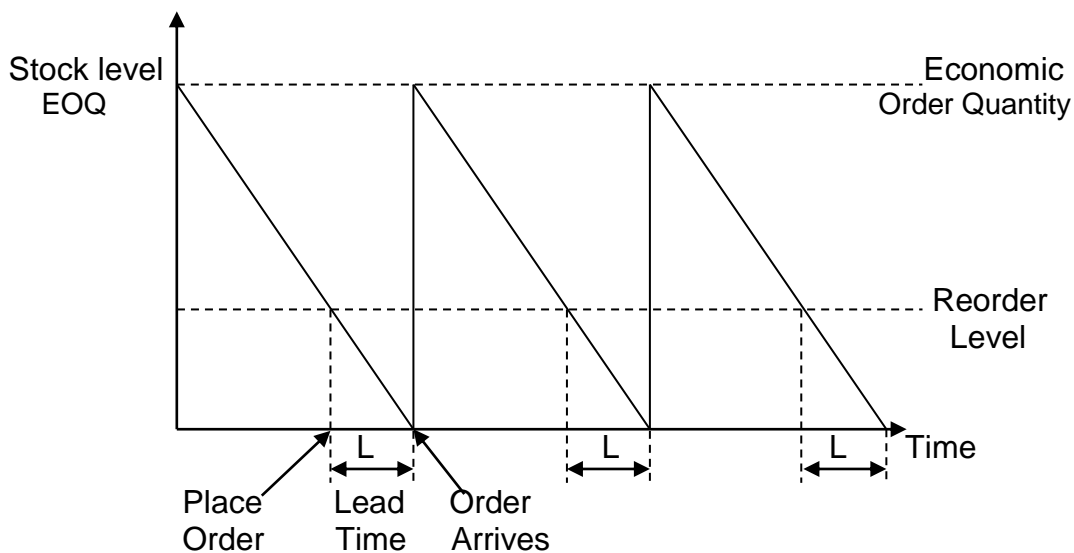


Figure 3.3. Timing orders using reorder level.

$$\text{Reorder level (ROL)} = \text{Lead time (L)} \times \text{Demand (D)} = \text{Lead-time demand (LD)}$$

3.4 SAFETY STOCK

This can be expressed as holding of extra stocks in order to overcome excessive in demand. It is used in situations where there is uncertainty in demand and to add to the margin of safety. These safety stocks are used when normal working costs run out and they do not affect the reorder quantity.

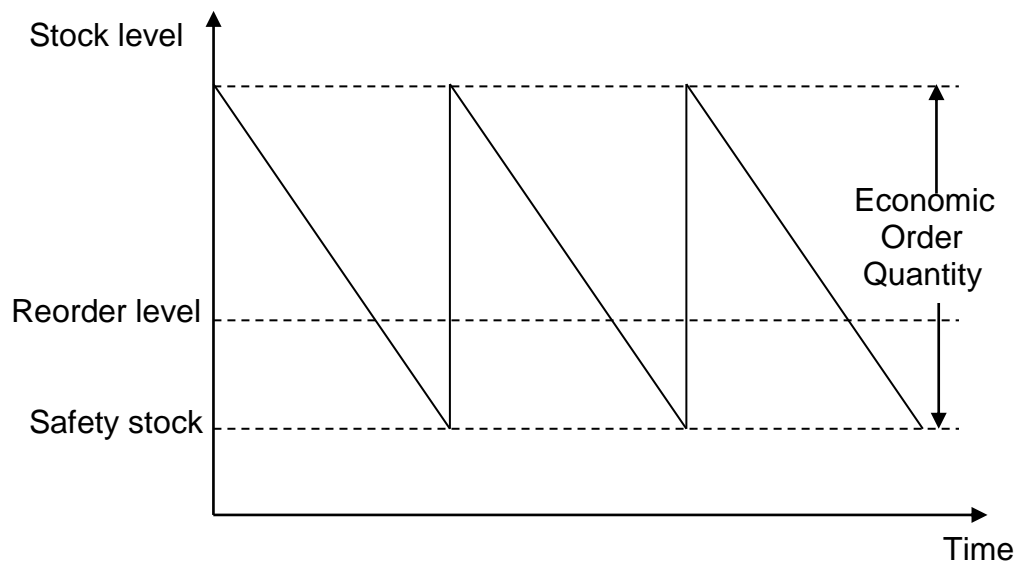


Figure 3.4. Safety stock.

Although higher safety stocks give higher protection against uncertainty and unexpected demand, they also increase the holding costs. In safety stock, the reorder level is equal to the lead-time demand in addition with safety stock.

I.e. $\text{Reorder level} = \text{Lead-time demand (LD)} + \text{safety stock}$ (Waters, D. 2009).

3.5 INVENTORY REPLENISHMENT AND RENDERING

Inventory replenishment can be explained as the backing up system for an inventory. This is a necessary process to avoid being out of stock. Although in this system, there may be danger of the inventory being replenished too early, which causes the old stock to be double-handled and put on top of the replenished stock, and more concerning, replenishment arriving too late with no goods left in storage. A good method is to base the replenishments on the known order quantities for the next wave. Furthermore, rack flow of goods is often used when picking from the storage so that when one batch of stock is emptied, then next batch flows in and it is available immediately for use.

For fast-moving materials, there is the probability of serious congestions between the picking and replenishment operations. There are some ways to avoid this:

- 1) Having multiple storages for fast moving materials and popular product lines.
 - 2) Materials layout pattern so that one area is for picking and the other area is for replenishment.
 - 3) Scheduling replenishments in situations where the stock usage is constant.
 - 4) Carrying out replenishment and picking at different times e.g. have different shifts for retrieving materials from storage and replenishment.
- (Rushton, A. Croucher, P. Baker, P. 2006).

4 SUPPLY CHAIN RISKS

Supply chain risks can be expressed as fear of instability in the supply chain. It is any threat of an event that might disrupt normal flow of materials. Since it is impossible to see the future, there will be some uncertainties that bring risks. An organization can face many risks across the entire supply chain which include suppliers, process, regulatory, intellectual property, political and economical risks.

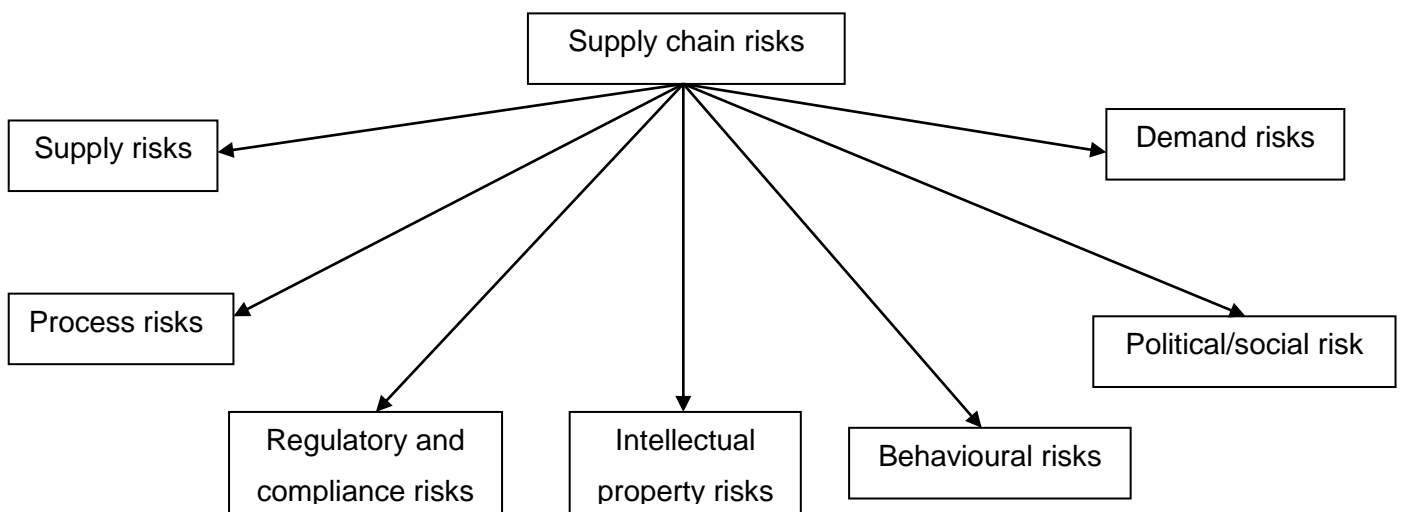


Figure 4.1. Supply chain risks. (Metric stream, 2014)

4.1 RISKS ANALYSIS

As describe above, supply chain risks may come in different forms and they can also show up at any point of a supply chain right from the suppliers' stage to the final customers. As a result of these many types of risks, they are been grouped into two basic kinds;

- The external risks
- The internal risks

The External Risks: These are the type of risks that arises outside the supply chain which may be destructive to an organization. The main characteristic of this type of risks is that they can't be controlled by an organization but the organization can design their operations to work as efficiently as possible within

these risks in the environment. Even with these design operations, the managers cannot completely remove the risks, they can only be reduced. These types of risks include:

- **Environmental hazards:** This type of risks involves the earthquakes, hurricanes, floods, tornado etc. They may cause total breakdown of a company if occurred.
- **The Economy:** This has an impact on all companies either been high or low. It is impossible to control but understanding it can minimize treats and maximize opportunities.
- **Political Actions:** These are actions which may result to war, government taking over the business, imposing higher taxes and so on.
- **Inflation:** This is a risk which results from dramatic increase in price. This price increase includes cost of raw material, maintenance, labour etc. which affects the company. (Waters. D. 2009).

The Internal Risks: These are the risks that appear within the supply chain operations. Unlike the external risks, these are the types of risks an organization can control. The following are the examples of internal risks of an organization:

- **Politics and Mismanagement:** This is internal company politics which may cause the management and staff not to focus on the market and job at hand. Mismanagement includes improper control of finances, production, labour and marketing.
- **Resources:** This is the risks arising from both financial and human resources. The non-present of either of them will make an organization find it difficult to achieve business goals.
- **Incentives:** This is an uncommon aspect of business risks but needs good attention. Unhappy staff will bring about poor production, so there is need to create proper incentives schemes for the organization.

- **Stability:** This is the ability of an organization to manage its finances. A financially stable business will grow more profits than when it is unstable.
- **Organizing structure:** The organization of a business can also affect its success. Poor job positions might pose risks on the success of an organization. (Waters. D. 2009.)

4.2 RISKS MANAGEMENT

Supply chain risks management is the identification of risks and carrying out necessary procedures for dealing with them. Risks management involves three main processes; Identifying, analyzing and responding. (Waters. D. 2009)

- 1) **Identifying the risks:** This monitors the supply chain, defines the various activities and studies them to find areas of risks. Although, managers do not have to identify every supply chain possible risks but only those that will be of great impact for the company. In an attempt to do this, the company has to carry out the following:
 - Define the different operations in the supply chain.
 - Separate them into series of distinct, related activities.
 - Carefully consider the details of each activity.
 - Identify the risks in each activity and their main features.
 - Describe the most significant risks.
- 2) **Analyzing the risks:** After carrying out the risks identification, the next phase is to analyze the risks carefully and give each priority. Analyzing of risks in supply chain is based on two factors:
 - The likelihood of a risky event occurring.
 - Its consequences when the risk event occur.

We can use these two factors to calculate the expected value for each risk.

Expected value of a risky event = Probability x consequence

This expected value is used for showing the relative important of risks and it can also be used in ranking them in order of priority.

Companies should give highest priority to the most significant risks (which comprises of risks with highest probability and greatest consequence) but risks with low probability are unlikely to occur, so company can pay them less attention. We can also classify these risks as:

- Most severe that needs full attention.
- The medium risks that require normal attention.
- The little ones that need less attention.

3) **Responding to the risks:** After knowing the different categories and priority of supply chain risks, there is need to know the ways of dealing with them. As there are many possible risks, there are also many possible responses. Some of them are:

- **Avoid the risk:** Creating preventive measures in case of risk occurrence. Risks of great impact on supply chain or in cases where it will cost the organization a fortune to restore are best avoided. The cost of avoiding the risk is more preferable to the cost of restoring the damage done by the risk.
- **Reduce risk probability:** Carrying out actions to reduce the chance of that risk event occurring. Reducing the risk is done in cases where the risk cannot be completely avoided. In this case, the cost of reducing the risk is more affordable than cost of restoring the damage.
- **Reduce the consequences:** This is the action carried out to reduce the effect of the risk.
- **Transfer or share the risk:** This is deflecting part or all the risk in the organization to another e.g. the insurance company. The cost incurred in transferring the risk to another organization is more affordable than the cost of restoring the damage caused by the risk e.g. fire outbreak
- **Make contingency plans:** This is planning of what to do in case a risky event occurs. It is normally referred to as the backup plan.

- **Adaptation:** This is done when the risk cannot be avoided. The operation system is then designed to fit the new circumstances.
- **Ignore or accept risk:** company can ignore the risk if the consequences are minor. In situation like this, the option of doing nothing is better than doing something. (Waters. D. 2009)

5 NIGERIA BREWING INDUSTRY

Nigerian Breweries Plc is the largest brewing company in Nigeria. It was incorporated in 1949 with the first bottle of STAR lager beer produced in Lagos Brewery. In 1957, the company commissioned its second brewery in Aba while the Kaduna and Ibadan Breweries were commissioned in 1963 and 1982 respectively. The company grew quite well and acquired its fifth brewery in Enugu in 1993 and in October 2003, a sixth brewery, sited at Ameke named Ama Brewery also in Enugu State was commissioned which leads to the discontinuation of the previous Enugu brewery and it's the biggest and most modern brewery in Nigeria today.



Figure 5.1. Nigerian Breweries Plc. Headquarters. (NBPLC, 2014).

Furthermore, from the humble beginning in 1946, the Nigerian Breweries Plc now has eight operational breweries from which its high quality products are distributed to all parts of Nigeria, in addition to the ultra modern malting plant in Aba and Kaduna.

Nigerian Breweries Plc have varieties of brands produced all over the country, they include;

- 1) Star Lager Beer which was the first and was launched in 1949.
- 2) Guilder lager beer and was launched in 1970.
- 3) Maltina (The nourishing malt drink) was introduced in 1976.
- 4) Legend Extra Stout came out in 1992.
- 5) Amstel Malta was launched in 1994.
- 6) Heineken lager Beer was relaunched into the Nigerian market in 1998.

- 7) Fayrouz drink was launched in 2006.
- 8) Goldberg beer.
- 9) Malta gold malt drink.
- 10) Climax non alcoholic energy drink.
- 11) Life Continental lager which became part of the family in October 2011.



Figure 5.2. Nigerian Breweries Plc. Products (NBPLC, 2014).

INDUSTRY OUTLOOK

Nigerian breweries had a good record of export business that dates back to 1986 with current known export destinations like United Kingdom, European Union and West African region. In 1973, the Nigerian Breweries was the least company on the Nigerian Stock Exchange (NSE) and as at today, it's among the top three largest companies in Nigeria.

From valuation perspective, the industry outlook will be described as follows:

- 1) **DEMOGRAPHIC APPROACH:** This is carried out from the population size and structure perspective. With the country population growing to 168.8 million people, there is high demand for the product. Nigeria has a high fertility rate of four to five children per woman which results to high population growth rate of 2.8% per Annum based on IMF estimate. (IMF, October 2010). Although the growing population has effect on the

country's economy but also increase the potential demand for consumer goods.

On the other hand, the population structure of the country contains the average population age of 19 years and average life expectancy of 50 years. Therefore, Brewers target more on the country youthful population.

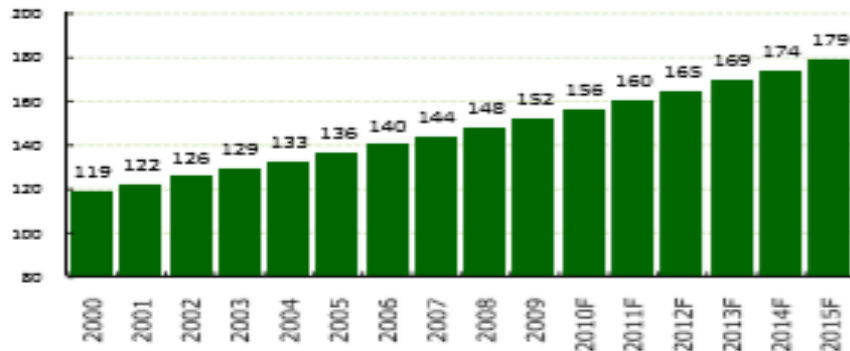


Figure 5.3. Nigeria population buildup (2.8% growth). (IMF, October 2010).

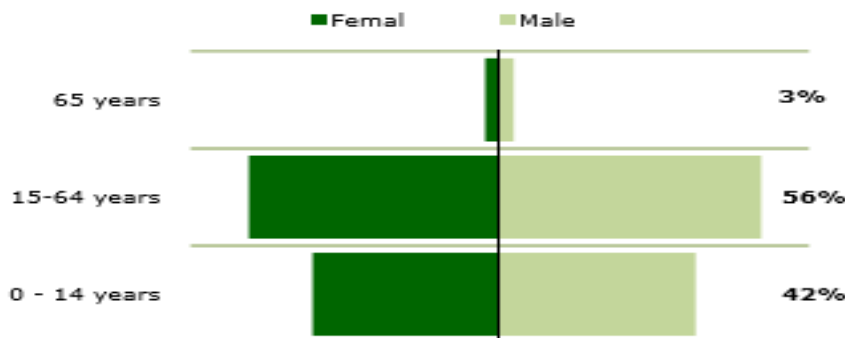


Figure 5.4. Nigerian Population structure (IMF, October 2010).

- 2) **INCOME:** Due to the increase in Nigeria per capita income with significant growth for over 10 years, the demand for brewery products are also increased. IMF estimated a per capita growth of 8.3% with income per capita expected to reach 1,839 US Dollars by 2015.

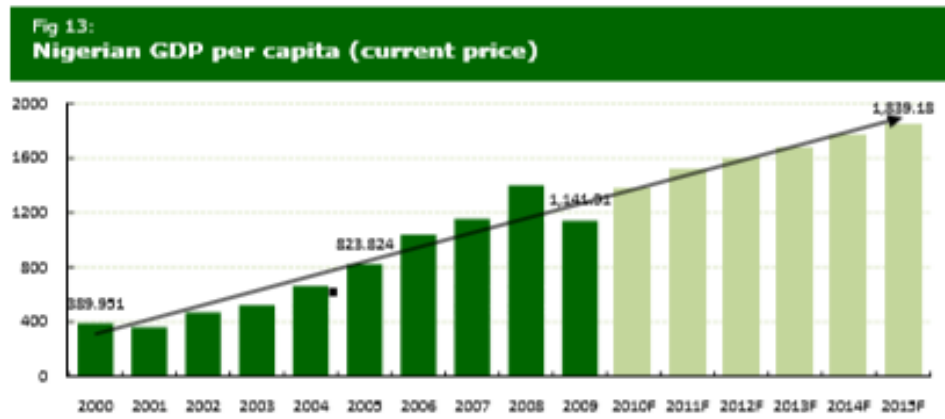


Figure 5.5. Nigerian Income per capital (IMF, October 2010).

As generally known, beer growth are both income and price elastic so increase income level and price reduction will boost beer volume growth significantly. However, it is observed that income-effect on volume growth is as twice as price-effect.

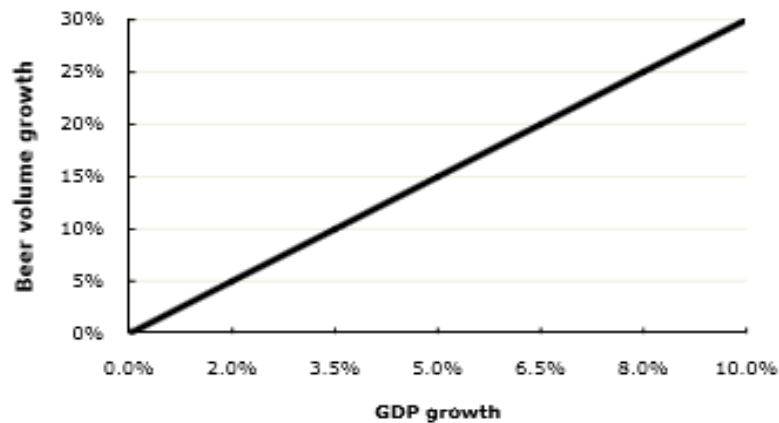


Figure 5.6. Nigeria income-effect on beer volume growth (1 to 3).

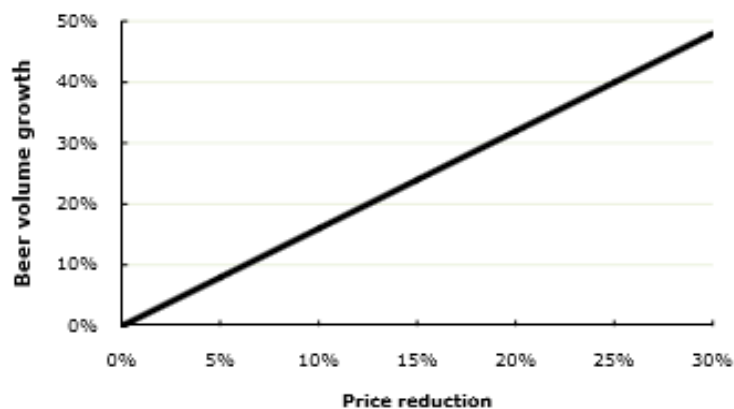


Figure 5.7. Nigeria price-effect on beer volume growth (1 to 1.7).

- 3) **APPEALING BAR CULTURE:** Nigerian ethnic groups are one of the most flamboyant people in terms of social functions. Most social functions among the growing elite and middle class are marked by generous beer consumption apart from the daily and weekend fun-catching activities with selling outlets highly concentrated in the south-east, south-west and south-south regions of the country which contributes to the overall consumption rate.

5.1 BREWERY INDUSTRY STRUCTURE AND FOOTPRINT

5.1.1 BREWERY INDUSTRIAL STRUCTURE

The Nigerian market is been dominated by two main companies which are the Nigerian breweries and Guinness Nigeria plc. It is about 15 mhl (million hectoliters) market. The Nigerian breweries and Guinness Nigeria Plc combined market have a share of 80% while others share the remaining percentage. The third player in Nigerian brewery market which is consolidated Breweries Limited is also majority owned by Heineken N.V. Group, other brewing companies include Nigeria Bottling Company in PortHarcourt, International Breweries Plc in Ilesha, Golden Guinness Plc in Abia, Africana Breweries Plc in Ibadan, Diamond Breweries Plc and like 43 others.

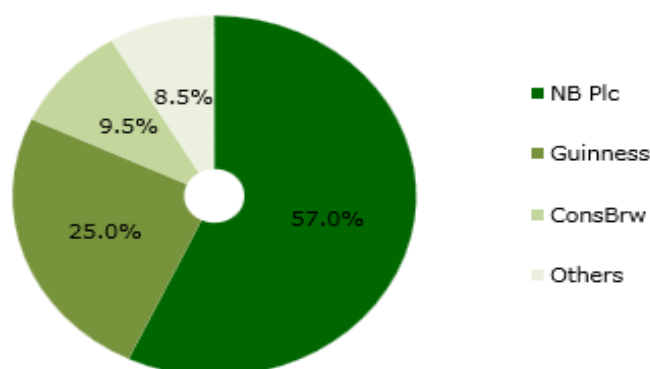


Figure 5.8. Beer market share estimates.

In 2008, SABMiller which is the brewer in Africa entered Nigerian market but couldn't leave a footprint in Nigeria. SABMiller operates in 6 continents. It is the

biggest brewer in Africa and it is among the top 4 global brewers. Due to the long term connection of the customers with the Nigerian beers which have been in existence for over 60 years, Nigerian breweries have only slight fear about its newly arriving competitors because it has successfully built a strong customer base.

Nigeria beer per capital consumption is at 10 litres per annum which is considered average when comparing it to other African countries and the global average of 26.9 litres. Most customers are from the southern part of the countries, because there are high religious rules in the northern part which affect the number of consumers.

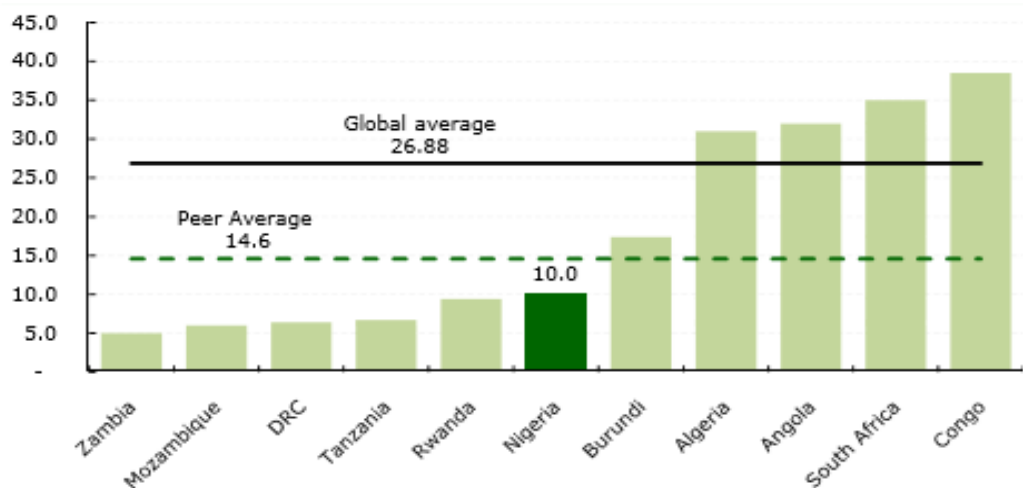


Figure 5.9. Beer consumption rates.

5.1.2 BREWERY FOOTPRINT AND CAPACITY DISTRIBUTION

The Nigerian Breweries Plc have five brewery locations with one malting plant and is mostly concentrated at the southern part of the country. The Breweries produce over 10 million hectoliters of beer with over 1900 people in production. The percentage volume in technical capacity is about 84% in the southern part of the country while the northern part has only 16 %.

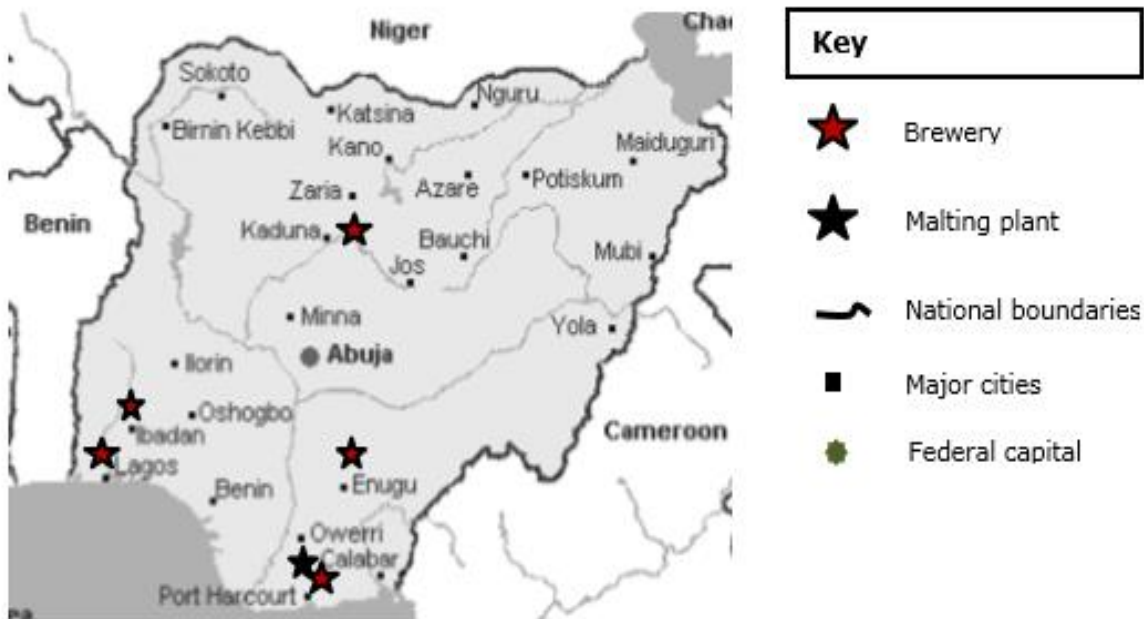


Figure 5.10. Nigerian Breweries company geographical footprint.

Nigerian Breweries Plc has six sales region offices (Warehouse). Five are located in the same city with the brewery plant and one is located in the capital city of the country Abuja. Through these locations, Nigerian Breweries Plc is able to reach their consumers and distribute to retailers. They include:

- Beer depots
- Local retailers
- Beer parlors
- Recreational centers.

From these various locations, it is analyzed that Nigerians consume 1.6 million bottles of beer daily which gives about 600 million bottles of beer per year.

5.2 NIGERIAN BREWERIES PLC SUPPLY CHAIN NETWORK

Nigerian Breweries Plc supply chain begins from the purchasing of their main raw materials (Sorghum and Maize) which covers about 67% cost value of their total materials from indigenous farmers while the remaining 33% are imported.

These materials are transported by trucks to their manufacturing plants locations where the manufacturing processes take place. After production, the beverages

are transported to their warehouses. The beverages are distributed from their warehouses to sale offices or depot where retailers come for purchase.

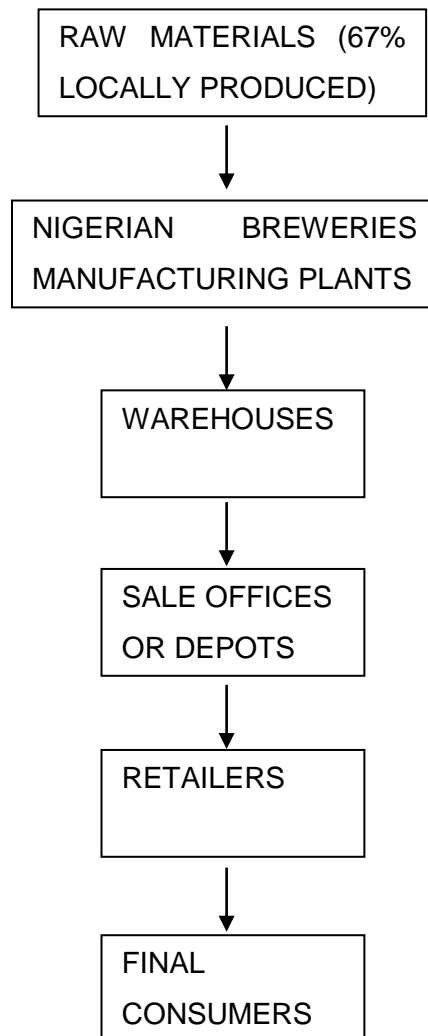


Figure 5.2.1. Nigerian Breweries Plc. supply chain chart.

This chart shows the supply chain process of Nigerian Breweries Plc right from the suppliers of raw materials to the consumer.

OY SINEBRYCHOFF AB PRODUCT DISTRIBUTION

Oy Sinebrychoff Ab distributes its products in three main countries. They are:

- Finland
- Sweden
- United States of America

Oy Sinebrychoff Ab distributes to stores, bars, restaurants and by mail order which are then purchased by their final consumers.

Sinebrychoff Koff Porter distribution



add distribution info

Beer last available Wednesday, November 12, 2014

Bottle/can entries 33

Tap entries 5

Countries	Subregions	Places	Mail Order
Finland, Sweden, USA	FINLAND , SWEDEN , UNITED STATES Alaska, Connecticut, Florida, Illinois, Massachusetts, Michigan, New Jersey, New York, Ohio, Pennsylvania, Washington	FINLAND Alko Muonio [edit] Alko Rovaniemi Keskusta [edit] Olutkellari Helsinki [edit] Hospoda Koruna [edit] Jaakko V [edit] SWEDEN Systembolaget Emporia (Malmö) [edit] Systembolaget Forum (Nacka / Stockholm) [edit] Systembolaget Hansacompagniet (Malmö) [edit] Systembolaget Källered [edit] Systembolaget Majorna / Karl Johansgatan (Göteborg) [edit] Systembolaget Nordstan (Göteborg) [edit] Systembolaget Oslovägen 7 Strömstad [edit] Systembolaget Passagen (Regeringsgatan) Stockholm [edit] Systembolaget Råå [edit] Systembolaget Tornby [edit] Systembolaget Väla [edit] Old House Inn [edit] Systembolaget Arninge [edit] Systembolaget Täby Centrum [edit] UNITED STATES ALASKA La Bodega [edit] CONNECTICUT The Half Door [edit] FLORIDA World of Beer - Altamonte [edit] ILLINOIS Binny's Beverage Depot - Lincoln Park [edit] The Beer Temple [edit] MASSACHUSETTS Colonial Spirits [edit] MICHIGAN Red Wagon Shoppe [edit] NEW JERSEY WineWorks [edit] NEW YORK Gramercy Tavern [edit] OHIO Belmont Party Supply [edit] The Hills Market [edit] PENNSYLVANIA Brû Craft and Wurst [edit] WASHINGTON The Beer Junction [edit] Total Wine & More - Spokane [edit]	

Click to challenge, correct the validity of a location.

Figure 5.2.2. Oy Sinebrychoff Ab koff portal distribution (Rate beer, 2014).

5.2.1 OPTIMIZATION OF NETWORK THEORY

This is a strategic way of designing the whole supply chain network. It includes the evaluation of supply network from the supplier to the customers. It balances the flow of goods and enables the company to compete successfully.

FEATURES AND BENEFITS

1. **REDUCING THE SUPPLY CHAIN COST:** Optimization of network theory takes into account all the excessive costs and design that deals with the network design and allow you to decide most optimal network configuration for the business.
2. **IMPROVE PROFIT:** It helps a company to analyze their supply chain network which includes all cost of transportation, manufacturing, sourcing, storage and labour. It also rationalizes capital assets, optimizes product and customer mix therefore improving the company's profit.
3. **IMPROVE SALES AND OPERATION PLANNING PROCESS:** It helps in fulfilling the demands and supply. It also helps in profitable use of available resources.
4. **MANAGING SUPPLY CHAIN RISKS EFFECTIVELY:** When supply chain network is fully optimize, the risks involved will be reduced and easily managed. Risk factors can be strategic and tactical in nature. Network optimization enables the company to model and evaluate the impact of potential unplanned events, understand their impact, determine the most costly effective strategies and formulate contingency plans.
5. **SIMULATING CHANGING BUSINESS CONDITIONS:** Network Optimization provides value with its flexible and easy to model conditional (what-if) simulation capabilities that enable powerful decision support for making tough strategic business decisions. It enables you to answer tough trade off questions such as inventory pre-build versus overtime, or

single source vs. multi-source. You can also perform quick and comprehensive what-if analysis against multiple demand scenarios, evaluate currency fluctuations, acquisitions to your distribution and supply network.

→ Examples of optimization of network theory are analyzed below using Microsoft Excel application (Solver tool):

1. <http://www.youtube.com/watch?v=K4QkLA3sT1o> (Optimizing sale)
2. <http://www.youtube.com/watch?v=W7DdbAZDmAM> (Solving transportation problem)

5.3 COMPARING BREWERY SYSTEMS IN NIGERIA AND FINLAND

The Finland brewery system described in the Hartwall sustainability report 2013 (Figure 5.3.1.), the supply chain looks as follows:

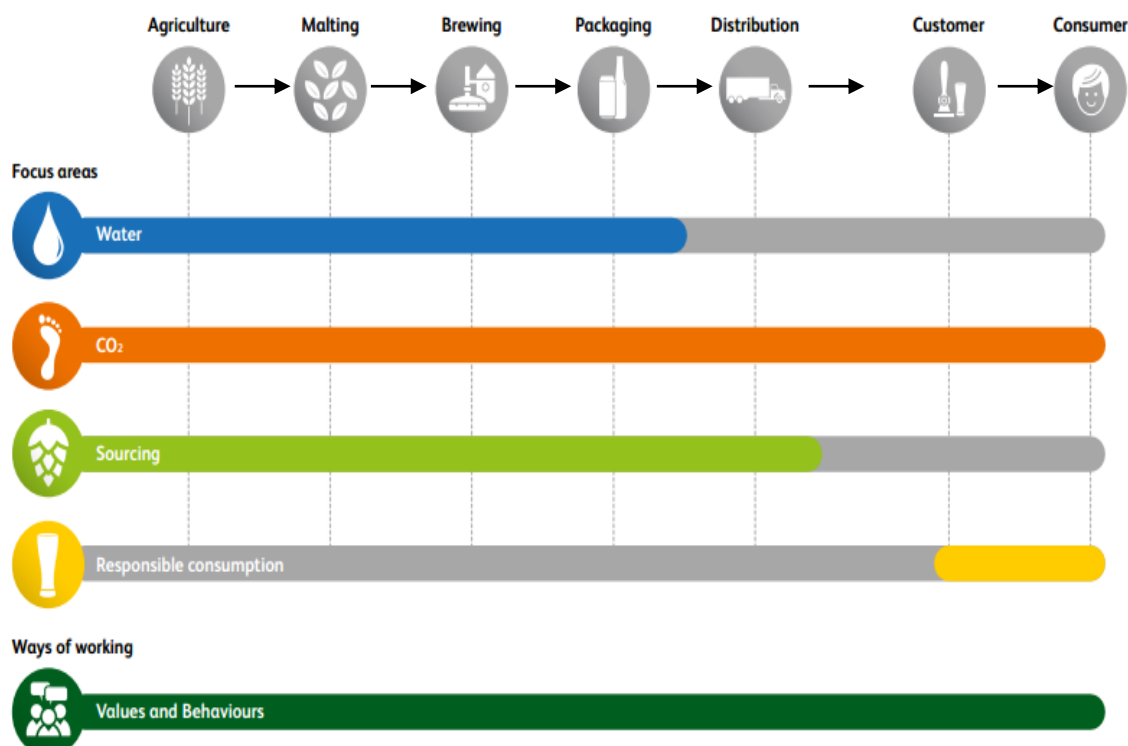


Figure 5.3.1. The Finland brewery system.

The supply chain starts from agriculture i.e. the raw materials, then the malting, brewing, packaging, distribution to their customers and finally to the consumers.

For a fair comparison, it is necessary to compare the best against the best. As we all know, every great company has its own history, Oy Sinebrychoff Ab is also the oldest Nordic industrially operating brewery founded in October 1819 in Helsinki by a Russian immigrant Nikolai Sinebrychoff. It is the largest Finnish brewers with market share of 46% and others include Hartwall and Olvi. Oy Sinebrychoff Ab has 10 different brands in its portfolio and they include:

- 1) Battery energy drink
- 2) Crowmoor cider
- 3) Golden cap cider
- 4) Sinebrychoff long drink
- 5) Kurko long drink
- 6) Koff beer
- 7) Karhu beer
- 8) Porter beer
- 9) Nikolai beer
- 10) Saxon beer



Figure 5.3.2. Some of the Sinebrychoff Brewery Company brands (Alko, 2014).

Both the Nigerian breweries plc and Oy Sinebrychoff Ab are the largest brewery companies in Nigeria and Finland. They own the largest market share in the different countries. Their tabular comparison is analyzed in Figure 5.3.3.

Figure 5.3.3. Nigerian Breweries Plc. and Oy Sinebrychoff Ab comparison.

	Nigerian Breweries Plc	Oy Sinebrychoff Ab
Market share	57%	46%
Number of brands	11	10
Number of personnel	1900	850
Revenue	USD 1.1 billion (2009)	€ 369 million (2012)
Production volume	10 000 000 hectoliters	3 970 000 hectoliters
Per annum consumption	600 million (bottles)	440 million (Bottles)
Per capital consumption	10 liters	9.5 liters
Partnership	Heineken	Carlsberg

The Nigerian Breweries Plc revenue was influenced by the country's population when compared with Oy Sinebrychoff Ab. Nigeria's population also results to the Nigerian Breweries Plc.'s high number of personnel, production volume and per annum consumption.

6 RESULTS

The supply chain of Nigerian Breweries Plc aided with Nigeria's weather condition has boosted the growth of Nigeria brewing industry. At the same time, the Nigeria brewing industry helped the growth of the Nigeria agriculture sector by using locally cultivated raw materials by farmers.

The implementation of high level diversification of products which ranges from alcoholic beverages with different levels of alcoholic percentages to non alcoholic drinks also results in notable trend in the brewing industry and makes beverages consumption available for all consumers.

According to Proshare Nigeria (2008), great results are achieved by Nigeria brewers through their effective marketing. Various media for marketing are usually deployed such as print, electronics, billboards and sponsorships of events and programmes. These efforts create awareness in mind of customers, leading to greater patronage.

Nigeria brewing industry distribution network played an important role in the growth of the industry. Getting the products to the final consumers when needed gave them high level of income.

Just like in any other industry, the quality of the management team is essential for the success of the industry. The track record, experience and competence of top management determine to a large extent the ability to grow volumes and margins.

COMPARISON OF NIGERIA BREWERY PLC AND OY SINEBRYCOFF AB SWOT ANALYSIS

STRENGTHS:

NIGERIA BREWERY PLC	OY SINEBRYCOFF AB
Heineken ownership: Strong management, corporate governance, and deep pockets	Good domestic market sales
Largest capacity and well located	Low cost of labour
Dominance in most segments and pricing points	Excellent sales network
Relatively good margin control	Experienced workforce

WEAKNESSES:

NIGERIAN BREWERY PLC	OY SINEBRYCOFF AB
Lack of good power supply	High cost of investment in research and development
Weak infrastructure curtails operations to some extent	Future competition
Short-term volatility in oil prices can impact consumer spend	Little business units

OPPORTUNITIES:

NIGERIAN BREWERY PLC	OY SINEBRYCOFF AB
Warm weather condition	Rate of growth and profitability
Under-penetrated	Constant increase of income level
High barriers to entry	Growing economy

THREATS:

NIGERIAN BREWERY PLC	OY SINEBRYCOFF AB
Increased competition, especially from SABMiller	Increase in cost of raw materials
Market-wide capacity growing faster than demand	Increase in competition

CONCLUSIONS

The outlook of the beverage market in Nigeria looks very positive and there is big growth potential. Growth will be fuelled by an increase in disposable income, company advertising and heightened competition among key players. New product launches are expected to boost soft drink sales especially with the entry of new soft drinks brands. Due to Nigerian Brewery recognition in Africa, the company have no problem with selling of their products and even spend little on advertisement unless there is a new product ready to be launched.

Some conditions like population size, hot weather and festive behaviour of the citizens helped Nigeria in having more sales in brewery market than Finland.

SUPPLY CHAIN SIMILARITIES IN OTHER BRANCHES OF MANUFACTURING

In Nigeria, supply chain has lot of similarities and the common goal is making sure the final products reach the customers. Companies including big and small also take part in the supply chain process because a company can't produce without having buyers for their product and in one way or the other, all companies have raw materials that are used to create their final product. In some cases, raw materials may be averagely created products by another company which are then been completed and forwarded as final products of the company. In cases like this, there are mutual agreements between the companies and there are always long time partnerships.

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APPENDIX ONE

. AN INTERVIEW ABOUT NIGERIA BREWING INDUSTRY

BREWING INDUSTRY'S CONTRIBUTION TO NIGERIAN ECONOMY MASSIVE – MR. SENI ADETU (MANAGING DIRECTOR, GUINNESS PLC) BY THE PUNCH (SEPT. 27, 2013) (NIGERIA NEWS PAPER)

The Managing Director, Guinness Nigeria Plc, Mr. Seni Adetu, takes a look at the brewing industry in the country vis-à-vis the opportunities and challenges as well as the company's recent performance, among other issues, in this interview with AKINPELU DADA and MAUREEN AZUH

Since you took up appointment as the Managing Director of Guinness Nigeria Plc, what has been your experience so far?

First and foremost, I am delighted to be back in the country to serve in the capacity of Managing Director for Guinness Nigeria Plc after spending a big chunk of my career outside the market. It's been an exciting journey because as a company we have a vision to be the best performing, most respected and trusted consumer product company in Nigeria.

And that, by implication, requires a whole set of transformational interventions to enable us attain that height. In the last one year since resuming office here, I have in my way tried to inspire the team, provide strategic direction and orchestrate our performance across the organization and I'm delighted that one year on, we have made significant progress.

Some have said manufacturing in Nigeria is a huge task, how well is Guinness doing in this regard?

The unique thing about us is that we are so much wedded to our goals in this market, we are clear on what we want to achieve and our focus is on driving our strategies towards that. What is working for Guinness Nigeria is the clarity of our vision, the clarity of our strategies to achieve the vision and the investment that we are putting in to enable us actualizes those strategies.

Over the last four years, we have almost doubled the net sales value of this business; today, Guinness is the biggest brand by net sales value in Nigeria, which is the biggest

market for Guinness anywhere in the world. There's no other market that generates the net sales value for Guinness like Nigeria.

We are delighted, but of course, there's room for improvement but I can guarantee you that this is a very strong company; the fundamentals for business are very strong. We have a healthy balance sheet, and from our perspective, it is a business that is poised to grow further.

Do you share the perception by some that Africa is a drunken continent?

Sentiments aside, one thing I know is that the insight we have around the market here indicates that in terms of per capital consumption of alcohol, Africa is lagging behind the rest of the world, and within Africa, and I will tell you that Nigeria is within the bottom quarter of per capital consumption.

Guinness just released its results with massive dividend payout but in terms of performance of the company, there was a bit of a drop, what accounted for this?

We are delighted with the company's top line performance that we have announced, the net revenue of the company grew five per cent year-on-year and this is in the face of the challenging environment that manufacturers are operating. I would suggest it is a creditable performance.

In the last two or three quarters, the beer market has been relatively soft on account of decreasing discretionary income arising from the impact of inflation and the fuel subsidy removal. People are putting a lot more of their income around housing and feeding. So, in that circumstance, the Board of Guinness Nigeria is delighted with the performance that we have generated for the company.

The operating profit dropped marginally versus last year, but that's really on account of the cost of goods, which resulted from inflation of the prices of raw materials and the under recovery of some of the costs associated with the investments we made.

In 2010, we announced an investment of N52bn in capacity upgrade and we have expanded our capacity in Benin City and Ogba.

In profit after tax level, there is a real challenge that we have around investment funded through borrowings, and so, the interest expense that came as a result of that is the

reason why you saw a bit of depression in profit. But the underlying fundamental business remains strong and the equity of our brands has never been stronger; overall, we are pleased with the result and we know it can only get better.

How has the Boko Haram and other security challenges in parts of the country been affecting your business?

It is no gainsaying that for any business to thrive, the environment has to be conducive, and when you talk about the conduciveness of an environment, you are talking about the economic as well as political environment. The case of the insecurity issues in the country, particularly in the North, has been a concern to not just to us, but to the entire industry in the sense that there's always so much you can do in terms of creative presence in those markets on account of security concerns.

Over the last few years, the issue of Boko Haram in the North has slowed down business. I say with emphasis that that's not just talking about Guinness as a company or the brewing industry, but across the economy.

Why did you scale down on some brands such as Gordon Spark and Satzenbrau?

The market here is very dynamic and it is the dynamism that we see that affects the taste of the consumers. As marketers, our job is to base all of our innovation activities around consumer needs and the insight we get from them. While we can talk about one or two brands that have been relegated in terms of presence, there have been new brands.

For example, Snapp has been around for about one year. I think it is okay for some flavours and brands to be available at some point, and after some time as tastes change, we bring out new brands.

We still have Satzenbrau, the distribution is somehow limited but it is a brand that will continue to thrive in this market. We are continually evaluating our innovation options to ensure that whatever we serve our consumers is what they need at every point in time.

How would you rate the brewing industry in the country?

The brewing industry in Nigeria is a massive one and depending on who you talk to, it could be anywhere from 11 to 12 million hectolitres of business or more than that per annum. The good news is that the big players in the industry continue to invest in the

market because they all have internationally strong parent companies. For instance, Diageo is our on parent company. Overall, given the expertise that those international companies bring to the industry, you can imagine that it is an industry that is here to stay.

Beyond that is that over the last three years, there have been a lot of activities in the industry with the result that suddenly there's an expanded capacity and my guess is that we have a 30 per cent headroom capacity. In order words, what we have in terms of demand is about 30 per cent short of the capacity that we have here.

A few years ago, one of the big players in the market acquired some local regional players, we invested N52bn over the last four years, and we have completed that investment. Another big player has also come into the market.

So, overall, the industry is solid and very competitive, and the intensity of competition is getting stronger, which is good as long as there is a level playing ground for the players in the industry.

The bigger things that people really don't associate with the brewing industry are first the share size of the investment we put into the community. Be it water, education or health, I think what you see is worthy of emulation, we commit a certain percentage of our profits to the community every year.

Secondly, we are self-regulated, we invest in things such as responsible drinking, we put campaigns outside on when to and how to drink. Overall, I think the economic value and proposition that comes from the brewing industry in Nigeria is massive. I want to believe that it is an industry that plays a big part in the economic development of Nigeria.

Are there plans by Guinness to acquire some smaller companies?

We are constantly evaluating our options in the market place and if they come from new acquisitions, buying smaller businesses or if the oppositions are attractive from the international stand point, we will absolutely key into it.

It does not strike us that there are small viable brewery companies still available out there.

What are you looking at in terms of investment in 2014?

I wouldn't be quoting any figure now for two reasons; the investment we have announced has put us in a very strong position capacity wise to satisfy the market in the next couple of years that assumes that the market is going to turn around.

Secondly, our investment goes beyond plant and machinery, it includes marketing, distribution infrastructure etc.

How do you manage the logistics aspect of the business?

The supply chain is long and involves a lot of things; there's the part of inbound, actual manufacturing and outbound. Depending on the part of chain you are talking about, there are different modules. For instance, inbound is contracted out manufacturing we do ourselves, and outbound is part contracted and part self done. We review this every now and then to ensure that we create value in our organization. It varies from one supply chain subject to another. When you talk about packaging, it is something we control because the quality of our brands is important to us.

Apart from the problem of infrastructure, what are the other peculiar challenges that the industry is facing?

A lot of people talk about the telecommunications industry and how capital intensive it is, but I am not sure that people appreciate the level of capital investment that go into brewing operation, whether in terms of plants or equipment.

When you talk about the challenges, first is infrastructure. The first challenge is the quantum of the share capital. I talked about N52bn investment, there was no way we could have generated that within and we needed to borrow money.

The reason for the depression you noticed in the results we announced was, like I said earlier, due to finance charges associated with borrowings and plants. So, really one of the challenges that we face is the cost of funding what we do to keep the breweries running.

I am delighted to see the Federal Government making progress around the power reforms and I congratulate all the bidders that won in the recent privatization of the power firms.

I think that this is going to be a big achievement for us. When I think of other countries, and from available information, I think you need a megawatt of power for every 10,000 of the population that is the standard everywhere.

APPENDIX TWO

SCOR (Supply Chain Operations Reference-Model)

The SCOR (Supply Chain Operations Reference-Model) is developed by the SCC (Supply Chain Council). Its framework, improvement methodology, training, certification and benchmarking tools helps members organization to make dramatic, rapid and sustainable improvement in supply chain performance.

The following description is based on Supply Chain Council (SCC, 2014).

SCOR FRAMEWORKS

Frameworks provide a standard language for your supply chain operations and a blueprint of the key activities needed to manage effective and efficient supply chains.

SCOR frameworks are currently divided into six different topics and full content of these topics are available only to members. Nevertheless, the abstract of these frameworks will be introduced.

- SCOR 11.0: This SCOR-model has been developed to describe the business activities associated with all phases of satisfying a customer's demand. By describing supply chains using process building blocks, the model can be used to describe supply chains that are very simple or very complex using a common set of definitions. The model has been able to successfully be described and it provides a basis for supply chain improvement for global projects as well as site-specific projects.
- M4SC: Management for supply chain (M4SC) demonstrates how to implement SCOR tools, techniques, and templates throughout your organization, not just at a project level. SCM process categories, also called “layers”, in M4SC are Strategy, Network, Process and Resource.

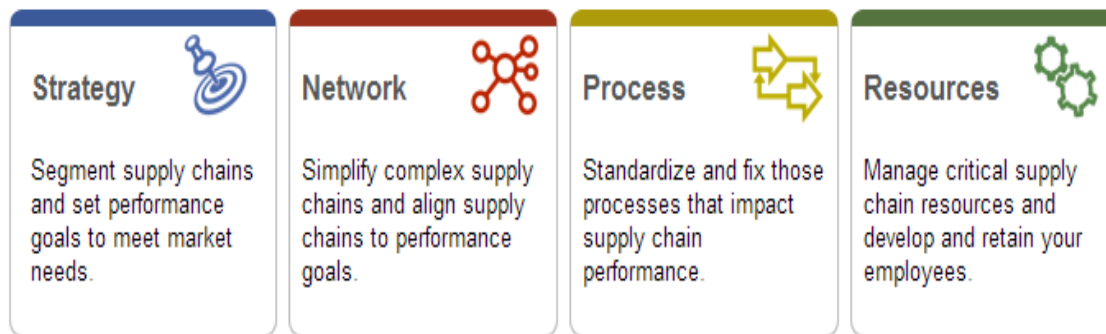


Figure 1. M4SC framework (SCC, 2014).

- DCOR 1.0: The Design Chain Operations Reference model (DCOR™) provides a unique framework that links business process, metrics, best practices and technology features into a unified structure to support communication among design chain partners and to improve the effectiveness of the extended supply chain.
- PLCOR: Product Life Cycle Operations Reference (PLCOR) model is intended to be industry-independent and should apply to lifecycles of both, products and service offerings. It spans all product lifecycle activities from the first idea to broad adoption in the mass market.
- CCOR 1.0: The Customer-Chain Operations Reference-model (CCOR) provides a unique framework that links business process, metrics, best practices and technology features into a unified structure to support communication among supply chain partners and to improve the effectiveness of supply chain management and related supply chain improvement activities.
- SCORmark: Companies generally use SCOR-based benchmarking to:
 - Set reasonable performance goals based on the SCOR model
 - Calculate performance gaps against a global database
 - Develop company-specific roadmaps for supply chain competitive success

