Investigating the impact of supply chain management on the performance of manufacturing industries in Sierra Leone: case study of Sierra Leone bottling company (SLBC)

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Abstract. Supply Chain (SC) is a series or network of companies who work collectively to make and deliver products and services to end-users. SC has become an important way of gaining competitive advantage and a way of improving companies’ performance. The impact of supply chain management (SCM) on the performance of manufacturing industries is very important in gaining competitive advantage. A weakness in SCM has a negative impact on the profit and can seriously affect the production and delivery of products. This research conceptualizes and develops four main dimensions to improve the performance of SLBC on Strategy and design, enabling infrastructure, process, and performance. To investigate the impact of SCM on the performance, this research employed descriptive data which was tested base on the available data through the use of software packaging for social scientists (SPSS) and Minitab. From the results, Process was found to have a strong correlation with performance (0.821), enabling infrastructure and performance (0.596) which shows that there is a cordial relationship between the variables. Also, performance has the highest mean (4.0760) which indicate it output factors have a very great impact on profitability, productivity and the entire performance. The company faced several setbacks in achieving its goals.

Keywords: Supply Chain Management, Supply Chain Impact, Performance Measurement, Customer Relationship Management, Implementation Strategies.

1. Introduction

Supply Chain has to do with the taking and managing of a product(s) which begin from the point of production on to the point of consumption. The process from the production to the consumption has to do with the upstream and downstream. SC nowadays play a key role in gaining competitive advantage over other competitors and a way of improving companies’ performance as competition is very high among companies. [1] started that since competition is no more among organizations, for companies to gain advantage and improve organizational performance over other competitors, they must create value chain through supply chain integration. [2] mentioned that the demand of customers in terms of how they ask for products is now becoming more sophisticated it is calling for individualized goods and services. It is for this reason that organizations are trying to ensure that they increase their revenue, and at the same time, they reduce cost. A major element of effective SCM includes both upstream collaboration and downstream integration of the partners of the firm’s and the customers in an efficient and effective manner [3]. The study specifically covers problems that are connected with the systems of supply chain management and how best they will minimize expenses to a level that maximizing...
profit and investigating the impact it has on the entire industry. The Manufacturers and Suppliers are different units that are financially independent to each other, but they pursue their own motive in order to maximize their returns [1].

The supply chain management system is the Centre for any organization more especially for manufacturing companies. Manufacturing companies need a proper management system. According to [4] A holistic view of supply chain systems can deliver an insights on how the participants supply chain operate independently and collectively towards attaining a real-time, global supply chain. In the process of trying to attain the goal of SCM system, each organization in the network has its own plan and operates independently from the others. [2] Stated how supply chain management has become very important in order to gain competitive advantage. As a result of this, people from academics and industries are now showing great concern in SCM with many models and techniques which are extremely useful in order to maximize the market with more efficiency and effectiveness.

1.1 Background
Supply chain is now becoming a very important concept in a comprehensive analysis. It is a link that connects the different elements of a manufacturing process that start from the stage of production up to the stage of delivery. In recent times, SCM has become well-known, and it is shown by marked increases in conferences, professional development programs, practitioner and academic publications [5]. SCM focuses at the management function that purely deals with the management of goods, works and services from the original producer, through some transformation processes in a firm in order to add value to the ultimate consumer and backflow of remains and empties together with the related information [6]. The motive of SCM is to see how best companies can incorporate activities within and across organizations for providing customer value. As also mentioned by [5], [2], supply chain management contains the preparation of all activities involved in sourcing and procurement, conversion, and involved in acquiring, manufacturing, issuing, and selling the products or services to the end customers. According to [7] they explained that “Supply chain management includes coordination and collaboration with channel partners, which can be suppliers, intermediaries, third-party service providers, and customers which integrates supply and demand management within and across companies”.

In order to make sure there is a great turnout in long term performance of SCM and other industries, SCM has a key role to play in order to have a massive improvement within an organization. One major important role of supply chain management is that it increases competitiveness in order to satisfy customers. In these current days, SCM has become an integral part of a business and it is essential to any company’s success and customer satisfaction. In order to have a better improvement, sometimes supply chain managers involves in going beyond the suppliers that interface with the organization. For this to be actualized, this may include removing cost and increasing quality.

1.2 Problem Statement
There are several manufacturing companies that are faced with many challenges which normally have an adverse effect on the output of the firm’s performance [8]. The problem of how best companies should ensure they minimize their cost and satisfy the need of their customers on time has existed for a very long time. It is of essence for companies to know the real problem before thinking about how to solve the problem. [9] mentioned that the “idea of a problem statement, a problem-solving method, and the application of the problem-solving method to a problem are given detailed formulations that are purely based on the type of the problem”. Any weaknesses in the process of transforming a product(s) can seriously disturb the manufacture and distribution of products to final consumers. One of the major problems relating to researchers is to identify the reasons why companies tend not to implement SCM, notwithstanding its advantages and its driving forces [10]. The weaknesses that might have occurred in a production process may have adverse impacts on the overall outcome of the company. There has always been a shortage of the company's products during festive seasons. In recent years, there is very high competition with other beverage producing companies which had
prompted the SLBC to revisit their packaging system as other beverage manufacturing companies are using plastic bottles that are disposable after use. There are also problems with lead time, transportation facilities and holding of raw materials as well as finished products.

Management of the company should ensure that they do not have shortage of products particular during the festive season, and this can be done by ensuring they follow the company supply chain procedures by having all materials needed early. Also, strict measures should be taken in order to solve the packaging problem of the company by making sure that they gain a competitive advantage over other competitors in the market. This can be solved by using plastic bottles which are disposable and not returnable. Finally, the problem of lead time, transportation facilities and the holding of raw materials can be solved through early preparation and having sufficient vehicles to transport the product. The company should ensure they have an intermediary that exists between the company and the suppliers by making sure that the company receives its supplies at the appropriate place, time and quantity.

1.3 Objectives of the Study
The reason for SCM increasing is to compete at the SC levels, organizations must ensure they incorporate strategies. The objective of this study is to examine the impact of Supply Chain Management on the SC performance of SLBC. However, in order to ascertain its motive, key objectives had been investigated which includes:

- To evaluate the supply chain management of the SLBC in order to make rapid and drastic improvement in its supply chain process/procedures
- To evaluate the importance of SCM on the overall performance of SLBC.
- To evaluate the challenges/problems faced by SLBC while adopting supply chain management

2. Methods
This part focuses on the approaches used to carry out this research. It describes the methodology used in collecting and analysing the data for this research. This study assumes a cross-sectional survey design that uses both quantitative and qualitative approaches. A questionnaire was obtained to gather information from the employees asking them to indicate their level of agreement on the questions asked by each variable. The questions were designed on the review of the literature and from the author.

2.1 Research Design
[11], has mentioned that research design is a set of conceptual procedures in which research is conducted and analysed in order to measure the variables specified, it gives a clear picture about how the analysis of the data design would look like. The study adopted descriptive statistics. The methodology used in this study is vital for any research work to be carried out. [12] stated that “A research design is the arrangement of conditions for collection and analysis of data in a manner that aims to combine relevance to the research purpose with economy in procedure”. A cross-section study was used. The use of research design is very useful because it helps the smooth sailing of the several research processes, by ensuring the research is well-organized as a way of obtaining the highest information with a minimal expenditure of effort and time [12].

2.2 Sample Size and Techniques
A sample is a small number of people that are normally selected for proper observation and for further analysis [13]. The study used stratified random sampling to members who are in the network of manufacturing and distribution of the operations of the SLBC. The Sample was drawn from SLBC Limited and focused on all departments dealing with Supply Chain management issues. According to [12], a sample design has to do with a certain way of getting sample output from a particular population. 30 respondents out of 100 were drowned from the sample frame through the use of
stratified sampling. [12], stated that a representative sample could be 30% of the targeted population. The sample included 3 members of SLBC from the Administration and HR department, 5 members of staff from the Logistics department, 5 members from the Marketing/commercial department, 6 members from the production/Technical department, 5 members from the supervision department, 3 managers, and 3 members from the Finance department.

2.3 Collection of Data
The process of collecting data take effect after a problem(s) and a plan have been identified [12]. They are known to be un-interpreted materials on which a decision is to be created and rely on facts which may include anything known to be true or exist [11]. This paper develops and administers an online questionnaire that investigates the performance of the manufacturing company through Google from a well-represented sample of members from the SLBC. The questionnaire was divided into various sections. In collecting the data, both secondary and primary data were used.

2.4 Data Analysis Procedure
In order to show a convincing conclusion in analysing the data, this paper shows different statistical procedures where a test was done base on the available data. Data analysis which involves the systematic process of establishing a relationship between and among data collected through various instruments used. The study thus used descriptive statistics mainly mean, variance and standard deviation to summarize the response. According to [14], descriptive statistics offer simple summaries about the sample that include the statistical measures of central tendency and dispersion. This was used to analyse the objective and to integrate both qualitative and quantitative techniques in the data analysis [14]. A reliability test was done, and the analysis was done through a software packaging for Social Scientists (SPSS) version 23 and Minitab 17.

3. Results and Discussions
The process of a company in understanding the need of their customers help the company to deliver high good products or service to their customers [15] This paper sought to establish the different SCM process on the impact of SLBC that had been adopted by different institutions. Table 1 shows the summarized output on the impact of SCM improvement. It evaluates the SC processes that help to determine the weak links and identify possible improvement ways in the areas of strategy and design, enabling infrastructure, process, and performance. The study of supply chain that concerns manufacturing industries are done with the help of certain key variables like, lack of sophisticated information system to help the IT department, and lack of support among members in the SC [3]. The discussion regarding the rapid improvement of the company SC, it is clearly shown from the output that the average mean score obtained from the four variables were rated high which concluded that the SCM of the SLBC is effective and efficient. It has also proven that there is a relationship between the factors and performance. The problem of packaging, storage, lead time, outdated machinery, having one production centre are issues that need key intention in order to gain competition in the market and maximize profit.

3.1 The Improvement process implementation of SCM for the variables
This research sought to establish the different SCM process on the impact of SLBC that had been adopted by different institutions. The respondents were asked to rate the variables base on their level of agreement working with the company with different statements on a scale of 1-5. The outputs of the responses are provided in table 1.
Table 1: Mean of Strategy, Enabling Infrastructure, Process, and Performance.

|                       | N  | Range | Minimum | Maximum | Mean  | Std. Deviation | Variance |
|-----------------------|----|-------|---------|---------|-------|----------------|----------|
| Strategy and Design   | 30 | 1.60  | 3.00    | 4.60    | 4.0733| .40166         | .161     |
| Enabling Infrastructure| 30 | 1.85  | 2.75    | 4.60    | 4.0170| .41836         | .175     |
| Process               | 30 | .86   | 3.64    | 4.50    | 4.0570| .20785         | .043     |
| Performance           | 30 | 1.19  | 3.33    | 4.52    | 4.0760| .27535         | .076     |
| Valid N (listwise)    | 30 |       |         |         |       |                |          |

The descriptive statistics in Table 1 and Figure 1 was obtained from the first objective of the research that tries to evaluate the SCM of the company that aim at it improvement for Strategy and design, enabling infrastructure, Process, and Performance that shows the way in which the variables have been adopted either to a great extent or to a moderate extent. A variable(s) can be adapted to a great extent if (mean lies between 3.51 and 5) and for a moderate extent the mean must lie between 2.51 and 3.5. From the results, Strategy and design show an output of 4.0733 with a standard deviation and variance values 0.40166 and 0.161 respectively. Enabling infrastructure has a mean of 4.0170 which is the smallest when compared to the others with a minimum value of 2.75 and a maximum value of 4.60. Process has a range of 0.86, mean value of 4.0570 and a minimum value of 3.64 and a maximum of 4.50. Performance has the highest output of 4.0760. It has a variance and a standard deviation of 0.076 and 0.2753 respectively it also has a range of 1.19 with a minimum and a maximum value of 3.33 and 4.52 respectively. The results clearly show how each variable has a role in attaining the success factor in determining the SC performance of the study [17] These findings show that the SCM improvement process implementation has been adopted and implemented to a great extent, where there is no moderate extent from the results. It doesn’t mean that the SLBC did not have grounds to cover in terms of improving the company SC.

3.2 The important and relationship of SCM on the performance of SLBC

In an extent to know the relationship that exists among the following variables, a correlation analysis tests were done in order to know the relationship between two continuous variables in terms of how strong the relationship is, and in what direction the relationship goes. The strength of the relationship lies between -1 to +1. In order to know whether the relationship is strong or weak as shown in table 2.
Table 2: Correlation of the variables

|                      | Strategy & Design | Enabling Infrastructure | Process | Performance |
|----------------------|-------------------|--------------------------|---------|-------------|
| **Strategy and Design** | 1                 | .618**                   | .203    | .140        |
| Sig. (2-tailed)       | .000              | .283                     | .461    |             |
| N                    | 30                | 30                       | 30      | 30          |
| **Enabling Infrastructure** | .618**           | 1                        | .500**  | .596**      |
| Sig. (2-tailed)       | .000              | .005                     | .001    |             |
| N                    | 30                | 30                       | 30      | 30          |
| **Process**           | .203              | .500**                   | 1       | .821**      |
| Sig. (2-tailed)       | .283              | .005                     | .000    |             |
| N                    | 30                | 30                       | 30      | 30          |
| **Performance**       | .140              | .596**                   | .821**  | 1           |
| Sig. (2-tailed)       | .461              | .001                     | .000    |             |
| N                    | 30                | 30                       | 30      | 30          |

Strategy and design plus enabling infrastructure have a positive correction coefficient of 0.618 which shows that the correlation between them is strong. The output shows that the correlation is significant at a level of 5% because the p-value for strategy design and enabling infrastructure is less than the alpha value. The correlation coefficient for process and performance is 0.821 positive which means that the relationship between process and performance has positive properties. The strength of the correlation is also strong because the P-value is < alpha, then it implies that the correlation between process and performance is statistically significant at 5% level.

The correlation between Enabling infrastructure and process is positive 0.500. The strength of the correlation 0.500, in this case, it can be said to be moderate. Since the P-value (0.005) is less than 0.05, it indicates that the correlation is significant at 5% level. Also, the correlation coefficient that exists between Enabling infrastructure and performance is positive 0.596. This result shows that there is a moderate linear relation between enabling infrastructure and performance. Since the P-value between enabling infrastructure and performance is less than the alpha value of 0.05, it indicates that the correlation is significant.

A Pearson correlation was used to assess the predictive relationship between the following factors: strategy and design, enabling infrastructure, process, and performance with the overall performance of the company. Finding show showed a positive correlation among the factors toward the performance of the company. Process was found to have a very strong correlation with performance (0.821), enabling infrastructure and performance (0.596) as it is shown in Table 4.12. The output clearly shows that the factors have a strong impact on the aspect of productivity, profitability and the overall performance.

The variables were supported by sub-variables. Enabling infrastructure comprises of (ICT, human resource, and organizational structure), process (CRM, warehouse management, delivery, planning, and sourcing) while performance (reliability, responsiveness, and flexibility).
4. Conclusion

4.1 Conclusions
The implementation of effective and efficient SCM can significantly improve organizational performance through cost reduction [15]; [18]; [19]. Based on the topic under review which problem statement was developed with a specific objective set out upon which a particular methodology was drowned, data collected were presented, analysed and interpreted. From the above findings, the researcher has come to the following conclusions: Firstly, the SCM systems have a very great impact on the aspect of productivity, profitability and the overall performance of the operations of SLBC. Secondly, it was concluded that strategy design and enabling infrastructure, plus process and performance have a strong positive relationship with the SLBC while process and performance have a moderate relationship with enabling infrastructure. Thirdly, the researcher concluded that the SLBC faced some challenges in their bid to implement SCM best practices. These include the failure on the part of top management officials to give deserved attention to the functions of the suppliers and distributors, delays in the clearing of materials at the quay, poor technology, old and outdated equipment and machinery, lack of branch production centre, long lead time, and inadequate number of distributors. For any SCM to be more effective, it must require managing relational exchange with other supply chain institutions [20].

4.2 Recommendation
In order to improve performance, profitability, and the productivity of SLBC, the following recommendations have been put forward:

● The company should ensure they try to decentralize its production process by extending production branch in the provinces
● Management of the company should replace the old and outdated equipment and machinery, and also introducing technological innovations in the company production process.
● The company need to build more outlet throughout the country, where customers can easily have access to the company products.
● In order to avoid supply management challenges arising from the suppliers in future contracts, management of SLBC should consider a supplier who has demonstrated reliability in their previous contract by fulfilling its obligation of the contract.
● From the output of the correlation, out of four variables, only two were found to have a strong and positive relationship. Management should ensure that there is a cordial relationship that exists between the manufacturer (buyer) and the supplier, manufacturer and distributors, and they should have an intermediary that exists between the company and its suppliers by ensuring that they receive their supplies on time.
● From the output, the SLBC should strengthen the company SCM in order to continue improving the performance of the company

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