Assessing supply chain practices and how they are perceived to impact performance of firms in Sierra Leone: A Case Study in a telecommunication company (*Sierratel*)

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**Abstract.** As competition is no longer between organizations but among supply chain players, Supply chain practices have become a major strategy employed by many businesses to gain competitive advantage and improving organizational performance. The research aimed at assessing Supply Chain Practices and how they are perceived to impact the performance of firms in Sierra Leone a case study in a Telecommunication Company (Sierratel). Two paradigms of the supply chain were developed for this research. Supply chain enablers (Organization, People, Technology, Plan, Source, Deliver, Information Sharing) and supply chain non-financial performance (Flexibility, Responsiveness, Reliability and Agility). Self-administered questionnaires were sent to thirty-four respondents through google form using a simple stratified random sampling technique. Descriptive statistics is applied to analyse the data through SPSS. The findings showed differences in various supply chain practices adopted and implemented by the company. People, Technology, Delivery, Responsiveness, Reliability and Agility did not create much impact on the company’s performance. Further analysis also revealed that supply chain processes as one of the practices among the others adopted and implemented are almost in its right footpath as compared to strategy and performance but continuous improvement of supply chain practices will attain a sustainable competitive advantage and hence firm’s performance.

**Keywords:** supply chain practices, supply chain strategy, enablers, performance, competitive advantage, continuous improvement

1. **Introduction**

Nowadays, organization has realized that they only control and command a small portion of the value chain in their operation and the opportunities for creating an atmosphere of continuous improvement is very much imminent. These realization by supply chain (SC) practitioners demands a strategy and processes for securing competitive advantage. Supply chain management (SCM) is a new phenomenon in the service industry and may play a significant role towards the successful achievement of any organization. Supply chain management practices (SCMP) are set of standard events designed and undertaken by organizations to enhance the effective management of supply chain. SC practices have served as an engine that accelerated economic growth for businesses. SCM has perceived as a strategic response to the global challenges ahead from the SC players due to the over dependencies of the inflow and outflow of information, products and services among SC members[1]. Studies by [2], stated that SC is a whole set of activities involved in taking and managing the product from point of production to point of consumption. Much interest and attention have been seen over the recent years especially in the field
of operations management research. Development of new ideas such as outsourcing, decreased in inventories, Just-In-Time Philosophy, cooperation and collaboration, and strategic partnerships within the SC [3].

1.1 Background
SC practices have become paramount for most business and therefore examining the relationship between organizational performance and SC performance has prompted managers to seek better knowledge and understanding of SC. This has prompted many organizations recently to adopt and integrates different supply chain practices like e-collaboration within the supply chain network [4]. SCM is an integrated management approach dealing with interdependent network of suppliers, manufacturers, distributors, and retailers to facilitates the smooth flows of goods, services, and information from suppliers to end customers with minimum cost while sustaining required service levels [5]. According to [6], SC manages supply of relations as well as managing a network of interconnected businesses with the aim of providing the required product/service to the end users with satisfaction. The number of competitors in the market is increasing and expanding gradually and organizations has to re-establish their operations to respond to the changing market dynamics to produce goods and services of high quality that differentiates from others through efficient and effective management of the SC. Over the years, the nature of SC has changed to the extent that organizations no longer compete against each other on the basis of quality as it was practiced in the nineties [8]. As competition in the 1990s continues to intensified in the markets. Improving customer service level in terms of delivering the product or service to the right place, at the right time and at lowest cost became the challenges associated. To be more competitive organizations should begin to think ahead to improve efficiencies within their entire SC network. Understanding SC strategies as well as implementing effective SC practices is an essential prerequisite to global competition and profitability [9], [10]. However, [11], mentioned that, to survive in tight competition, continuous improvement of SC practices should be adopted and integrated by companies as it is largely believed by many practitioners that, better SC practices will lead to better performance. Because organizations no longer compete between themselves but among supply chain the current trend of SC practices has become a future path for scoring competitive advantage and improved organizational performance [12]. The new source of business competition lies outside the walls of the firm. It’s determined by how effectively these organizations link their operations with the SC partners.

1.2 Problem Statement
SC practices are designed to reduce cost, if not to eradicate the high incidence of wastages among the supply chain networks. SCM itself is compounded by a network of key players both at the strategic and operational levels. This problem sometimes leads to poor coordination and fall in performance standards. Survey has revealed that a high percentage of companies in Sierra Leone are still prone to traditional practices and lack modern SC practices that would improve performance. Such practices as it is observed had little or no effect in increasing the performance of companies especially SIERRATEL to meet global competitiveness. Many studies on supply chain management have been carried out but majority of them focused on processing and manufacturing sectors. Supply chain management within the services sector, especially in the telecommunication sector, has not been fully addressed by many researchers. This is justified by [13], that, SCM practices, in general, is not fully matured in businesses rendering services and conclusions reached are untenable. Studies by [14] have found varied impacts of SCM on organizational performance. Some of the findings include but not limited to; improved performance measurement, continuous improvement of organizational practices. Supply chain practices require effective collaboration, cooperation and strategic partnership at all levels of management both internal or external to attained organizational performance of which presently this has not been adequately showcased in the service sector of Sierra Leone with emphasis placed on the Sierrtel.

The critical challenges mostly faced by the company includes the adoption and integration of effective SC practices, Poor Information and Communication Technology (ICT) and others. The company should be able to quickly identify the best SCM practices to respond to changes in the market.
Information technology is a pathway for connectivity and integration in doing businesses thereby linking different supply chain players to a whole operation in an efficient and effective way. Technology is often seen as an enabler in SC due to its substantial reduction in paperwork, improve communication and reduce supply chain cycle times if appropriately implemented [15]. There are numerous complaints from customers on the poor quality connection lines and response time causing dissatisfaction among customers. Major concerns raised by customers is that the company lacks a comprehensive strategy to improve performance despite it enormous potential for growth. To ensure successful growth, the company’s SC should eliminate quality defects through the implementation of a robust and continuous improvement strategy to increase the level of service with minimum cost. It required management to invest on advanced IT systems, recruit trained and qualified people to handle current technology.

1.3 Objectives of the Study
This study includes the following: (1) To assess the SCPs and how they are perceived to impact performance. (2). To provide a framework for effective and excellent supply chain practices., (3) To identify supply chain strategies that will enable companies to achieve superior performance.

2. Methods

2.1 Research Design
The study is designed into qualitative and quantitative in nature. To describe some aspect of the objectives and to further understand the relationship between the variables of the study, a research framework was designed to form the basic construct of the research and can be seen below in Figure 1

![Figure 1 Expanded Model View](image)

2.2 Population and Sample Size
The researcher identified a special population of interest to investigate a specific issue whose findings is used to generalized the whole population. [16], define the target population as a population consisting of a specific group of subjects to whom the researcher plans to generalize their findings. The population of the study includes all directors, managers, procurement officers, supervisors and warehouse officers of the company. A sample size of thirty-four (34) respondents was drawn from the sample frame using simple stratified random sampling to promote the needs for efficiency and representativeness. No fixed percent of the target population is used as a representative sample of this study as this is justified by [16]. It may depend on the nature of the population of interest or the data to be collected.
2.3 Research Instrument
The instruments used in the research are questionnaire and personal interview. To ensure convenient comparison and analysis of the variables under investigation, the use of statistical tools such as tabulation, charts and the transformation of the absolute data value into percentages is also adopted to examine the magnitude of the SCMP and its impact on performance. Finally, an interview is justified because a high percentage of the respondents are not familiar with SCMP to respond to the items in the questionnaires whilst at the same time rephrasing the questions to avoid ambiguity.

2.4 Sources of Data
The research utilizes both primary and secondary data as the main sources of the research data.

2.5 Data Collection Procedure
The data was collected through a questionnaire. The questionnaire is administered using google form platform method. To ensure effective data collection, the questionnaire was designed in an open and closed-ended question in order to enable the respondent to answer the questions independently. To avoid missing out very important details from the interview, the researcher also made phone calls to asked questions and then record the responses by means of note-taking. The questionnaires was presented into blocks and marked on a Likert scale of 1 to 5. The scale is labelled with Strongly Agree [5 ] to Strongly disagree [1]. Finally, email was first sent to respondents at an earlier period explaining the aims and objectives of the study and requesting their participation. Also, similar mails and phone calls was done repeatedly to reminding them to respond to the survey.

2.6 Pilot testing of the research instrument
A Pre-testing of the research instrument was done prior to the main study on a group of respondents. Mugenda and Mugenda,(2003), as cited in [17] stated that a sample size of 1- 10% of the sample frame is a suitable frame to engage in a pilot testing. Three (3) respondents were used for the pilot testing to determine the suitability, appropriateness, and clarity of the questionnaire in addressing the variables under investigation to determine the reliability of the instrument.

2.7 Reliability and Validity of the Study
The greater the degree of consistency and stability in an instrument the greater its reliability.[18],states that “validity refers to an empirical measure adequately reflects the real meaning of the concept under consideration”. Mugenda & Mugenda (2003) as applied to [17] hold that, the accuracy of data to be collected largely depends on the data collection instruments in terms of validity and reliability achieved by having objective questions included in the questionnaire. The questionnaire was tested for both internal consistency and stability of items in the survey and to prove how the items measuring a concept hang together as a set. [19], stated that Cronbach’s Alpha is a reliability coefficient that indicates how well the items in a set are positively correlated to one another. The closer the alpha value to 1, the higher the internal consistency but for the purpose of this study, Cronbach Alpha coefficient of 0.5 and above is accepted and suitable for the questionnaire. Sekaran (2003) as cited in [20], further claims that a study is only reliable when another researcher using the same procedure and studying the same phenomenon arrives at similar conclusions

2.8 Data analysis and presentations
[19] asserts that there are three objectives in data analysis; getting a feel for the data, testing the goodness of the data, and Hypotheses testing to answering the research question. Establishing the goodness of data lends credibility to all subsequent analysis and findings because it measures the reliability and the validity of the study. Thus, the study used the Statistical Package for Social Sciences (SPSS) version 23 and Ms – Excel to analyze the data. Three techniques of data analysis test were used in the study such as descriptive statistics, reliability and correlation analysis.
3. Result and Discussion

3.1 Supply Chain Strategy

The research uses three paradigms as strategy to assess the supply chain practices of the research as shown below in Table 1

|                      | N  | Range | Min. | Max. | Sum  | Mean  | Std. Dev. | Variance |
|----------------------|----|-------|------|------|------|-------|-----------|----------|
| Organization         | 34 | 3.80  | 1.20 | 5.00 | 136.90| 4.0265| .70681    | .500     |
| People               | 34 | 2.70  | 2.30 | 5.00 | 132.90| 3.9088| .67211    | .452     |
| Technology           | 34 | 2.70  | 2.30 | 5.00 | 132.50| 3.8971| .54688    | .299     |
| Valid N (listwise)   | 34 |       |      |      |       |       |           |          |

From the data presented in Table 1 above, it shows that “organization” as a supply chain strategy score the highest mean and standard deviation of (4.0265) and (0.70681) respectively, followed by people and technology. 34% (12) of the respondents of the company strongly agree that the company assign responsibilities to employees with set targets as well as the organization has a well-defined policy that is periodically reviewed. Also, 33% (11) respondents agree that employees are not involved in some decision-making process and the company do not have sophisticated IT systems for their operations. Meanwhile, the same 34% (12) employees agree that the company has a focus and visionary leadership as well as a centralized and decentralized work policy but disagree with the fact that the company has a shorter span of control. More so, 66% of the respondents disagree that the organization invests heavily in IT infrastructure and their IT system enables cross-enterprise connectivity. They also failed to agree that, the organization provides training capacity for their employees and the right people are assigned in the right positions.

3.2 Supply Chain Processes

Four constructs were used by the researcher to assess the various supply chain processes. The mean and standard deviation were the main measures used by the researcher to analyse the results. A mean of 4 and above indicates that the respondents agree or strongly agree while a mean less than 2 indicates strongly disagree or disagree and a mean of 3 shows that the employees are neutral in their opinion. The findings of this study are presented in Tables below.

|                      | N  | Range | Min. | Max. | Sum  | Mean  | Std. Dev. | Var.  |
|----------------------|----|-------|------|------|------|-------|-----------|-------|
| Plan                 | 34 | 2.30  | 2.70 | 5.00 | 138.40| 4.0706| .57342    | .329  |
| Source               | 34 | 2.10  | 2.90 | 5.00 | 140.60| 4.1353| .48548    | .236  |
| Deliver              | 34 | 2.40  | 2.30 | 4.70 | 129.60| 3.8118| .59583    | .355  |
| Information Sharing  | 34 | 2.00  | 3.00 | 5.00 | 137.40| 4.0412| .47934    | .230  |
| Valid N (listwise)   | 34 |       |      |      |       |       |           |       |

The results presented in Table 2 above clearly shown that the sourcing policy adopted by the company has the highest mean score of (4.1353) interns of its supply chain processes as compared to plan (4.0706), information sharing (4.0412) and deliver (3.8118). This means that since source has the highest mean, the respondents agree that the company have good supplier relationship, an inventory plan for supplier; regularly update their suppliers with their performance records; supplier has high level of reliability and manage supply risk systematically. Also, the planning process of the company yield a mean of (4.0706) This means that the company have a strategic plan which has a timeline for implementation, do a collaborative planning with suppliers, plan for capacity requirement and finally, periodical reviewed of the strategic plan for improvement. With regards to the information sharing
process of the company, it has a mean score of (4.0412). This indicates that the respondents agreed with the view that, the company inform their suppliers in advance of any changing needs or events that may affect their relationship, share information of core business processes. Meanwhile, the mean score of the delivery process (3.8118) fall below the average which means that the respondents disagreed with the delivery processes of the company. For instance, they disagreed that the company’s distribution centres are closer to the customers, delivery schedules are shorter than competitors; make provisions for potential delivery disruptions such as breakdowns and natural disaster.

3.3 Supply chain Performance
The researcher used non-financial performance measurements to assess the performance of the company. This includes flexibility, responsiveness, reliability and agility are shown in the Table below.

| Table 3 Supply Chain Non-Financial Performance |
|-----------------------------------------------|
| Flexibility | N | Range | Min | Max | Sum | Mean | Std. Dev. | Var. |
|---------------|---|-------|-----|-----|-----|------|-----------|------|
| Flexibility   | 34| 2.20  | 2.80| 5.00| 136.10| 4.0029| .61026     | .372 |
| Responsiveness| 34| 2.30  | 2.50| 4.80| 133.30| 3.9206| .66596     | .444 |
| Reliability   | 34| 3.60  | 1.40| 5.00| 135.60| 3.9882| .73020     | .533 |
| Agility       | 34| 3.20  | 1.60| 4.80| 126.00| 3.7059| .73069     | .534 |
| Valid N (listwise) | 34 |

From the Table 3, there is empirical evidence showing that flexibility have an average mean of (4.0028) which indicates that, respondents agreed with the fact that flexibility has a direct effect on the performance of the company. Most of the respondents interviewed express their opinion that the company has the ability to change planned delivery schedules as well as quickly adapt to changes in demand in the market. Meanwhile, the company’s responsiveness practices have a mean of 3.9206 indicating that the company could not respond to customers’ request promptly; response time is not always available on a 24 hours bases; and customers complaints are not handled with the attention needed. Both reliability and agility also showed a mean of (3.9882) and (3.7059) respectively.

3.4 Summary of Supply chain Practices

| Table 4 Summary of Supply Chain Practices |
|-------------------------------------------|
| N  | Range | Min | Max | Sum  | Mean  | Std. Dev. | Var. |
|----|-------|-----|-----|------|-------|-----------|------|
| Strategy | 34 | 2.70 | 2.20| 4.90| 133.90| 3.9441| .53315| .284 |
| Process  | 34 | 1.60 | 2.90| 4.50| 136.70| 4.0147| .42411| .180 |
| Performance| 34 | 2.50 | 2.30| 4.80| 133.10| 3.9044| .62140| .386 |
| Valid N (listwise) | 34 |

This section sought to give an overall summary of the findings made from the different supply chain practices adopted and implemented by the company for the period under reviewed. Table 4 shows a summary analysis of the different supply chain practices adopted and implemented by the company for the period under review. Statistical data clearly indicates that the company is only able to achieve an average mean of 4.0206 for it supply chain processes while the mean scores for strategy (3.9382) and performance (3.9147) practices fall below average, meaning that the two practices did not contribute much impact on the performance of the company. Finally, it can be concluded that the higher/stronger the company’s supply chain practices rating the better the company’s overall performance and improvement it will be. This is inconsistent with the studies done by [8] and [12].
3.5 Correlation

A Pearson correlation was used to show the direction, strength and significance of the bivariate relationships between strategy, processes and performance. The $(r)$ between 1.0 which indicates a positive relationship and $(r)$ -1 indicate a negative correlation.

|                  | SC Strategy | SC Process | SC Performance |
|------------------|-------------|------------|----------------|
| SC Strategy      | Pearson Correlation | 1          | .653**         | .653**         |
|                  | Sig. (2-Tailed)       | .000       | .000           | .000           |
|                  | N                      | 34         | 34             | 34             |
| SC Process       | Pearson Correlation   | .653**     | 1              | .834**         |
|                  | Sig. (2-Tailed)        | .000       | .000           | .000           |
|                  | N                      | 34         | 34             | 34             |
| SC Performance   | Pearson Correlation   | .653**     | .834**         | 1              |
|                  | Sig. (2-Tailed)        | .000       | .000           | .000           |
|                  | N                      | 34         | 34             | 34             |

**. Correlation is significant at the 0.01 level (2-tailed).

According to Table 5, strategy shows a positive relationship with process and performance. The path coefficient of strategy was 0.00 and is statistically significant ($p < 0.05$) A correlation of 0.653 is moderately a positive correlation with process and performance and that there is evidence to say that a correlation exists in the population. Also, there is a strong direct relationship between process and performance (0.834) and statistically significant ($p < 0.05$). This means, there is enough evidence to justify that, a positive relationship exist between process and performance ($r= 0.834$) indicated that the level of process accounted for a large portion of (83.4%) of the variability in strategy.

4. Conclusion

From the research carried -out, it can be concluded that the company’s supply chain strategy is below average to fully achieve its strategic objectives. This is due to the company’s failure to invest heavily on IT infrastructure. The technology used is not sophisticated to meet the current trend of the market making business operations more difficult. There is inadequate training capacity for personnel and lack of expertise in the supply chain. People are not assigned in their rightful position. The results from the findings also shows that the SC process scored the highest mean and standard deviation than strategy and performance. This is as a result of (plan, source and information sharing) scored a mean of 4 and above as compared to strategy and performance with only one indicator above four for each. The company’s sourcing policy is in the right path with the current practices, as well as the good supplier’s relationship and high level of reliability. The performance indicator became the least among the supply chain practices of the company. The analysis of the result showed that only flexibility had an impact on the performance. The company’s responsiveness practices are below average meaning that, the company could not respond to customers' requests promptly and response time is not always available on a twenty-four (24) hours bases. Also, customer complaints are not handled with the attention needed. Both reliability and agility shown a mean that is below average respectively.

4.1 Recommendations

The following recommendations where drawn from the research for management of the company, other organizations and future academic researchers wanting to undertake a similar venture. Firms have to design a clear and comprehensive strategy that will embrace supply chain best practices. This is so because the strategy shows the direction or path the business is going in terms of efficiency and responsiveness. The company should invest heavily in IT infrastructure and installed sophisticated systems to avoid the problem of poor network connectivity nationwide. Training programs should be
developed and implemented more frequently for performance and continuous improvement. The company should also have the willingness to share vital information or knowledge of core business processes with its strategic partners. Performance has to be measured at least and adjust to the rapid changes in the market. Finally, to ensure sustainability and continuous improvement of performance, all three levels of management should collaborate through a closed-loop system.

5. References
[1] L. Xu and B. M. Beamon, 2006 Supply chain coordination and cooperation mechanisms: An attribute-based approach, *J. Supply Chain Manag.*, 42(1), pp. 4–12.
[2] S. Sindhu and A. Panghal, 2016 Robust retail supply chains - the driving practices, *Int. J. Adv. Oper. Manag.*, 8(1), p. 64.
[3] D. Kern, R. Moser, E. Hartmann, and M. Moder, 2012 Supply risk management: model development and empirical analysis, *Int. J. Phys. Distrib. Logist. Manag.*, 42(1), pp. 60–82.
[4] P. Hove-Sibanda and R. I. D. Pooe, 2018 Enhancing supply chain performance through supply chain practices, *J. Transp. Supply Chain Manag.*, 12(September), pp. 0–13.
[5] L. Avelar-Sosa, J. L. García-Alcaraz, and J. P. Castrellón-Torres, 2014 The effects of some factors in the supply chains performance: A case of study, *J. Appl. Res. Technol.*, 12(5), pp. 958–968.
[6] C. M. Harland, 2005 Supply Chain Management: Relationships, Chains and Networks, *Br. J. Manag.*, 7(s1), pp. S63–S80.
[7] J. R. Stock and S. L. Boyer, 2009 Developing a consensus definition of supply chain management: A qualitative study, *Int. J. Phys. Distrib. Logist. Manag.*, 39(8), pp. 690–711.
[8] S. E. Fawcett, P. Osterhaus, G. M. Magnan, J. C. Brau, and M. W. McCarter, 2007 Information sharing and supply chain performance: The role of connectivity and willingness, *Supply Chain Manag.*, 12(5), pp. 358–368.
[9] D. Power and S. Rahman, 2001 Critical Success Factors in Agile Supply Chain Management. *International Journal of Physical Distribution & Logistics Management Article information.*
[10] S. Li, S. S. Rao, T. S. Ragunathan, and B. Ragunathan, 2005 Development and validation of a measurement instrument for studying supply chain management practices, 23, pp. 618–641.
[11] I. N. Pujawan, 2008 SCAT: Supply Chain Assessment Tool toward Excellence, *Proc. 9th Asia Pacif Ind. Eng. Manag. Syst. Conf.* 2008, no. August 2015, pp. 580–585.
[12] I. Musa and I. Nyoman Pujawan, 2018 The relationship among the resiliency practices in supply chain, financial performance, and competitive advantage in manufacturing firms in Indonesia and Sierra Leone,” *IOP Conf. Ser. Mater. Sci. Eng.*, 337(1).
[13] T. K. Hong and S. Zailani, 2011 Service supply chain practices from the perspective of Malaysian tourism industry, *IEEE Int. Conf. Ind. Eng. Eng. Manag.*, no. February, pp. 539–543.
[14] M. Blowfield and C. Dolan, 2010 Outsourcing governance: Fairtrade’s message for C21 global governance, *Corp. Gov.*, 10(4), pp. 484–499.
[15] R. B. Handfield and C. Bechtle, 2002 The role of trust and relationship structure in improving supply chain responsiveness, 31, pp. 367–382.
[16] J. W. Best and J. V Kahn, 2006 *Welcome to Research in Education*, Tenth Educ. Pearso.
[17] P. R. O. Amos Sila Mwangangi, Rukia Atikiya, Joyce Nzulwa, 2017 Effect of Community Related CRS on Performance of Manufacturing Firms in Kenya, 9(24), no. August, pp. 68–79.
[18] E. Babbie, 2011 *The Basics of Social Research*, Fifth. (USA: Wadsworth).
[19] U. Sekaran, 2000 *Research Methods For Business Fourth Edition*.
[20] L. O. Oyewobi, B. Suleiman, and A. Muhammad-Jamil, 2012 Job Satisfaction and Job Commitment: A Study of Quantity Surveyors in Nigerian Public Service, *Int. J. Bus. Manag.*, 7(5), pp. 179–192.