
Effect of Supply Chain Management Practice on Operational Performance in the Case of Bedele Brewery Share Company

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Abstract: The main objective of this study was to investigate the effect of supply chain management practices on operational performance of Bedele brewery Share Company. The dimensions of SCM practices examined in this study were strategic supplier partnership, customer relationship management, level of information sharing, quality of information sharing and internal lean practice. The metrics for measuring the company's operational performance was the lead time. Quantitative research approach was used for this study to determine the effect of supply chain management practices and operational performance of BBS. c. Descriptive and explanatory research design employed for the study. Probability sampling technique particularly stratified and simple random sampling method was used to enables the researcher to use his discretion in selecting samples from the target population. Using a total of 33 questionnaires; the primary data was collected from 184 employees. The data was collected by using 5 point Likert Scale type questionnaire and then the collected data were analyzed using SPSS Version 25. From the result of the analysis it was concluded that there was strong positive and significant correlation between SCM practices and overall operational performance since the SCM practices included in this study explained by 80.9% of the variability of the operational performance of the company. Based on the findings, the researcher recommended that, Bedele brewery share company should strive to involve its key suppliers in planning and goal setting, create long term agreement with key strategic suppliers, interact with customers to set reliability, responsiveness, and other standard work for the organization, to be informed on the changing needs in order to improve their understanding with their trading partners and to work on improving quality of information sharing practices across the supply chain timely with its supplier.

Keywords: Supply Chain Management Practices, Operational Performance, Bedele, Oromia, Ethiopia

1. Introduction

Companies must not only reestablish themselves to manufacture higher quality goods and services, reduce waste, and adapt to the demand but also manage their supply chains effectively as a result of the increasing number of competing companies growing both locally and globally. To succeed in today's competitive global marketplace, companies face a variety of challenges. Despite significant advancements in research and practice, many organizations continue to struggle to comprehend the complex issues associated with organized preparation and supply activities among supply network participants [20].

The concept of Supply chain management refers to a group

of three or more entities (organizations or individuals) that are directly involved in the upstream and downstream flow of goods, resources, financing, and/or information from the source to the customer [21]. It represents all those efforts and measures considered by the organization for the development of a smooth supply chain process. In recent scenarios about based us in not used the based not with packaging's competition is among SCM practices [7]. Many studies indicate that organizations need to be more focused on SCM practices because it plays an important role in a company's performance [3].

On the other hand, the concept and practices of SCM have received increasing attention from Managers, academicians, and consultants [14]. For any firm to earn good returns and

create value for its customers, embracing excellent supply chain management practices is very paramount. The best supply chain practices are programs that affect the entire supply chain, as well as its components and main processes [5].

According to Siddig et al, [31] a successful SCM implementation is expected to enhance the relationship between upstream suppliers and downstream customers, and thereby increase customer satisfaction and firm performance. Globally, supply chain management practice has been gaining importance for nearly two decades due to the global competitive business environment. The increase in global business competition has forced companies to reexamine their global supply chain management processes for moving goods and the provision of services globally to remain competitive. The issue of global supply chain problems in developing countries has received little attention [24]. A recent study conducted (Gualandris, 2014) [10] confirms that supply chain management and global sourcing have an impact on the sustainability performance of the company. Therefore, a prerequisite for manufacturers enhances profitability and remains competitive in the current global dynamic market are to understand and practice Supply Chain Management [4].

In comparison to the global supply chain management practices, the African supply chain management practice is still in the infant stage in the manufacturing company as well as in the service industry (Abu Alrejal, 2007). For example, in the African countries in particular in Gulf countries Like Ethiopia, in the Ghanaian, and as well as West Africa business executives and policymakers continue to underrate the strategic importance of SCM. It was contended that African countries are suffering largely due to the non-application of the principles of supply chain management practices to business activities. This phenomenon has halted the manufacturing industry of these countries from adopting and developing practices that enable the effective management of their supply chains.

Correspondingly, the SCM Practice in Ethiopia is still under investigation and there is a lack of practice of integration and collaboration in managing supply chains. In addition to that, (H/Michael, 2011) [11] also suggested that supply chain management practice in Ethiopia is in the beginning stages, and there are small numbers of companies integrating it into their operational system. But, many manufacturers and distributors are waking up to the potential for major cost reduction and service improvements offered by implementing best practices in their supply chain.

When we come to the area under investigation of the study, Bedele Brewery Share Company is a privately owned business organization and is one of Ethiopia's brewery companies, producing different brands of beer products in our Country, as well as the company is one of the largest producers and distributors of various beer such as Bedele regular, Bedele Special, Walia, and Sofi. The company was established in October 1993 E. C in Bedele town around 483 km from Addis Ababa in Oromia regional state, southwestern

Ethiopia. The company is refreshing natural water on 250,000 m² surface coverage in a major market in the northwest, west, south, central, and southwest of Ethiopia and from abroad USA, Canada, Australia, Israel, and Sudan.

Many researchers reported that, to stay competitive and enjoy market dominancy, organizations have to adopt SCM practices [19, 27, 28]), A study by Alvarado et, al., 2011) [1] documented that the secret of the success of Wal-Mart, Hewlett Packard, Siemens, Dell, and Allied Signal is the implementation of SCM practices within the organization.

As stated by, Koplin et al, (2007) [18] viewed SCM practices in terms of supplier partnerships, customer relationships, benchmarking; Just in time processes and e-procurement, few suppliers; many suppliers; strategic planning; outsourcing; subcontracting of activities; holding buffer stock and third-party logistics (3PL). Similarly, David, et, al., (2014) [6] mentioned, asset utilization, and customer satisfaction include, the 5 rights; right quality, right quantity, right place, right time, and right price as an important SCM practice. According to, Tan et, al., (2008) [34] the most important SCM practices are supply chain integration, information sharing, supply chain characteristics, customer service management, geographical proximity, and JIT capability. As well as, Muhammad (2004) [25] stated that supply chain management practices as; upstream (strategic supplier partnership) and downstream (customer relationship), information flow across a supply chain (level of information sharing and quality of information sharing), and the internal lean system as an important determinant of operational performance, organizational performance, competitive advantage, and customer satisfaction. It is only by embracing supply chain management practices that companies are recognized by their customers and industry as highly effective professionals who contribute towards the most cost-effective business solutions.

The study was guided by four theories: Network Perspective Theory, relationship marketing theory, Resource-Based View theory, and Relational View Theory. The Company's operational performance is affected by different supply chain management practices. One of the most important factors influencing the performance of the industry is strategic supplier partnership (Narasimhan, et al., 2006) [26] Effective partnerships with suppliers can be a critical factor to guide supply chain management (Li, et, al., 2006). It can improve supplier performance, reduce time to market, and increase the level of customer responsiveness and satisfaction [8].

The other factor is having good relationships with customers, which are needed for the successful implementation of SCM schedules on the downstream side of the chain (Moberg et, al., 2012) [22] Close customer relationship allows an organization to differentiate its product from competitors, sustain customer loyalty, and dramatically extend the value it provides to its customers (Magretta 2008). Furthermore, for Supply Chain integration, information sharing is another critical factor. Supply chain partners that exchange information regularly can understand the needs of

the final consumer and are capable of responding fast to ever-changing changing market demand [19]. The failures can occur when there is an information delay, shortage or distortion occurs across the supply chain. Also, information sharing is one of the important factors influencing the performance of the company, the significance of its impact on SCM depends on the extent of the quality of information shared, when and how it is shared, and with whom [16].

Finally, According to (Moslem et al, 2013) [23] internal lean practice is the other factor that affects supply chain performance. One of the key vital of internal lean practice is to improve the speed, delivery, and efficiency of production flow (Shah et al, 2008 [30]; Sunder, 2013 [33]; Vinodh et al, 2012 [36]; Ward, et al, 2006 [37]). Subsequently, there are several studies related to the know-how of SCM practices as well as their effect on operational performance in Ethiopian manufacturing companies. However, five SCM practices (strategic supplier partnership, customer relationship management, level of information sharing, quality of information sharing, and internal lean practice) were designated for this study in line with lead time reduction on the operational performance of BBSc because, the designated SCM practices are important determinants of operational performance, organizational performance, competitive advantage, and customer satisfaction [25].

Since it is a multidimensional cooperation, Bedele Brewery Share Company was preferred as the unit of study because of its outstanding results, the speed at which it presents products to the market, and the establishment of alliance, in essence, in line with the supply chain management Bedele brewery Share Company was appropriate as the southwestern region of the country by having different partners (like, suppliers distributors and customers) from different part of the country (e.g., from Jimma, Nekemte, Assossa, Mizan tepi, etc.) as well as the Company has a diversified product portfolio (produces different brands namely; Bedele regular, Bedele Special, Walia, and Sofi) that is normally used by almost all groups of people and the SCM practices and dimensions identified by this researcher can be applied on this company. As a result, the researcher would be inspired to investigate the effect of supply chain management practice on operational performance, as well as to instigate efforts to fill these gaps by the concentration of Bedele Brewery Share Company.

2. Statement of the Problem

Supply Chain Management is currently no longer a new strategy; there are still some serious practical problems that have yet to be addressed. The problem was intensified for developing countries like Ethiopia because, they are characterized by a lack of basic knowledge of SCM among the business practitioners, increasing uncertainty and competition, lack of understanding of what constitutes a comprehensive set of SCM practices [20]. Haque & Islam, (2013) [15], adds that in Ethiopia most of the product and service-giving activities have major gaps regards to their

operational performances, which is due to a lack of adequate SCM practices.

Despite the increasing of empirical research, the relationship of SCM with operational performances could not be regarded as conclusive. Differences in research design undermine comparability and lack of consensus about the definition and dimensionality of the SCM practices, the use of different units of analysis, and different approaches to performance measurement. This demonstrates that less insight into the supply chain management practices and their effect on operational performance [2].

However, Different studies conducted empirical research on the aspects of supply chain management practice to enhance the operational performance of the industry and reduce the operational cost of the company. The study conducted by Kassanesh, (2018) [17], carried out a study on the Effect of Supply Chain Management Practices on Operational Performance at Heineken Kilinto Brewery in Addis Ababa. The study revealed that Strategic supplier partnerships; customer relationships and internal lean practices had a strong positive relationship with the operational performance of the company. But effects telecom levels of information sharing and quality of information sharing had no statistically significant effect on operational performance. Hence, in this study, the researcher would be inspired to conduct the effect of SCM practice on Bedele Brewery Share Company by the aforementioned variables.

Additionally, Haftay, (2019) [12] Investigates the effect of SCM practices (strategic supplier partnership management, customer relationship management, level of information sharing, quality of information sharing, and internal lean practice) on the operational performance of the company. As the major findings of this study, he has observed that there was a significant correlation between all of those SCM practices and the overall operational performance of the company. Also, this researcher measured the company's operational performance by using delivery dependability, quality of product, supply chain cost, and operational flexibility metrics but not addressed the metrics of lead time allied with those SCM practices on the operational performance of the company. Though, the researcher stirred to investigate the effect of SCM practices in line with lead time metrics of its operational performance on BBS. c.

Furthermore, the research worked by Solomon, (2017) [32] emphasized the effect of supply chain management practices on the operational performance of Ethio-telecom. The study studied that all supply chain management practices i.e. strategic supplier partnership, customer relationship, information sharing, information quality, and lean practices had significantly affected the operational performance of Ethio telecom. As well, this research is conducted on Ethio telecom nevertheless, not on beer company particularly, Bedele Brewery Share Company. Likewise, the study lacks to see the dimension of operational performance, (i.e., Lead Time). Therefore, the above-stated study was unable to show the effect of SCM Practice on the operational performance of the Bedele Brewery factory.

Although, the other research conducted by Vilhenac, (2017) [35] focused on the impact of Supply chain management practices (like Top management support, Customer focus, Supplier management, Process control, and improvement) and the company's operational performance on the Vietnam garment industry. However, the above-stated research shows us the existence of gaps. Those gaps were; the study was dears to see the major SCM practices such as level of information sharing, quality of information sharing, and internal lean practice on the operational performance of the company in line with lead time. Additionally, the study was focused on the garment industry, not on brewery factories about based on lead time.

Consequently, the research conducted by, Binalla, (2019), focused on the title of the study of strategic supplier partnership along with the status of supply chain management among the hardware and construction supplies enterprises operating in the Philippines on Competitive Advantage. The significant findings of this researcher were; there is a positive relationship between strategic supplier partnership and the competitive advantage of the company and there is a need to revisit supply chain strategies in improving competitive opportunity and harnessing relationships among different units within the supply chain. The researcher targeted strategic supplier partnerships in the retail industry and their relationship to obtaining a competitive advantage through price and cost, value to the customer, and delivery dependability but not concerted on the effect of the strategic supplier partnership in Brewery Company and not raised the metrics of lead time to measure the operational performance of the company.

The other research also indicated that strategic supplier partnership practice affected Supply Chain Integration, Supply Chain Performance, and Farmer's Performance [29]. This researcher concentrated on Supply Chain Integration, Supply Chain Performance, and Farmer's Performance in terms of competitive advantage and level of profitability.

However, the above studies failed to demonstrate the link between supply chain management practices and the

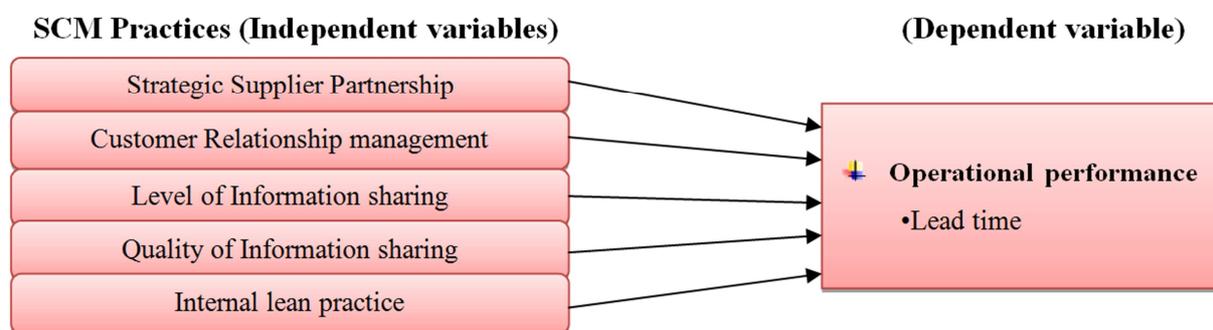
operational performance of Bedele Brewery Share Company and as well as its effects In terms of lead time. Therefore, to fill the above-stated gaps the researcher was inspired to investigate the effect of SCM Practices (strategic supplier partnership management, customer relationship management, level of information sharing, quality of information sharing, and internal lean practice) in line with lead time metrics under study on the operational performance of Bedele brewery Share Company. To do so the researcher addressed the following questions.

3. The Objective of the Study

The main purpose of this study was to investigate the effect of supply chain management practice on operational performance: The Case of Bedele Brewery Share Company. Therefore, the following specific objectives were addressed.

1. To describe the current operational performance of Bedele Brewery Share Company looks like in Bedele Brewery Share Company;
2. To assess the effect of strategic supplier's partnership on the operational performance of the Bedele brewery share company;
3. To investigate the impact of customer relationship management on the operational performance of the Bedele Brewery share company;
4. To assess the effect of the level of information sharing on the operational performance of the Bedele Brewery share company;
5. To examine the effect of Quality of information sharing on the operational performance of the Bedele Brewery share company; the Level of Information Sharing.
6. To investigate the effect of internal lean practice on the operational performance of the Bedele Brewery share company Strategic Supplier Partnership; Customer Relationship Management; Quality of Information Sharing Internal lean practice Operational performance Lead time.

4. Conceptual Framework



Source: Researcher's survey, (2023)

Figure 1. Conceptual Framework.

5. Research Methodology

To conduct this research; the researcher used descriptive and explanatory research designs by describing the characteristics or functions of particular individuals or groups or phenomena and pattern of the study to answer research questions by qualitative and quantitative approaches. Both primary; questionnaire and interview surveys and secondary data sources were used to analyze this data. The sampling design used in this paper and the total population of the employees of Bedele Brewery Share Company were 395.

Since it is difficult to access all employees, the researcher took 195 sample sizes out of the total population by using (Kothari, 2004) statistical formula as $n = Z^2 \cdot P \cdot q / N$.

$$e^2 (N-1) / z^2 \cdot p \cdot q$$

The researcher used the (Kothari, 2004) formula to determine the sample size for the study based on a 95% desired confidence level, a 5% desired level of precision, the proportion of success (50, a proportion of failure of (50%anda confidence level (1.96) from the following departments:

Table 1. Sample Size Determination.

Identified Departments	Population	Sample
Operation/Production	266	266/395x195= 131
Transportation Management	61	61/395x195= 30
Sales Management	4	4/395x195 = 2
Quality Assurance	26	26/395x195 = 13
Warehouse	6	6/395x195 = 3
Inventory/ Material Management	32	32/395x195= 16
Total BBS. c Populations	395	195

Source: Own computation based on (Kothari, 2004) formula

Therefore, the model that is applied for this study was as described below:
Multiple Regression model,

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + e$$

6. Result and Discussion

Table 2. Cronbach's Alpha reliability test.

Variables	Number of items	Cronbach's Alpha reliability test
Strategic Supplier Partnership	5	0.687370
Customer Relationship Management	6	0.852148
Level of Information Sharing	6	0.724610
Quality of Information Sharing	5	0.708036
Internal Lean Practice	5	0.765478
Operational performance (Lead Time)	6	0.646626
Total	33	0.937266 0.94

(Source: Researcher’s survey result, 2023)

6.1. Descriptive Statistical Analysis of the Study

Table 3. Descriptive statistics on operational performance.

Statements	Mean	Std. Dev.	N
In our company, the time elapsed between request and delivery of product required by internal customers is as requested	3.15	1.168	184
Our company can quickly respond to changes in market demand	3.52	1.395	184
In our company, the time required for manufacturing process is lesser	3.29	1.346	184
The company takes a little time until the goods are ready for packaging	3.76	1.346	184
In the company, the time required for supplier selection based on time considerations is reasonable	3.78	1.375	184
Our Company can quickly adjust products to meet our customer’s requirement	3.84	1.357	184
Grand mean of Lead time (operational performance)	3.555	0.803	

(Source: Researcher’s survey, 2023)

From the above, Regarding to lead time, 6 questions were asked the respondents to understand that those questions resulted in operational performance. Accordingly, the Company can quickly adjust products to meet the customer’s

requirement have high mean score which is 3.84 with 1.357 standard deviation followed by the time required for supplier selection based on time considerations is reasonable with the mean value of 3.78 & 1.38 standard deviation. Also, the

statement that the company takes a little time until the goods are ready for packaging have mean 3.76 & 1.246 standard deviation and the company can quickly respond to changes in market demand have mean 3.52 and 1.359 standard deviation. On the other hand, the mean score of the time elapsed between request and delivery of product required by internal customers in the company is as requested have 3.15 with 1.168 and in the Bedele brewery share company, “the time required for manufacturing process is lesser” have 3.29 with 1.346. The overall mean score of operational performance was 3.555 with standard deviation 0.803. It denoted that most of the respondents were agreed to be retained and efficient in all parameters of operational performance.

6.2. Descriptive Analysis's of the Supply Chain Management Practices

Table 4. Analysis of Strategic Supplier Partnership.

Statements	Mean	Std. Deviation	N
We consider quality as our number one criterion in selecting suppliers	3.47	1.272	184
BBS. c include our key suppliers in our planning and goal setting activities	3.17	1.418	184
BBS. c Encourages and developed the capacity of local strategic Suppliers	3.58	1.381	184
BBS. c has a long term agreement with key strategic suppliers	3.24	1.228	184
BBS. c has continuous improvement programs that include our key suppliers	3.48	1.263	184
<i>Grand mean of Strategic Supplier Partnership</i>	3.383	1.312	

(Source: Researcher's survey, 2023)

As it is indicated in above, In order to measure the perception of employees about strategic supplier partnership five questions were asked to the respondents. From the questions which are asked to the respondents BBS. c encourages and developed the capacity of local strategic suppliers have a highest mean score 3.58 with 1.381 standard deviation. BBS. c has continuous improvement programs that include our key suppliers have the second mean score of 3.48 with 1.263 standard deviation followed by the respondents consider quality as their number one criterion in selecting suppliers have a mean score of 3.47 & 1.272 standard deviation.

The others remaining questions the BBS. c include the key suppliers in their planning and goal setting activities and BBS. c has a long term agreement with key strategic suppliers has 3.17 and 3.24 mean score respectively. Accordingly the overall

From this result it is possible to understand that, how is the operational performance of the company in line with lead time in BBS. c. Therefore, the operational performance of the Bedele brewery Share Company was practiced quick response for product adjustment to meet customer's requirement, reasonable time for supplier selection, to be ready for packing at the company and respond to changes in the market demand is quick and efficient in all parameters of operational performance.

Hence, the study's first research question which says, “What is the current operational performance of the BBS. c looks like, would be answered by this analysis.

mean score of Strategic Supplier Partnership shows that 3.383 with standard deviation 1.312, which means that, most of the respondents were not agreed (neutral) to the practice of strategic supplier partnership in BBS. c, as the rule indicated above by (Alhakimi & Alhariry, 2014).

Therefore, the finding has shown as Bedele brewery Share Company has averagely practiced the Strategic supplier partnership. This shows, Even if the mean value of strategic supplier partnership of the company felled in neutral averegically, to some degree there is a practice of strategic supplier partnership in BBS. c. Hence, the company has to improve the involvement of its key suppliers in planning and goal setting activities and on a long term agreement with key strategic suppliers in order to improve its strategic supplier relationship.

6.3. Analysis of Customer Relationship Management

Table 5. Statistical analysis for Customer Relationship.

Statements	Mean	Std. Dev.	N
BBS. c interact with customers to set reliability, responsiveness, and other standards for the organization	3.26	1.474	184
BBS. c Trusts key strategic customers to share supply chain Information	3.82	1.437	184
BBS. c Integrates with key customers in product carrying decision	3.76	1.507	184
BBS. c has documented procedures to deal with customer complaints	3.86	1.384	184
BBS. c facilitate customers' ability to seek assistance from us	3.84	1.461	184
BBS. c periodically evaluate the importance of our relationship with our customers	3.80	1.485	184
<i>Grand mean of Customer Relationship management Practices</i>	3.72	1.106	

(Source: Researcher's survey, 2023)

From the above, Observing all the values, highest number of employees has agreed on the company has documented procedures to deal with customer complaints, facilitate customers' ability to seek assistance from them, Trusts key

strategic customers to share supply chain Information, the important evaluation of the company's relationship with their customers and Integration with key customers in product carrying decision.

However, few respondents were said neutral or not agreed on the company’s interaction with customers to set reliability, responsiveness, and standard work for the organization by mean 3.26 and 1.474 standard deviation. Using the overall variables the practice of customer’s relationship management is implemented in the Bedele brewery share company. This is indicated by

overall mean of 3.72 and standard deviation of 1.106. This showed that Bedele brewery Share Company has good customer relationship with the customer. However, the company has to work to improve its relationship with the customer especially by interacting with customers to set reliability, responsiveness, and other standards for the organization.

6.4. Analysis of Level of Information Sharing

Table 6. Statistical analysis for level of information sharing practice.

Statements	Mean	Std. Dev.	N
We inform Supply chain partners in advance of changing needs	3.30	1.340	184
Our suppliers share proprietary (original) information with us	3.57	1.213	184
Our suppliers keep us fully informed about issues that affect our business.	3.28	1.234	184
Our Supply partners share business knowledge of core business processes with us	3.58	1.442	184
our organization and our suppliers exchange information that helps establishment of business planning	3.42	1.435	184
We and our trading partners keep each other informed about events or changes that may affect the other partners.	3.97	1.400	184
<i>Grand mean of level of information sharing</i>	3.52	0.870	

(Source: Researcher’s survey Result, 2023)

As it is presented in the above, the mean value for most variables has shown a higher than the middle value whereas few items has little higher than the middle value. Detecting all the values, the highest number of employees has agreed on the company their trading partners keep each other informed about events or changes that may affect the other partners with mean 3.97 and 1.400 standard deviation, followed by the company’s Supply chain partners share business knowledge of core business processes with them have mean 3.58 & 1.442. In addition, the highest mean has been also observed for the BBS. c’s suppliers share proprietary (original) information with the company and the organization and their suppliers exchange information that helps establishment of business planning with the mean of 3.57 & 1.213, standard deviation. On the other hand, some respondents were said neither agree nor disagree on company’s suppliers keep fully informed about issues that affect their business and Supply chain partners in advance of changing needs. From this result it is possible to understand that, Bedele brewery Share Company lacks to keep each

other informed about events or changes that may affect the other partners with its trading partners and to informed its trading partners on the changing needs. This implies that some the respondents were not agree or neutral concerning to keep each other informed about events or changes that may affect the other partners with its trading partners and to inform its trading partners on the changing needs of the company (BBS. c). Because the mean score between 2.61 and 3.40 was considered as neutral for the purpose of this study as it was discussed earlier. Overall mean for practice of level of information sharing is 3.52 and the standard deviation is 0.870 suggesting that there is information sharing in the company (BBS. c).

Based on the overall variables of the level of information sharing practices, the findings have clearly showed that BBS. c has well practiced with respect to the level of information sharing across the supply chain. Consequently, BBS. c has attempted to retain the extent of its information sharing with upstream and downstream of the supply chain.

6.5. Analysis of Quality of Information Sharing

Table 7. Descriptive statistics on quality of information sharing.

Statements	Mean	Std. Devi.	N
Information exchange between our suppliers and BBS. c is accurate	3.45	1.317	184
Information exchange between our suppliers and BBS. c is reliable	3.91	1.491	184
Information exchange between our suppliers and BBS. c is adequate.	3.61	1.163	184
Information exchange between our suppliers and BBS. c is complete	3.95	1.453	184
Information exchange between our suppliers and BBS. c is timely	3.27	1.237	184
<i>Quality of information sharing</i>	3.635	0.917	

(Source: Researcher’s survey, 2023)

Based on the previous literatures, practice of quality of information sharing is indicated by dimensions of accurate, adequate, complete, reliable, and timely. above presented the practice of quality of information sharing in the BBS. c.

The responses indicated that the company and supply chain partners are exchanging accurate, adequate, reliable,

and complete information. This indicated that BBS. c had little or unsatisfactory practices in terms of quality of information sharing timely with its supplier. So, BBS. c has to make efforts to improve quality information sharing practices across the supply chain timely. Overall mean for quality of information sharing is 3.635 and 0.917 standard

deviation. This implied that the BBS. c is sharing quality information with strategic Supplier partners. Ensuring the

quality of the shared information becomes a critical aspect of effective supply chain management.

6.6. Analysis of Internal Lean Practice

Table 8. Statistical analysis for internal lean practice.

Statements	Mean	Std. Dev.	N
Your Company strives to reduce time wastage in operation	3.42	1.435	184
The company has continuous quality improvement programs	3.94	1.472	184
The company produces only what is ordered by customers when needed (e.g. JIT)	3.57	1.213	184
The company has an organized team of dedicated employees who lead and support the implementation of internal lean practice	3.82	1.477	184
BBS. c pushes suppliers for shorter lead-time	3.94	1.419	184
<i>Grand mean of Internal lean practice</i>	3.752	1.019	

(Source: Researcher's survey, 2023)

Based on the analysis, the result of the mean value of internal lean practice scores were greater than 3.42 or all variables mean are higher than the moderate value, which inferred the respondents agreed to the fact that internal lean practices are highly applied in the Company followed by Customer relationship, the level of information sharing and

quality of information sharing. The value of overall mean for internal lean practice 3.75 suggesting that there is good internal lean practice in the company. The standard deviation of 1.019 suggests that the agreement of the respondents is similar with little variation in order to reduce wastages of time and resources.

6.7. Inferential Analysis for SCM Practices and Operational Performance

6.7.1. Correlation Analysis

Table 9. Correlation matrix between constructs of SCM practices and operational performance.

		LIS	SSP	CRM	QIS	ILP	Operational Performance
LIS	Pearson Correlation						
	Sig. (2-tailed)						
SSP	Pearson Correlation	.754**					
	Sig. (2-tailed)	.000					
CRM	Pearson Correlation	.705**	.460**				
	Sig. (2-tailed)	.000	.000				
QIS	Pearson Correlation	.775**	.643**	.776**			
	Sig. (2-tailed)	.000	.000	.000			
ILP	Pearson Correlation	.733**	.507**	.857**	.773**		
	Sig. (2-tailed)	.000	.000	.000	.000		
Operational Performance	Pearson Correlation	.810**	.658**	.798**	.835**	.807**	
	Sig. (2-tailed)	.000	.000	.000	.000	.000	

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

(Source: Researcher's survey result, 2023)

As the correlation matrix above shown, the correlation coefficient values of the company's performance among SCM Practices (SSP, CRM, LIS, QIS and ILP) were 0.658**, 0.798**, 0.810**, 0.835 and 0.807** respectively. Their significant level is 0.000. As the conducted Pearson correlation test indicated that there is strong positive relationship between quality of information sharing (QIS) and operational performance with a Pearson correlation coefficient of 0.835 with ($p < 0.001$). This significance tells that there is genuine relationship between quality of information sharing and operational performance of the company. Followed by quality of information sharing, the study depicted that there is strong positive relationship between Level of information sharing (LIS) and operational performance with a Pearson correlation coefficient of 0.810 at ($p < 0.001$). This significance tells that there is honest relationship between Level of information sharing and

operational performance of the company. Simultaneously, as the correlation matrix inferred in the above there is a strong positive relationship between internal lean practice and customer relationship management with operational performance with correlation coefficients of 0.807 and 0.798 respectively at $p < 0.001$. In addition to that, clearly indicates that the existence of a high positive relation between Strategic supplier partnership (SSP) and operational performance at correlation coefficient of 0.658 ($p < 0.001$).

Consequently, a Pearson correlation analysis results indicated here under is a significant correlation between all SCM practices and the overall operational performance of BBS.c, which means they have a strong effect on company's operational performance. This inferred that if the QIS, LIS, ILP, CRM, and SSP increase the operational performance of the Bedele brewery Share Company will increase. The finding of this study is similar to the results of (Haftay, 2019

[12] & Solomon, 2017 [32] as discussed under the statement problem of the study.

6.7.2. Analytical Tests

(i). Multicollinearity Tests for Independent Variables

Table 10. Multicollinearity Test.

Model		Collinearity Tolerance	Statistics VIF
1	Level of Information Sharing	.240	4.171
2	Strategic Supplier Partnership	.391	2.555
3	Customer Relationship Management	.224	4.467
4	Quality of Information Sharing	.264	3.789
5	Internal Lean Practice	.224	4.460

(Source: own survey result, 2023)

Regarding above, the result of VIF was below 10 and the tolerance statistics was more than 0.1 (10%). So, there is no Multicollinearity problem in the regression model used for this study among the predictors. Because, Variance Inflation Factors (VIF) and tolerance all fall within the acceptance range (VIF=1-10, and tolerance=0.1-1.0).

(ii). Normality Test

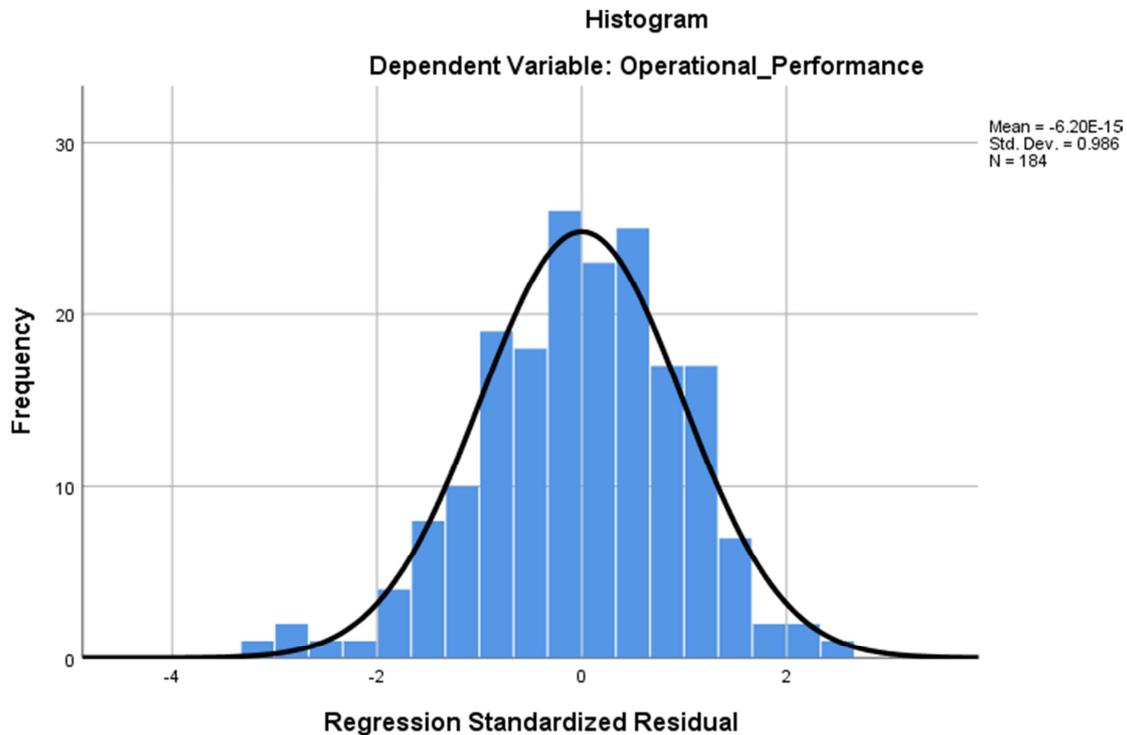
As stated in the work of George & Mallery, (2010) [9] which describes that the values for Skewness and kurtosis between -2 and +2 are considered acceptable and the departure from normality is not extreme. Therefore, the data used in this study was normally distributed considering the criteria of Skewness and kurtosis values between -2 and +2.

Table 11. Statistically Normality Test by Kurtosis and Skewness.

		LIS	SSP	CRM	QIS	ILP	Operational Performance
N	Valid	184	184	184	184	184	184
	Missing	0	0	0	0	0	0
	Skewness	-1.081	-.252	-.854	-.960	.994	-1.092
	Std. Error of Skewness	.179	.179	.179	.179	.179	.179
	Kurtosis	.891	-.715	-.284	.264	-.004	1.086
	Std. Error of Kurtosis	.356	.356	.356	.356	.356	.356

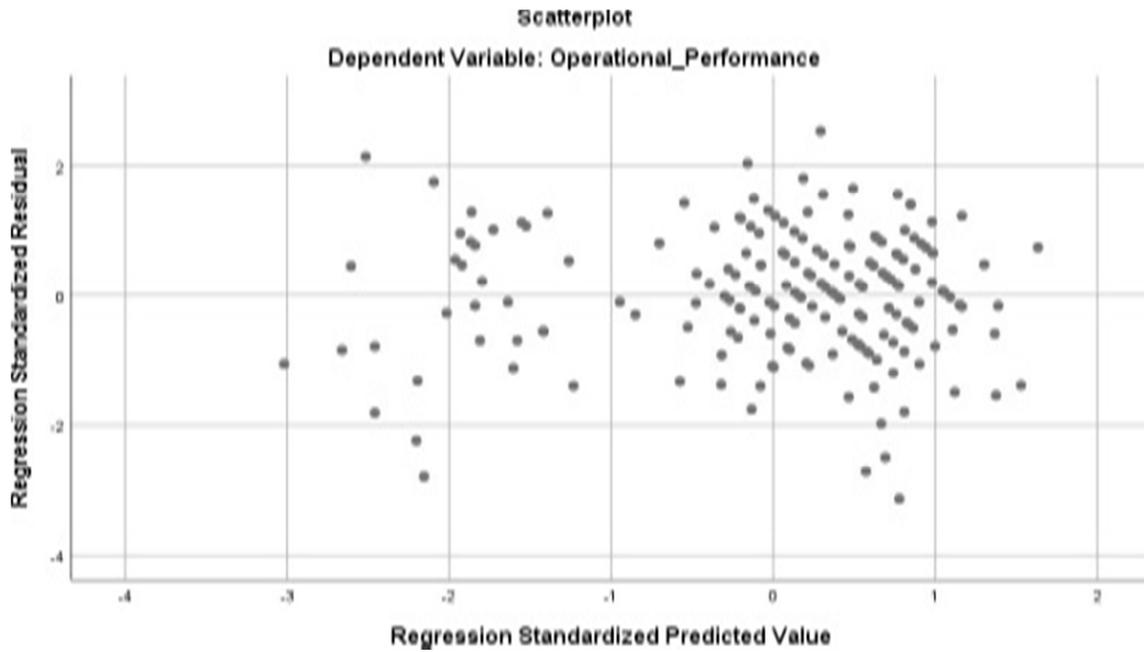
In addition to the above test for normality, (Hair, et al, 2010) [13] also suggest that histogram is another method to use for comparing the observed data values with a distribution approximating the normal of distribution. The researcher used histogram to identify normal distribution of residuals and the result indicates that standard residuals are a little far away from

the curve, many of the residuals are fairly close more to the curve and the histogram is bell shaped. This implies that the majority of scores lie around the center of the distribution. So, the largest bars on the histogram are all around the central value. Therefore, this indicates that the residuals are normally distributed as shown in of histogram below.



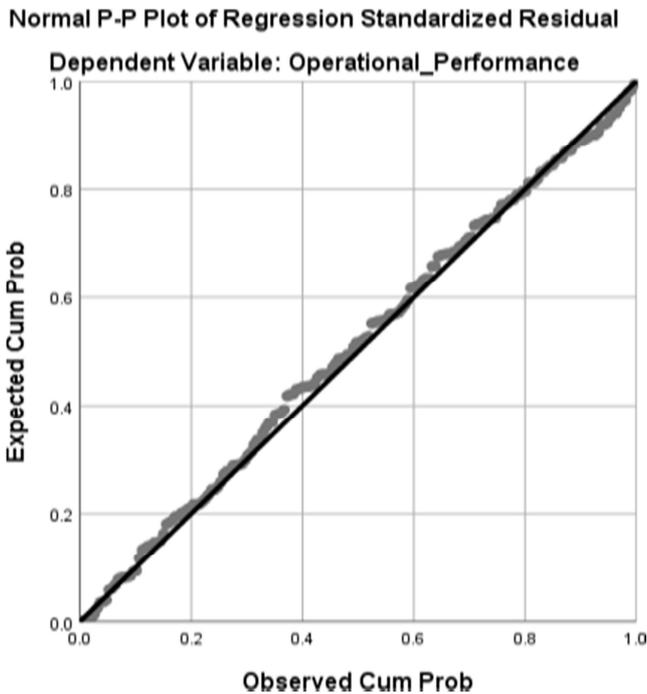
(Source: Own survey result, 2023)

Figure 2. Graphically Normality Test by histogram.



(Source: Regression output of SPSS from own survey result, 2023)

Figure 3. Homoscedasticity test.



(Source: Own Survey, 2023)

Figure 4. Linearity Test.

In order to test the Homoscedasticity assumption the researcher used scatter plots graph. Scatter plots depicted the relationship between each of the independent and dependent variables that are identified for the purpose of this study. Therefore, the scatter plots for each of the five independent variables (strategic supplier partnership practice, customer relationship management practice, level of information sharing practice, quality of information sharing practice and

internal lean practice) and the dependent variable (operational performance) is depicted as follows. The graph of *ZRESID and *ZPRED should look like a random array of dots evenly dispersed around zero. Therefore, it is safe to say that this study has no heteroscedasticity problem.

The above showed that, the residuals have a sound normal distribution because the plotted residuals were around the diagonal straight line instead of making any other shape or curve. The scatter plot shown from the above, the relationship between each of the independent variables (SSP, CRM, LIS, QIS and ILP) and the dependent variable (operational performance) could be modeled by a straight line proposing that the relationship between each of these two variables is linear. Therefore, the assumption of multiple linear regressions is met. As a result, multiple regression can accurately estimate the relationship between dependent and independent variables i.e., the relationship can be characterized by a straight line.

(iii). Model Summary

Table 12. Model Summary.

Model	R	R Square	Adjusted R Square
1	.900 ^a	.809	.804

Predictors: (Constant), ILP, SSP, QIS, LIS, CRM, Dependent Variable: Operational Performance
(Source: own survey result, 2023)

Regarding to the SPSS generated in the above, R=0.900, indicates that the sum of SCM Practices (which are SSP, CRM, LIS QIS and ILP) have a linear relationship with company's operational performance. And, R² (also called the coefficient of multiple determinations) is indicates how much of the total variation in the dependent variable, (operational

performance), can be explained by the independent variable, (SCM Practices), in this case, 80.9% (0.809) could be explained, which is very large.

Therefore, as disclosed, the R² (coefficient of multiple determination) explicate 80.9 % (0.809). This means that

80.9% of the changes in the company's performance are explained by the changes in the independent variables (SSP, CRM, LIS QIS and ILP) in the study. The remaining 19.1% of the changes in the dependent variables is explained by other factors not involved in this study.

6.7.3. ANOVA Test

Table 13. ANOVA Test.

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	95.616	5	19.123	151.217	.000 ^b
	Residual	22.510	178	.126		
	Total	118.126	183			

Dependent Variable: Operational Performance
 Predictors: (Constant), SSP, CRM, LIS, QIS, ILP
 (Source: Own Survey, 2023)

The above shown the results of the F ratio is 151.217, with 0.000, significance. The sum of squares gives the model fit. It explains that the data set fits into regression model. In other word, this analysis is used to identify effect of supply chain management on operational performance which is general objective of the study. In addition, this analysis is used to identify appropriateness of the model in estimating effect of supply chain management practices on operational performance.

The researcher used multilinear regression method to run regression analysis. F-statistic value of the model is 151.217

and it is significant at 0.001 indicating that the model used is appropriate to explain effect of supply chain management on operational performance. This implies that supply chain management of BBS.c significantly affects operational performance of the company. Finding of this study is that supply chain management practice of the study has significant positive effect on operational performance of BBS.c through Lead Time metric. Since, Regression > Residual, these variables statistically significantly predicted at, F= 151.217, p = 0.000, R² = 0.809. All five variables added statistically significantly to the prediction, p < 0.05.

6.7.4. Regression Coefficients

Table 14. Regression Coefficients.

Model	Unstandardized Coefficient		Standardized Coefficients	T	Sig.	
	B	Std. Error	Beta			
1	(Constant)	.477	.118		4.056	.000
	SSP	.110	.045	.127	2.430	.016
	CRM	.151	.050	.208	3.005	.003
	LIS	.190	.062	.206	3.085	.002
	QIS	.245	.056	.280	4.395	.000
	ILP	.155	.054	.197	2.853	.005

Dependent Variable: Operational Performance
 (Source: Own Survey, 2023)

The above multiple regression coefficients referred that, the effect of each supply chain management practices on operation performance. The independent variables which have a higher beta coefficient with the lower p-value (p<0.05) have a significant contribution or effect on the dependent variable.

The highest value of Beta value shows the highest influenced variable or the dominant factor, due to that Quality of information sharing is the highest influenced

variable in this study.

Therefore, the 2nd, 3rd, 4th, 5th and 6th research questions or objectives of the study which says, “what is the effect of strategic suppliers partnership, customers relationship Management, level of information sharing, quality of information sharing and internal lean practice on operational performance of Bedele Brewery share company” would be answered by the this analysis.

$$Y = 0 + \beta_1 * X_1 + \beta_2 * X_2 + \beta_3 * X_3 + \beta_4 * X_4 + \beta_5 * X_5 + e$$

$$Op. = 0 + SSPX_1 + CRMX_2 + LISX_3 + QISX_4 + ILPX_5$$

This is:

$$Op. = 0.477 + 0.110SSP + 0.151CRM + 0.190LIS + 0.245QIS + 0.155ILP$$

The value of 0 is 0.477 which mean the expected value of company performance is 0.477 when all the five variables assume zero value.

6.7.5. Hypothesis Testing

Table 15. Summary of Hypothesis Testing.

Hypothesis	Analysis used	Findings	Results
H1	Multiple Regression	$\beta=0.127$; $p<0.05$	Positive Significant Accepted
H2	Multiple Regression	$\beta=0.208$; $p<0.05$	Positive Significant Accepted
H3	Multiple Regression	$\beta=0.206$; $p<0.05$	Positive Significant Accepted
H4	Multiple Regression	$\beta=0.280$; $p<0.05$	Positive Significant Accepted
H5	Multiple Regression	$\beta=0.197$; $p<0.05$	Positive Significant Accepted

(Source: Own Survey Result, 2023)

Hypothesis 1: Strategic supplier's partnership has a positive and significant effect on operational performance of BBS. c.

Hypothesis 2: Customer Relationship management has positive significant effect on operational performance of BBS. c.

Hypothesis 3: Level of information sharing has positive significant effect on operational performance of BBS. c.

Hypothesis 4: Quality of information sharing has positive significant effect on operational performance of BBS. c.

Hypothesis 5: Internal lean practice has positive significant effect on operational performance of BBS. c.

7. Summary of Major Findings

From the total distributed study questionnaire, 94% were returned. The study shown that, the major respondent's gender score was male employees (66%). From employees' age group, majority of the employees were from were from 26-33 (49.5%) years followed by 34-41 (27.2%) years old. From the study's result, the highest respondents have 1-4 & 9-12 years experiences (35.3%). From the prospective of educational level, the most respondents had 1st degree holders (47.3%) followed by college diploma (35.9%) The study also revealed that 69% of respondents were from operation/production department; this is the department which has highest employees than other department in the Bedele brewery share company.

In reference to the results from the conducted descriptive analysis showed that, the overall mean score of operational performance was 3.555 with standard deviation 0.803. It implies that most of the respondents were agreed to be retained and efficient in all parameters of operational performance. This is reinforced by the results from the conducted regression analysis that indicated there is a strong relationship between SCM practices and the operational performance of BBS. c. Hence, the finding of the study revealed that, the operational performance of the Bedele brewery Share Company was practiced quick response for product adjustment to meet customer's requirement, reasonable time for supplier selection, to be ready for packing at the company and respond to changes in the market demand is quick and efficient in all parameters of operational performance. By the first specific objective of the study, which says "what is the current operational performance of the Bedele brewery share company looks like," this finding was resulted or carried out.

Consequently, The descriptive analysis of this study revealed that Internal lean practice has the highest mean value of 3.75, followed by Customer relationship management with the mean value of 3.72, Quality of information sharing with the mean of 3.63, Lead Time with the mean of 3.56, and Strategic supplier partnership have the mean value of 3.38. This indicated that the attitudes of

respondents were agreed on the idea requested with respect to each.

The findings from the Pearson correlation analysis results revealed that there is a high positive and significant correlation between the aggregated SCM practices (SSP, ILP, CRM, QIS and LIS) and the operational performance of Bedele brewery Share Company with value of (0.658, 0.807, 0.798, 0.835, 0.810 at $p=0.000$) respectively.

In this study, regarding analytical tests the study used Multicollinearity test, normality tests, Homoscedasticity test and linearity). Regarding multicollinearity test, the result of VIF was below 10 and the tolerance statistics was more than 0.1 (10%). The finding showed that, there is no multicollinearity problem in the regression model used for this study among the predictors. On the other hand, the data used in this study was normally distributed considering the criteria of Skewness and kurtosis values between -2 and +2. (i e. lied between -1.092 and 1.086).

The results of the regression analysis showed that $R=0.900$ and $R^2=0.809$, indicated that there is a strong linear correlation between SCM practices and the operational performance of BBS. c. Therefore, the result of the analysis revealed that SCM practices as the independent variables explained 80.9% of the variability of the dependent variable which is the operational performance of BBS. c. The findings from ANOVA (F- Test) clearly shown that multiple regression model used in this study is statistically significant in explaining the relationship between the independent variables and dependent variable, meaning that it is a suitable prediction model for explaining SCM practices and operational performance.

On the subject of standardized Beta Coefficients of this study presented that, the highest effect was quality of information sharing (beta value 0.280) followed by customer relationships management (beta value 0.208), then level of information sharing and internal lean practice (beta 0.206 & 0.197) respectively. Finally, strategic supplier partnership has (beta value 0.127). This inferred that quality of information sharing highly significantly explains the company's operational performance. Totally, the coefficients of regression analysis demonstrated that all variables (SSP, CRM, LIS QIS and ILP) were significant to explain variances in the company's operational performance. Hence,

the 2nd, 3rd, 4th, 5th, and 6th objectives of the study which articulates, “To analysis the effect of SSP, CRM, LIS QIS and ILP on operational performance of the BBS. c”, would be answered by the result of this analysis.

8. Conclusions

The main objective of the study was to investigate the effect of SCM practices on operational performance. Based on the findings, the researcher concludes that BBS. c was implemented the SCM practices (SSP, CRM, LIS, QIS and ILP). These practices have helped BBS. c to improve its operational performance. This is supported by the results from the conducted descriptive analysis that showed, the operational performance of the Bedele brewery Share Company was practiced quick response for product adjustment to meet customer’s requirement, reasonable time for supplier selection, to be ready for packing at the company and respond to changes in the market demand is quick and efficient in all parameters of operational performance.

The findings from the Pearson correlation analysis results revealed that there is a positive and significant correlation between the aggregated SCM practices and operational performance of Bedele brewery Share Company. Accordingly, the multiple regression analysis result of this study demonstrated that, all independent variables (designated SCM Practices) have a positive and statistically significant effect on operational performance of the BBS. c. From the model summary of multiple regressions, the result showed that, the designated supply chain management practices were highly influences operational performance of Bedele brewery Share Company. $\beta=0.127$; $p<0.05$.

References

- [1] Alvarado, U. Y., & Kotzab, H. (2011). Supply Chain Management: The integration of logistics in marketing Industrial Marketing Management. *Journals of business logistics*, 30, 183-198.
- [2] Chen, I. J., & Paul raj, A. (2014). Towards A Theory of Supply Chain Management: The Constructs and Measurements. *Journal of Operations Management*, 143-161.
- [3] Constangioara, A. (2012). The impact of supply chain performance on organizational performance. *Journal of Electrical & Electronics Engineering*, 5 (2).
- [4] Cook, L., D., & Heiser, S.; Sengupta, K. (2011). The moderating effect of supply chain role on the relationship between supply chain practices and performance”. *International Journal of Physical Distribution and Logistics Management*, 41 (2), 104.
- [5] Cuthbertson, R., & Piotrowicz, W. (2008). Supply chain best practices–identification and categorisation of measures and benefits. *International Journal of productivity and performance management*.
- [6] David, L. A., Materna, A. C, Friedman, J, & Campos-Baptista, M. (2014). Host lifestyle affects human microbiota on daily timescales. *Genome biology*. 15 (7), 1-15.
- [7] Deshpande, A. (2012). Supply Chain Management Dimensions, Supply Chain Performance and Organizational Performance: An Integrated Framework. *International Journal of Business and Management*, 7 (8).
- [8] Frohlich, M. T., & Westbrook, R. ((2001).). Arcs of integration: an international study of supply chain strategies.
- [9] George, D., & Mallery, P. (2010). *SPSS for Windows Step by Step: A Simple Guide and Reference 17.0 Update*. 10th Edition, Pearson, Boston.
- [10] Gualandris, J. G. (2014). Do supply management and global sourcing matter for firm sustainability performance?
- [11] H/Michael D. (2011). Supply Chain Performance of selected leather Footwear firms in Addis Ababa. School of business & public administration masters of business Program.
- [12] Haftay, A. (2019). Supply chain management: practice, operational performance and its effect on Bishoftu Automotive Engineering Industry. Unpublished MA, Thesis of the University of Addis Ababa, Ethiopia.
- [13] Hair, J. F., William, C., Black, S., Barry, J., & Babin, A. (2010). *Multivariate Data Analysis: Seventh Edition*. Pearson Education.
- [14] Hamister J. W. (2012). Supply chain management practices in small retailers. *International Journal of Retail & Distribution Management* <https://doi.org/10.1108/09590551211230250>, 6 (40), 427-450.
- [15] Haque, & Islam,. (2013). Effects of Supply Chain Management Practices on Customer Satisfaction in the pharmaceutical industry of Bangladesh, *Global Business and Management Research*. *Ann international journal*, 5.
- [16] Holmberg, S. (2015). A system perspective on supply chain measurement. *International Journal of Physical Distribution & Logistics*.
- [17] Kassanesh, A. (2018). carried a study on Effect of Supply Chain Management Practices on Operational Performance in Heineken Kilinto Brewery in Addis Ababa.
- [18] Koplin, J., Seuring, S., & Mesterharm, M. (2007). Incorporating sustainability into supply management in the automotive industry–the case of the Volkswagen AG. *Journal of Cleaner Production*, 15 (11-12), 1053-1062.
- [19] Li, S., Ragu, B., T. S, N., Nathan, R. S., & Ra, S. (2006). The impact of supply chain management practices on competitive advantage and organ performance. *International Journal of Management Science*, 107-124.
- [20] Makena, Naomi, & Mutuerandu, (2014). Impact of Supply Chain Management Practices on Organizational Performance: A Case Study of Haco Industries Limited (Kenya). *IOSR Journal of Business and Management (IOSR-JBM)*, 16, 62-64.
- [21] McKinsey. (2011). Search for light dark matter in XENON10 data. *Physical Review Letters*, 051301. 107 (5). Mentzer, J. T., W, D., & J. S. I, K. (2001). Defining supplychain management. *Journa of Business Logistics*, 2 (22), 1-25.
- [22] Moberg CR, Cutler BD, Gross A, & Speh TW. (2012). identifying antecedents of information exchange within supply chains. *International Journal of Physical Distribution and Logistics management*, 32 (9), 55-70.

- [23] Moslem, Ghatebi, E., & M. A. (2013). "Impact of Supply Chain Management Practices on Competitive Advantage in Manufacturing Companies of Khuzestan Province". *Interdisciplinary journal of contemporary research in business* copy right © 2013 institute of interdisciplinary business research, 5 (6).
- [24] Msimangira, K., & Tesha, C. P. (2009). *International supply chain practices in developing countries: A study in Tanzania*. Production and Operations Management Society (POMS). 20th Annual Conference, Orlando, Florida, U. S. A.
- [25] Muhammad, B. (2004). *Supply chain management: Practices, performance and its impact on business performance*. Unpublished M. Sc Thesis of the University of Utara, Malaysia.
- [26] Narasimhan, Ram., Swink, Morgan., Kim, & Soo. W. (2006). *Disentangling leanness and agility: an empirical investigation*. *Journal of Operations Management.*, 24 (5), 440-457.
- [27] Ng, I., Scharf, K., Pogrebna, G., & Maull, R.. (2015). *Contextual variety, internet -of-things and the choice of tailoring over platform: mass customisation strategy in supply chain management*. (J. (. Nunnally, Ed.) *International Journal of Production Economics*, 159 (1), 76-87.
- [28] Qrunfleh, & T. M. (2015). *Supply chain management practices – IT utilisation alignment: impact on supply chain performance and firm performance*. *International Journal of Business Information Systems*, 5, 18 (4), pp. 364-389.
- [29] Sedyaningrum, M., Prasetya, A., & Kholid Mawardi, M. (2019). *e the effect of strategic supplier partnerships on the the supply chain integration, supply chain performance and farmers performance*. *Wacana- ISSN: 1411- 0199*, Vol. 22 (1).
- [30] Shah, R., Chandrasekaran, Aravind., Linderman, & Kevin. (2008). *In pursuit of implementation patterns: the context to Lean and Six Sigma*. *International Journal of Production Research*, 46 (23), 6679-6699.
- [31] Siddig B. I., & Adam Hamid, A. (2012). *Supply Chain Performance Effectiveness*. *International Journal of Science and Research (IJSR, ISSN (Online), 3 (358), 2319-7064*.
- [32] Solomon. (2017). *The Effect of Supply Chain Management Practices, operational performance*, Addis Ababa University. unpublished thesis, 65.
- [33] Sunder, V. M. (2013). *Synergies of Lean Six Sigma*. *Journal of Operations Management.*, 12 (1), 21-31.
- [34] Tan, K., Kannan, V., & Handfield, R. (2008). *Supply chain management: Supplier performance and firm performance*. *International Journal of Purchasing and Materials management*.
- [35] Vilhenac, E. (2017). *Supply chain management practices and firms' operational performance*. *International Journal of Quality & Reliability Management*.
- [36] Vinodh, S., & Joy, Dino. (2012). *Structural equation modeling of lean manufacturing practices*. *International Journal of Production Research*. 50 (6), 1598-1607.
- [37] Ward, Peter, Zhou, & Honggeng. (2006). *Impact of information technology integration and lean/just-in-time practices on leadtime performance*. *Decision Science.*, 37 (2), 177-203.