INNOVATIONS

Factors Affecting Supply Chain Management Performance in Cement Manufacturing Industry: The Case of Ture cement, Ethiopia

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Abstract *:* Supply chain managers always would assess the supply chain environment, based on the assessment result proper strategies have to be developed to minimize delivery time, and improve reliability. Supply chain management performance affected by different factors. This study mainly aimed to assess the factors affecting supply chain management performance of Ture cement factory. Supply chain management dimensions (suppliers' partnership, customer relationship, environmental issues and information communication technology) were identified. Questionnaire were used as primary data collection instrument. Study participants were selected based on purposive technique because of the limited number of population all 41target populations are taken to collect the necessary data. To analyze the collected data Descriptive statistics specifically measure of central tendency were used, among the inferential statistical tools Correlation and multiple regression analysis were implemented to analyze the collected data. The collected data also presented in tabular form. The results of the study showed that supply chain management challenges have significant relationship with the SCM performance of Ture cement factory and the current supply chain management performance of Ture cement factory is poor. Ture cement factory should give emphasis to supply chain management challenges to maintain and improve the performance of supply chain management.

KeyWords: **1.**Supply chain management **2.** Supplier partnership **3.** Customer relationship, environment t **4.**Information communication technology **5.** SCM performance

1. Introduction

Supply chain management encompasses the planning and management of all activities involved in sourcing and procurement, conversion and all logistics management activities. Importantly, it also includes coordination and collaboration with channel partners, which can be suppliers, intermediaries, third party service provider, and customers, in essence supply chain management integrates supply and demand management within and across companies. (Snyder, 2019).

In current environment of the business with globalization, specialization, innovation and outsourcing, it is crucial for entities to corporate and work in networks. So, the concept of supply chain is inevitable. Supply chain is as a flow of goods, information or finance. We can refer to a supply chain as a flow, where an actor decides which strategy is to be used, and I may therefore talk about the management of flows in terms of the flow of goods, information and finances. It means supply chain refers to the complex network of relationships that organizations maintain with trading partners in order to procure manufacture and deliver products to services. The term ‘‘supply chain management’’ appeared in the early eighties (Oliver & Webber 1982).

The concept of supply chain in management, was of great importance long before in the early 20th century, especially by the creation of the assembly line. As the first era it was termed as of creation era. The second era was integration of supply chain management, where studies were highlighted with the development of Electronic Data Interchange (EDI) systems in the 1960s and developed through the 1990s by the introduction of Enterprise Resource Planning (ERP). The third era which was identified as of globalization era characterized by the globalization of supply chain management in organizations with the goal of increasing competitive advantage, creating more value-added, and reducing costs through global sourcing (Kiran, 2018, pp.3-10).

Objectives of supply chain operation could be classified in three groups: asset utilization, customer response and efficiency. The cement industry is concentrated on asset utilization with some level of efficiency and low customer response. The main reason for this location is that cement companies are focused in minimizing cost based on the economies of scale generated by their investment in large manufacturing plants. This is a given condition for all large cement companies in the industry.

Supply chains must be responsive in emerging markets. In Ethiopia there are emerging markets for the cement factories are expected to play significant role in terms of supplying variety of cement products for the booming construction and infrastructure development. In addition, in today’s dynamic and very variable; companies need to consider their supply chain management as of strategic objective in a way of improving their SCM performance increased.

To improve overall supplies chain performances in global competitive environment, identifying challenges of supply chain management is important. So, this study is aimed to assess the challenges of supply chain management performance in Ture cement.

2. Literature Review.

Supply chain management

Blanchard (2018) defines supply chain as the sequence of events that cover a product’s entire lifecycle, from conception to consumption. ‘‘Supply chain is defined as a group of inter-connected participating companies that add value to a stream of transformed inputs from their source of origin to the end products and services that are demanded by the designated end-consumers’’ (Dawei, 2019, pp.8-11). It means a supply chain is basically a group of independent organizations connected together through the products and services that they separately and/or jointly add value on in order to deliver them to the end customer.

2.1.1. Strategic supplier partnership issues

The main goal of suppliers’ relationship is to improve business between you and your suppliers. By creating a streamlined approach, you improve efficiency for both business and your suppliers. Though the approach to SRM can vary from one organization to the next, the main focus is on developing a mutually beneficial relationship with all of your suppliers, especially those that are considered as *strategic partnerships* for your brand.

A strategic supplier partnership is defined as a long-term relationship between the organization and its supplier (Li et al., (2006). Companies such as Infineon Technologies, BM, Cisco and Hewlett

Packard have worked closely with their suppliers and moved from early ''arm's length'' relationships to ''durable arm's length'' relations and strategic partnerships. The strategic partnership could involve joint product development, and sharing of product demand forecasts. Adopting early supplier development operational activities, such as product development projects, can offer more cost-effective design choices, and select best available components and technologies, resulting in smoother production, improved product quality and reduction in lead time (Tan et al., 2002). Through strategic supplier partnerships, organizations can work closely with suppliers who can share responsibility for the success of the products (Li et al., 2005). Such strategic supplier partnership should enable successful supply chain management.

2.1.2. Supply chain management, customer relationship issues

Customer Relationship Management (CRM) refers to the methodologies and tools that aim encompasses all of a business' interactions with current, past and future customers with the goal of ''improving'' customers' relationships with that business. In other words, the goal of CRM is to gather enough information about a customer and use it well enough to increase that customer's positive interactions with the company, thereby increasing that company's sales.
Customer relationship management (CRM) is an important component of SCM (Ta et al., 1999) and involves building and maintaining long-term relationships with customers (Li et al., 2005). Stalk and Hout (1990) stated that maintaining a good customer relationship will enable organizations to be more responsive to customers' needs, thus creating greater customer loyalty, repeat purchase and willingness to pay minimum prices for higher quality products. Customer loyalty and customer satisfaction are the main goals of supply chain management.

2.1.3. Supply chain management, information communication issues

The success of a company's supply chain management depends upon the accuracy and speed of the information provided by each business partner (Chong et al., 2009). Li t al. (2006) defined information sharing in the supply chain as the extent to which vital and proprietary information is communicated to the company's supply chain partner. Wal-Mart is an example of successful information sharing practices whereby it shares online summaries of point-of-sales data to its close suppliers such as Johnson and Johnson and Lever Brothers (Lee et al., 2000). A successful sharing of useful information between the supply chains partners can result a reduction of inventory and manufacturing cost. Better understanding of customer needs and faster response to market changes. Driven by e-commerce's capabilities to empower client, most companies have moved from the traditional ''PUSH'' business model, where manufacturers, suppliers, distributors, and marketers have most of the power to customer driven ''PULL'' model.

2.1.4. Supply chain Management, environmental issues

For years the producers' responsibilities were finished when the product was on the shelves in the shop or when the guarantee period was over. Supply chain management was perceived as the planning and control of the flow of goods from the sourcing base to the final consumers, accompanied with the necessary information and money for the independent entities along that chain.

Traditional supply chain management focuses on low cost, high quality, reduced lead time and high service level. The introduction of the Extended Producer Responsibility in a number of countries and industries has changed the rules of the market behaviors. Nowadays manufacturers need to take into consideration the post-consumption phase of their products, the so called endof-life phase: the environmental burdens incurred during different stages of the product transfer from manufacturer to final user and then to the disposal site. The interest in environmentally friendly supply chain management has risen considerably in recent years. This can be seen by the number of initiatives taken by companies.

Brand owners are very often perceived to be responsible for environmental problems in the entire supply chain from the sourcing base to end-of-life recovery issues. It is expected that the manufacturers should reduce sources of waste and pollution throughout their supply chains, across multiple entities, upper stream (suppliers) and downstream (distributors and consumers). An environmentally friendly supply connects with partners who should make managerial decisions with regard to environmental consequences. It enhances competitiveness and creates better customer service, resilience and increased profitability. Companies are forced to adopt ecologically responsive practices to meet legislative requirements but they can also benefit from ‘‘green’’ behavior. According to Strivastava (2007), green supply chain management can reduce the ecological impact of industrial activity without sacrificing quality, cost, reliability, performance or energy utilization efficiency, meeting environmental regulations to not only minimize ecological damage but also to ensure overall economic profit.

Ignoring these issues has wide range of costly consequences. Some of these consequences are easily detected but others are hidden and difficult to track down. Government fines and civil penalties are clearly seen in terms of costs incurred to the company. Costs like legal and investigation costs, costs of taking corrective actions and administrative costs incurred for future compliances are covered in the general costs of an organization. Customer deflections and loss of reputations have devastating consequences and are difficult to quantify them as well (Thompson et al. 2008). According to McCrea (2010), these day’s companies are discovering that greener and most sustainable supply chain is not only good for the environment, but also for business firms.

2.2. Supply chain management performance issues

Top-performing supply chains have three distinct qualities. First, they are *agile* enough to react readily to sudden changes in demand. Second, they *adapt* over time as market structures and environmental conditions change. And third, they *align* the interest of all members of the supply chain network in order to optimize performance.

Performance as an indispensable tool measurement provides the necessary assistance for performance improvement in pursuit of supply chain excellence’’. The main difference between supply chain performance and other performance measures lies in the extended concept of supply chain where it includes suppliers and distributors etc. There are a number of performance measures that are available. The different performance measure systems have different views for integrating supply chain performance measures. These performance measure systems answer basic question like what is to be measured, what measures to be integrated and what is the frequency of integration etc.

Supply chain performance measures can be classified broadly into two categories: qualitative measures (such as customer satisfaction and product quality) and quantitative measures (such as order-to-deliver, lead time, supply response time, flexibility, resource utilization, delivery performance etc).

2.3. Supply chain Management in Cement Industry

2.3.1. Overview of Cement Industry supply chain management

According to Song Song Liu, (2018) SCM is one of the major issues in the process industry, which deals with large and complex supply chain networks as a process industry cement production plant consists of the following three processes: raw material process, clinker burning process, and finish grinding process. So, the distribution is an important area where with the help of supply chain management the best distribution channel can be framed. In cement industry SCM has its own role for improving its processes, especially energy, which would also enhance competitiveness of supply chain.

Cement as a final product is sold in bulk or bags. Cement bulk is the normal way to distribute cement in developed economies. Bulk sales represent almost 90% of the US cement market. Concrete

producers are the biggest customers. According to CEMEX, bagged cement represents 80% of sales in emerging markets. Bags sales are strongly related to Do-It-Yourself home construction.

2.3 Empirical evidence on challenges of SCM

Owing to SCM's interdisciplinary origin, there have been various definitions of SCM (Li, et al., 2016). The supply chain Management concept was derived from the areas of purchasing and supply management, and transportation and logistics management (Li et al., 2016; Tan et al., 1998). From purchasing and supply perspective, SCM is synonymous with the integration of the supply base that evolved from the traditional purchasing and materials function. Others who defined SCM from the purchasing perspective include Wisner and Ta (2000) and they stated that SCM is a basic strategic business process, rather than a specialized supporting function. From the perspective of transportation and logistics management however, SCM is synonymous with integrated logistics systems, and focuses on inventory reduction both within and across organizations in the supply chain (Fisher, 1997; Lamb, 1995).

Based on such integrated SCM concept, SCM is defined by Shimechi-Levi et al. (2000) and Park and Krishnan (2019) as a set of approaches utilized to efficiently integrated suppliers, manufacturers, warehouses, and stores, so that merchandise is produced and distributed at the right quantities, to the right location, and at the right time, in order to minimize system-wide costs while satisfying service level requirements.

Grossmann (2005) gave an overview and highlighted some major challenges of SCM in the process industry. Specifically, John, et.al (2012) evinced in their journal a number of challenges inhibiting supply chain management depending on the context and the way in which the challenge is utilized in reference to green manufacturing for Indian cement industry. In case of Pakistan as the challenge of lean supply chain management Khurram, et.al (2017) pointed out that even though lots of cement manufacturers have now developed their own energy development plants, which have resulted in elimination of production disruptions as well as reduction in overall energy bill and likewise, level of technology has also improved which would also support in implementation of lean supply chain; suppliers' consolidation is not taking place in cement industry of Pakistan. An underlying reason for this is that suppliers who not very learned and they do not understand benefits of such consolidation.

In addition, it was observed that in last few years, demand for cement was not certain. There were a number of reasons for this. This includes undocumented economy as well as limited ability of the businesses to forecast future demand. Moreover, unstable political and legal condition in Pakistan had resulted in varying demand patterns and had made planning difficult for businesses. This resulted in rise in stock levels, which resulted in loss in competitiveness of supply chain.

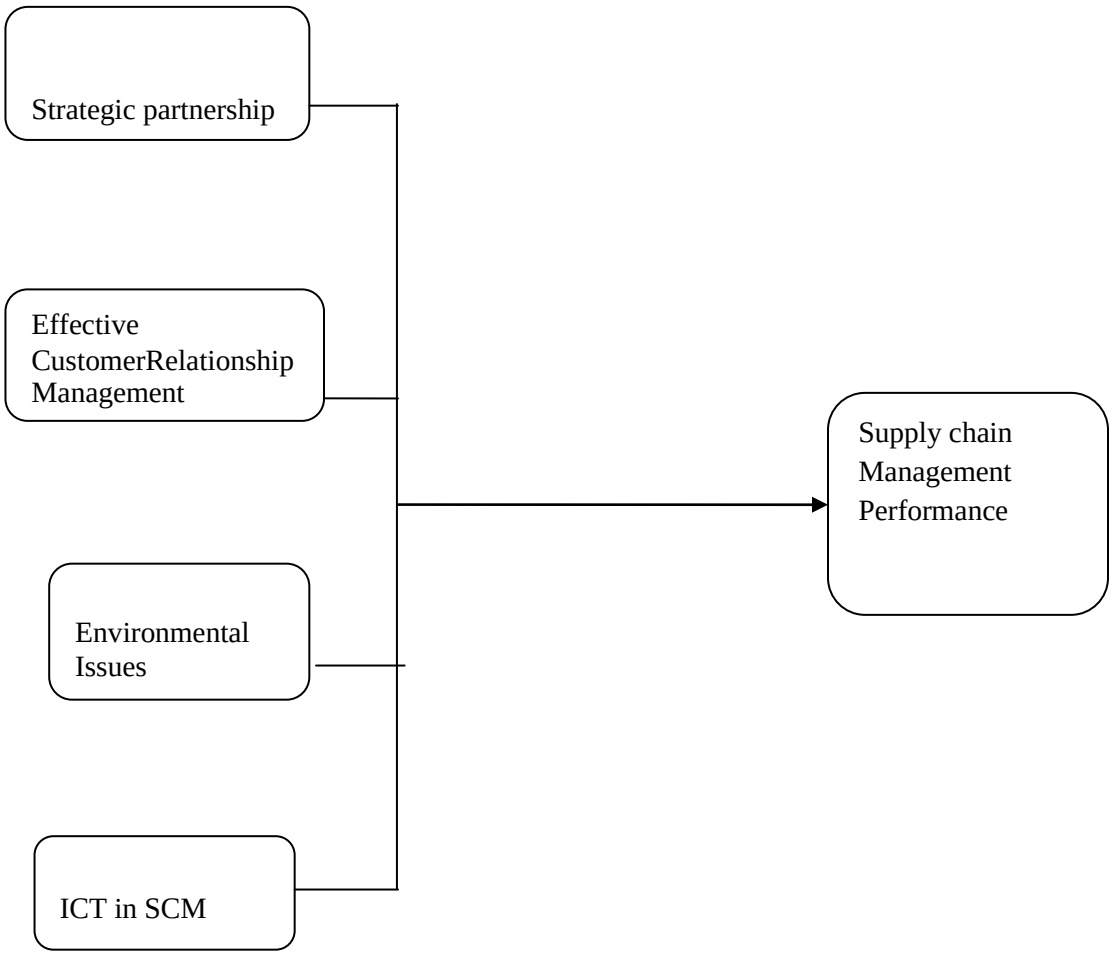
2.3. Conceptual framework of the study

Issues/challenges in SCM, as listed by Fawcetet al.2007, are poor coordination of effort, incompatible information system, long cycle time, communication problems, customer service issues, excessive waste and environmental degradation, relatively high inventory for the level of customer service achieved and lower than optimal profits. For this particular research, the researcher would identify the general problems that have an impact on the future performance of cement firms in Ethiopia. These are partnership with the suppliers, information communication, managing environmental issues and customer relationship issues. As described above, these challenges cross other multiple specific problems and cross multiple supply chain processes. For example, information communication crosses various processes related to demand management, transportation, inventory control, procurement, energy and environmental issues and so on.

The study was formulated based on four major dimensions of supply chain management challenges namely supply chain partnership, customer relationship, environmental aspects, and information technology. Independent variables of this research are supply chain partnership,

customer relationship, environmental aspects, and information technology. Organizational SCM performance is dependent variable of the study.

Figure 2.2. Conceptual framework



Source: adopted from Okoth, 2011

3. Research Methodology.

This research employs descriptive survey research approach in order to identify the current and the future challenges of supply chain management performance. The study populations are the total population of 41 by using Purposivesampling technique Primary data are those which are collected a fresh and for the first time and thus happen to be original in character (Kothari, 2004). Thus, this study mainly used questionnaire as an instrument of data collection. Data collected from different source were presented and analyzed with the help of frequency distribution, Pearson correlation, and multiplelinear regression to identify the relationship between the dependent and independent variables.

Before data analysis, data collections instrument validity and reliability were checked with the help of reliability and validity test techniques like Cronbach alpha

4. Results

4.1. Correlation between dependent and independent variables

		Partnership	Customer	Environment	ICT	Performance	SCM
Partnership	Pearson Correlation	1	.762**	.728**	.576**	.923**	.817**
	Sig. (2-tailed)		.000	.000	.000	.000	.000
	N	30	30	30	30	30	30
Customer	Pearson Correlation	.672**	1	.800**	.742**	.813**	.810**
	Sig. (2-tailed)	.000		.000	.000	.000	.000
	N	30	30	30	30	30	30
Environment	Pearson Correlation	.711**	.821**	1	.745**	.808**	.999**
	Sig. (2-tailed)	.000	.000		.000	.000	.000
	N	30	30	30	30	30	30
ICT	Pearson Correlation	.556**	.763**	.567**	1	.741**	.851**
	Sig. (2-tailed)	.000	.000	.000		.000	.000
	N	30	30	30	30	30	30
Performance	Pearson Correlation	.814**	.913**	.908**	.841**	1	.988**
	Sig. (2-tailed)	.000	.000	.000	.000		.000
	N	30	30	30	30	30	30
SCM performance	Pearson Correlation	.914**	.814**	.788**	.921**	.888**	1
	Sig. (2-tailed)	.000	.000	.000	.000	.000	
	N	30	30	30	30	30	30

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

Source: survey result (2020)

According to the Table: 4.1. Above, the correlation of supplier partnership shows strong correlation with organization performance (r =0.817, p<0.01). Customer relationship (r= 0.810, p<0.01) shows strong correlation with organization performance. Environment (r=0.851, p<0.01) and ICT (r=0.851, p<0.01) also have strong correlation with organization performance. In general supply

chain management performance had strongly and positive correlation with organizational performance with r value of 0.988 and p<0.01.

Table: 4.2. Regression Coefficients for challenges of supply chain management dimensions on Ture cement factory.

Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	.042	.081		.517	.607		
Partnership	.321	.028	.299	9.624	.000	.449	2.336
Customer	.313	.030	.214	6.751	.000	.264	3.793
Environment	.294	.044	.224	5.704	.000	.281	3.334
ICT	.220	.023	.303	9.718	.000	.446	2.243

a. Dependent Variable: SCM

Source: survey result (2020)

The above table IS interpreted as follows:

Supplier partnership

As shown in Table 4.2.Beta (B) values for supplier partnership is 0.321 and p value is (p<0.01). This indicates that on average a 1% improvement in supplier partnership will increase Ture cement industry performance by 30.21% and p<0.05 implies that supplier partnership is significant at 5% level of significance.

Customer relationship

Based on the above Table 4.2.The beta (B) coefficient of customer relationship 0.313 indicates that on average 1% increase in customer relationship will increase Ture performance by 31.3%. This implies there is significant relationship between customer relationship and Ture cement industry performance. The p value is (p<0.01) indicates that customer relationship is significant at 1% level of significant.

Environmental issues

Beta value of environment 0.294 indicates on average a percent increase in environmental issues will increase Ture cement performance by 29.4% as shown in table 4.2. The significance level is (p<0.01) which is less than 0.05 and is statistically significant.

Information communication technology (ICT)

For information communication technology the beta value is 0.222 which indicates on average 1% increase in ICT will increase organization performance by 22%. The beta value (P<0.01) which is less than 0.05 implies that, ICT is statistically significant. Therefore, ICT has significant relationship with performance of Ture cement industry.

5. Discussion.

Supplier partnership and supply chain performance

Supplier partnership explain Performance by 26.5% and $p<0.05$ implies that supplier partnership is significant at 5% level of significance. Thus we can conclude that the challenge of supplier partnership has significant relationship with Ture cement supply chain management performance. **Customer relationship and supply chain performance.**

Supply chain performance explained customer relationship by 31.3%. This implies there is significant relationship between customer relationship and Ture cement performance. Therefore the challenge of customer relationship has significant relationship with Ture cement performance.

Environmental Issue challenges and SCM Performance

The Beta value of environment 0.294 indicates on average a percent increase in environmental issues will increase Ture cement performance by 29.4% as shown in table 4.2. So, the challenges of environmental practices have significant relationship with Ture cement supply chain management performance.

Information Communication technology challenges and SCM Performance

IT improves supply chain agility, reduce cycle time, and enable higher level of efficiency and timely deliver goods and services to the customer. It requires uniform and compatible information technology investments and applications among the supply chain members. The connectivity alone does not bring what is required. There shall be a well-established trust and willingness among the users of the technology. Online infrastructures also be well designed and implemented so that chain members can transfer and share information among themselves.

6. Conclusion

From the analysis of the survey, the challenges of supply chain management have significant impact Ture cement factory performance. As the regression result showed for individual dimensions of challenges of supply chain management, supplier partnership, customer relationship, environmental issues, and information communication technology issues have highly significant relationship with the factory's SCM performance.

As it is shown in the descriptive statics, to the four general challenges of supply management and each classified variable, one can say that the performance of supply chain management of Ture cement are almost poor and at their low level. The impacts of these variables on Ture cement are highly significant.

Properly managed Supply chain would result in lower costs, short delivery time low inventory level and improve reliability which are all would improve the supply chain management performance of the organizations.

Cement price in Ethiopia is still perceived to be relatively higher as compared to global prices, because the use of costly imported energy sources, high logistics cost, poor infrastructure status, the factory's concentration at the center etc. are some challenges of Ture cement factory.

7. Suggestions

To maximize supply chain performance with those identified variables the researcher suggested the followings points.

•The factory need change from their usual transactional supplier's relationship to strategic supplier partnership. There should also be a suppliers performance measurement schemes with which they are going to be motivated and rewarded.

• An organization never exists if there are no customers. Thus, Ture cement need to understand that they are there not only sell cement but to serve their customers. Therefore, the factory need to

identify the need of the customers, collect feedbacks on any complaints and avail different products and services attributes to their customers.
• Environmental issues should be considered as a competitive necessity, instead of not only regulatory obligation.
• The Factory should have Information communication technology should be instituted to foster information communication within and among all supply chain members.

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