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Factors Affecting Supply Chain Management Performance: A Study on the Real Estate Industry of Bangladesh

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Abstract

The growth of the real estate industry in Bangladesh is seen as a prospective solution to the habitation problem of the exploded population, increased migration from rural to urban areas, among many others. This industry has also very significant contribution into the economy of the country. However, the success of this industry always depends on the procurement, transportation and project handover of the concerned real estate companies in the least possible time (i.e. Just In Time or JIT) and strict quality control (i.e. Total Quality Management or TQM) together with the effective and efficient management of capacity, demand, inventory, schedule, manufacturing, operation and above all, performance. Towards the end, the factors that affect the supply chain management (SCM) performance will be examined in this study from the perspectives of the REI of Bangladesh and necessary policy implications will be made to plan for an effective supply chain so that success and viability of the industry can be ensured.

Keywords: SCM; REI; REHAB; Overpopulation; Migration; Housing Facilities; JIT; TQM

1. Introduction

The real estate has been emerging as one of the growing industries of Bangladesh with respect to the population growth and migration from the rural to urban areas. In support of this emergence, the provisional results of Bangladesh Population and Housing Census 2011 exhibit that the population of Bangladesh on 15th March, 2011 was 142,319 thousand which was only 71,479 thousand in the year 1974 (BBS, 2011).

In 1970, the urban population was only 7.6%, whereas in 2010 it was 27.1%. In 2030, it

is projected to reach 39.3% (Desa, U. N., 2009). It means that in near future (by 2040), half of the total population will live in cities. In addition, the Government of Bangladesh has even permitted monetary investment from the undisclosed sources in this industry.

From the above perspective, the real estate industry (REI) has enormous prospect of substantial contribution to the economy of the country. However, the previous research studies evidenced that an integrated supply chain management (SCM) can play a very significant role in receiving and fulfilling a customer's request (Chopra, Sunil & Meindl, 2004) through the effective and efficient operation of such industry by spanning from raw material suppliers to the final customer (Frohlich & Westbrook, 2001; Heikkilä, 2002); in a forward as well as a backward direction (Cousins & Menguc, 2006). Now, it is generally accepted that the application of SCM allows firms to work in a seamless manner. In addition, SCM is a strategic weapon which helps to significantly improve the performance of businesses (Dierickx &Cool, 1989; Narasimhan & Das, 2001). Both of these findings are applicable to the REI of Bangladesh.

From the reviewed literature, a good number of factors have been identified such as mutual understanding, trust or commitment, long-term relationships, shared visions and goals, shared controlling systems, joint project groups, information sharing on forecasts, inventory status, product development, leadership, organizational culture, mutual dependency, profit, risk sharing, level of technology, procurement sourcing and processes, distribution channels, logistic flexibility, staff competency, quantity flexibility, pricing or cost, law and regulations, lead time, innovation, production system These act as the drivers for high performing supply chain management (Bechtel & Jayaram, 1997; Cooper, Lambert, & Pagh, 1997; Fawcett & Magnan, 2001; Hertz 2001; Mentzer et al., 2001; Droge & Vickery, 2004; Cousins & Menguc, 2006; Das, Narasimhan, & Talluri , 2006; Keskinocak & Tayur, 2001; Subramani, 2004; Lambert & Cooper, 2000). In this regard, the current study aims to investigate the role of the prevailing factors in ensuring effective and efficient performance of the SCM of the REI of Bangladesh.

2. Background of the REI in Bangladesh

Shelter is one of our fundamental requirements which are fulfilled through housing. According to World Bank (2010), housing is a critical necessity which is equated with a human right. Towards the end, Bangladesh, like many other small but densely populated countries, has been facing huge shortage of affordable housing both in urban and rural areas (Sarker, Siddiquee

& Rehan, 2008). Therefore, making shelter available to all is increasingly becoming a big challenge as well as a business opportunity for the real estate developers in Bangladesh (Mohidul C. Haque, 2013).

Challenges the Government face to mitigate housing problem include the increase in prices of land and construction materials, high rent, poor land administration policies, high profitability of the housing companies, inadequate infrastructure for expansion into urban and rural areas, usage of black money in acquiring land, apartments, buildings, shops and the likes in the names of relatives, friends or trusted men of the black money holder, re-structuring of family formation (single units), security, social esteem, among many others. On the other hand, these challenges receive enormous attention by the real estate developers as potential opportunities to provide housing facilities. Thus, the growth of the REI goes on and on at an accelerated growth rate. However, to ensure viable growth of this industry the Real Estate and Housing Association of Bangladesh (REHAB) was formed in the capital city of Bangladesh, Dhaka, in the late seventies with fewer than five companies. REHAB is now the sole regulatory organization of the real estate agents, developers and builders (Amin S., 2008). The current number of enlisted real estate developing companies with REHAB is 1133 (REHAB, n.d.). Today, there are many stakeholders in this industry including construction companies such as developers of land, apartment, roads, buildings and other service providers like architectural firm, interior designers, security companies, banks, finance companies, logistic support providers, power and gas suppliers and home appliances.

However, due to the political turmoil in recent past, high lending rates, presence of many non-registered real estate developers and probability of earthquake, the sale of apartment and plot in Bangladesh has registered a 60 percent drop in 2013 from its previous year 2012. By citing the REHAB, the Daily Star mentioned that the number of new projects undertaken by developers declined by around 75 percent in 2013, compared to the previous year. In addition, it was also cited that REHAB in a recent study found that a total of 338 companies have 22,572 units of unsold flats worth Tk. 21,506.36 crore. In spite of decrease in sales, the apartment price is not coming down to the affordable zone of middle and low income group of the population (The Daily Star, 2014; The Financial Express, 2015). In this regard, REHAB sought a stimulus package from the government to revive the struggling sector by including immediate formation of a Tk 3,000 crore fund to extend long-term credit to the low and middle-income buyers at a

single digit rate of interest. Developers also sought assistance for rescheduling their existing bank loans with a one-year grace period without down payments. According to NTV Bangladesh, REHAB leaders urged the government to allow investment of undisclosed money (black money) in the real estate sector with no conditions attached in order to eliminate the difficulties the sector was facing.

3. Literature Review

Supply Chain management is a corporate business process of integrating end users with suppliers that provide information, goods, and services that add value for customers (Grant, Lambert, Stock & Ellram, 2006). So, today's competition is not among individual companies, rather it is among networks of organizations that are known as supply chains (Dwyer et al., 1999). However, to survive in such competitive environment, organizations need to focus on supply chain management practices to effectively integrate the internal functions within the organization and link them with the external operations of suppliers and supply chain members in order to enhance the ultimate performance (Arawati, 2011). In this regard, Sarode et al. (2008) advocated a total of twelve measures which includes quality, visibility, trust, innovativeness, delivery reliability, flexibility and responsiveness, resource utilization, cost, assets, technological capability, service, time to market for effective supply chain performance. Steward, Wu, and Hartley (2010) consider factors such as product quality, responsiveness to requests for change, sales, service and/or technical support, total value received and overall cost performance as a measurement of supply chain performance.

In the years of various research studies, many factors which affect supply chain management performance have been identified. For example, Stanley and Gregory (2001) found a number of costs incurred in managing an efficient SC include the product purchase, transportation cost, taxes and so on. Childerhouse et al. (2003) studied the reengineering construction supply chain by using material flow control approach in nine different companies. Their study found that material flow is playing a key component in achieving enhanced supply chain performance. Fawcett, Ogden, Magnan and Cooper (2006) found that four types of managerial support are needed to achieve the highest levels of supply chain success: top management support, broad-based functional support, channels support and infrastructural/governance support. Simchi-Levi et al. (2003) observed that satisfaction of

customers depends on low cost, on time certain delivery or receiving a customized product from suppliers. Effective SCM will lead to a lowering of the total amount of resources required to provide the necessary level of customer service to a specific segment and improving customer service through increased product availability and reduced order cycle time (Banomyong & Supatn, 2011). Mehrjerdi (2009) emphasized that when there is responsiveness in supply chain then delivery will be on time, cost will be reduce and forecasting of data will be accurate. Singh and Acharya (2014) found 14 dimensions of supply chain flexibility which have positive role on effective SCM performance which are namely product, volume, transhipment, new product development/launch, sourcing, physical distribution, demand management, coordination, logistics, manufacturing, information system, delivery, access and process flexibility. Lockamy and McCormack (2010) identified that raw materials, components or products need to be imported, while Canbolat, Gupta, Matera and Chelst (2008) advocated the prudent management of the emerging risks from culture, language, foreign exchange rate, regulations, quality, political and economic stability as well as transportation delays. Steward, Wu, and Hartley (2010) found that supplier performance is higher when the supply manager perceives trust and satisfaction on the part of the supplier's account executive. Bowersox, Closs, Stank, and Keller (2007) found that logistics may responsibly design and administer systems to control movement and geographical positioning of raw materials, work-in process and finished inventories at the lowest total cost. Gunasekaran (2004) found that an increase in delivery performance is possible through inventory management for reduction in lead time attributes. Alam, Bagchi, Kim, Mitra and Seabra (2012) claimed that adopting supply chain management practices could result in superior performance in on-time delivery. According to O'Neill (2008), the advances in information technology have made communication tools easier for users, allowing its presence in components to extend in the supply chain. Zhou and Benton (2007) investigated the integration of information sharing to achieve improvement in supply chain performance. This study focuses on three aspects of information sharing: information sharing support technology, information content and information quality. From their findings, it is reflected that both effective information sharing and effective supply chain practice were critical in achieving good supply chain performance. As the level of information sharing ascends, it becomes more important to have effective supply chain practice, in order to achieve superior performance (Zhou & Benton 2007). Li, Rao, Ragu-Nathan,T.S., and Ragu-Nathan, B. (2005) postulated that

the supply chain trust relationships play an important role in achieving the firm's supply chain management goals and is directly related to relationship management, which includes suppliers and customers. The need for organizational commitment for supply chain success is also reported by Fawcett, Ogden, Magnan and Cooper (2006). Arshinder and Deshmukh (2007) advocated for effective coordination in decision making for efficient management of inventory, customer service and replenishment system. Previous research found that collaborative relationship between customer and supplier has positive significant influence on SCM performance improvement (Vereecke & Muylle, 2006; Bartlett, Julien & Baines, 2007; Ounnar, Pujo, Mekaouche & Giambiasi, 2007). According to a study carried out by Ambrose et al. (2010), uncertainty negatively affects company performance. However, this can be reduced if a strategic relationship with suppliers is established (Chen et al., 2004). Fynes, Voss, and de Búrca(2005) emphasized on the nature of supply chain relationships with the aim of improving customer satisfaction.

4. Research Problem

The rising requirements and awareness of the conscious customers have created serious challenges for the real estate companies of Bangladesh in maintaining effective and efficient supply chain management performance in order to ensure quality development of the real estates for the clientele. In order to accomplish this successfully by coping with all the concerned stakeholders, the best performing supply chain management is highly essential for the survival and success of the real estate companies in Bangladesh. However, such effective and efficient performance of the SCM depends on many factors and there is no concrete and exhaustive list of such factors. Furthermore, there is paucity of research works regarding this subject matter. So, it is clearly evident that there is a research gap and to mitigate this gap a rigorous research is yet to be systematically attempted.

5. Rationale of the Study

From the identified research gap, it can be stated that the previous studies focused on one or some specific factors other than the maximum factors affecting the supply chain management performance. However, to ensure effective holistic performance of the supply chain management it is important to identify the relevant factors that may enable the concerned

authorities to take necessary policy measures in order to ensure performance excellence of the REI. Furthermore, the present study may contribute to further research for innovative and efficient management in this arena.

6. Research Question

The present study investigates the research question: "Is there any factor that affect(s) Supply Chain Management Performance of the Real Estate Industry of Bangladesh?"

7. Research Hypothesis

The hypothesis derived from the above research question exhibits the following hypothesis as appropriate answer(s):

$H_{0:}$ There is/are no factor(s) that affect(s) Supply Chain Management Performance of the Real Estate Industry of Bangladesh.

H_a: There is/are factor(s) that affect(s) Supply Chain Management Performance of the Real Estate Industry of Bangladesh.

8. Objective of the Study

The objective of the study is to examine the factors which affect performance of the SCM of the REI of Bangladesh.

9. Methodology of the Study

The present study is the result of collection of both primary and secondary data and their analysis. In order to make the study effective, the primary data has been collected from the sample size of 100 employees of five real estate companies in Bangladesh using random sampling method through an extensive survey. A structured and self-administered questionnaire comprising of open-ended and non-forced, balanced and odd numbered non-comparative itemized questions using a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree) has been used for the survey. While the secondary data has been collected through literature review, which is based on the relevant research papers and articles published in the referred journals related to the literature of SCM and the real estate industry of Bangladesh. The study has endeavoured to perform quantitative analysis and as a part of this, the popular statistical tools of reliability and validity measurements, factor analysis using Principal Component Analysis

(PCA) with orthogonal varimax rotation, and several other similar methods, have been utilized to conduct necessary assessments. To conduct factor analysis, the independent variables which have been identified are exhibited in the Table 1 [Appendix].

10. Analysis and Findings of the Study

On the basis of the survey data, the following section exhibits the analysis and findings of this study.

10.1 Reliability Analysis

The Cronbach's Alpha value of all the 21 items together including 20 independent and 1 dependent variable(s) is .870 which is greater than 0.7, indicating an overall higher reliability factor. Thus, it can safely be stated that the reliability of this study is substantial in every perspective because the sample size and the data collected are reliable. Also, the reliability is shown to be good using all the 21 items.

10.2 Sampling Adequacy to Validate Factors Affecting Supply Chain Management Performance

The Bartlett Test of Sphericity and Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy have been used to validate the factors affecting supply chain management performance. Table 2 [Appendix] exhibits that the value of KMO is 0.757 which is 'good' or 'middling' (Kaiser, 1974) suggesting the adequacy of the sample size for the factor analysis. on the other hand, the results of the Bartlett's Test of Sphericity in the Table 2 [Appendix] show that with 190 degrees of freedom the approximate chi-square statistics is 879.944, which is greater than the table value. This means the null hypothesis of the population correlation matrix being an identity matrix is rejected by Bartlett's test of sphericity. So, the result of Bartlett's test of sphericity is significant suggesting that the population was not an identity matrix. Therefore, the Bartlett's Test of Sphericity is important.

10.3 Factor Analysis

10.3.1 Communalities of Integrated Marketing for Business Growth

The "Initial" column of the Table 3 [Appendix] exhibits that the communality for each

variable, v1 to v20 is 1.0 as unites which were inserted in the diagonal of the correlation matrix. Moreover, this Table also exhibits that the average communality of the variables after extraction is above 0.50, except the variable v4 which is .498.

10.3.2 Total Variance

In the Table 4 [Appendix], "Initial Eigenvalues" in column B exhibits the eigenvalues in its sub column entitled "Total". The eigenvalues for the components are exhibited in decreasing order of magnitude from component 1 to component 20. The eigenvalue for a component indicates the total variance attributed to that component. The total variance accounted for by all twenty (20) components is 20.00, which is equal to the number of variables (i.e., 20). Each of the 20 variables has a sample variance in column entitled "% of Variance", the sum of which equals the total variance in column entitled "Cumulative %". According to the eigenvalues criterion, the exact number of components is 20 which are exhibited in Table 4[Appendix].

10.3.3 Component Matrix

In Table 5 [Appendix] "Component Matrix", Component 1 is correlated with all the variables, except v1 and v2 with an absolute value of factor loading greater than 0.3. Likewise, Component 2 is correlated with v1, v2, v3, v17 and v18 of the 20 variables of which v3, v17 and v18 are commonly loaded on both the components 1 and 2. Similarly, Component 3 is correlated with v1, v2, v3, v10, v11, v12 of the 20 variables of which with v1, v2 and v3 are commonly loaded on both the components 1 and 3; v3 is commonly loaded among all the first three components. Component 4 is correlated with v4, v5, v6 and v7 of the 20 variables, none of which is correlated with any of the components 1, 2 and 3. Component 5 is correlated with v4 and v5 of the 20 variables, none of which is correlated with any of the components 1, 2 and 3, but they are commonly loaded on both the components 4 and 5. So, it is seen that the highlighted area (i.e., variables) in the various columns or components of the "Component Matrix" in the Table 5 are overlapping and so this matrix is not an ideal option to properly interpret the components. Therefore, it is difficult to interpret or seldom results in components that can be interpreted.

10.3.4 Rotated Component Matrix

Now, by comparing Table 6 [Appendix] Rotated Component Matrix with the Table 6 [Appendix]: Initial or Unrotated Matrix (titled "Component Matrix"), it is seen that how rotation achieves simplicity and enhances interpretability. From the comparison, it is seen that all variables except v1 and v2 are correlated with Component 1 in the unrotated matrix, whereas only variables v8 to v12 correlate highly with Component 1 having more than 0.5 cut off point. Likewise, the variables v15 to v20 correlate highly with Component 2. So, no variable commonly correlates highly with both the factors namely, component 1 and 2. In the next phase, the only variable v1 to v3 correlate highly with is Component 3 and are also not correlated with either of the component 1 and 2. The variables v4 to v7 are highly correlated to component 4, none of which are correlated with either of the component 1, 2 and 3. Again, the variables v13 to v14 are highly correlated to component 5, none of which are correlated with either of the component 1, 2, 3 and 4. This can be clearly seen in the "Table 6" [Appendix].

10.3.5 Component Loadings

Now by combining the Column C of the Table 4 and Table 6, five components are exhibited in Table 7 [Appendix] which effect supply chain management performance with the eigenvalues greater than 1.0 using the factor loading of 0.50 as the cut-off point and cumulative proportion of 63.990% variance.

From the findings of this study through Table 7, it is evident that supply chain management performance of the real estate industry (REI) of Bangladesh is ensured by five attributes namely 'Component 1: Performance Management', 'Component 2: Relationship Management', 'Component 3: Cost, Material and Management Support', 'Component 4: Customer Orientation' and 'Component 5: Information Management'.

The Component 1 contains 5 (five) variables namely v8: Material sourcing, v9: Supplier performance, v10: Logistics Management, v11: Inventory Management and v12: Delivery performance with component loading 0.581, 0.672, 0.859, 0.890 and 0.786 respectively. The examination of the impact of supply chain management performance on the real estate industry (REI) of Bangladesh reveals that all these five variables (v8 to v12) are significant. Since, all these variables are related to the performance management of the supply chain from material sourcing to deliver through suppliers, logistic and inventory system, the

component can be labelled as 'Performance Management'. So, it has been proved from the Principal Component Analysis [Table 3] that 'Performance Management' is a significant component in ensuring effective supply chain management performance of the real estate industry (REI) of Bangladesh.

The Component 2 contains 6 (six) variables namely v15: Trust, v16: Commitment, v17: Coordination, v18: Collaborative relationship, v19: Relationships with suppliers and v20: Relationships with customers with component loading 0.535, 0.743, 0.657, 0.624, 0.687 and 0.729, respectively. The examination of the impact of the supply chain management performance on the real estate industry (REI) of Bangladesh reveals that all these six variables (v15 to v20) are significant. Since, all these variables are related to the relationship management of the supply chain covering the relationship variables like Trust, Commitment, Coordination, Collaborative relationship, Relationships with suppliers and customers, the component can be labelled as 'Relationship Management'. So, it has been proved from the Principal Component Analysis [Table 3] that 'Relationship Management' is a significant component in ensuring effective supply chain management performance of the real estate industry (REI) of Bangladesh.

The Component 3 contains three variables namely, v1: Cost, v2: Material flow management and v3: Management support with component loading 0.814, 0.863 and 0.749, respectively. The examination of the impact of supply chain management performance on the real estate industry (REI) of Bangladesh reveals that all these three variables (v1 to v3) are significant. Since, all these variables are related to the Cost, Material and Management Support of the supply chain covering the management aspects of the cost, material flow and management support, the component can be labelled as 'Cost, Material and Management Support'. So, it has been proved from the Principal Component Analysis [Table 3] that 'Cost, Material and Management Support' is a significant component in ensuring effective supply chain management performance of the real estate industry (REI) of Bangladesh.

The Component 4 contains four variables namely, v4: Customer satisfaction, v5: Customer service, v6: Customer responsiveness and v7: Flexibility with component loading 0.654, 0.771, 0.620 and 0.537, respectively. The examination of the impact of supply chain management performance on the real estate industry (REI) of Bangladesh reveals that all these four variables (v4 to v7) are significant. Since, all these variables are related to the Customer Orientation of supply chain covering the satisfaction, service, responsiveness and flexibility of

customers, the component can be labelled as 'Customer Orientation'. Therefore, it has been proved from the Principal Component Analysis [Table 3] that 'Customer Orientation' is a significant component in ensuring effective supply chain management performance of the real estate industry (REI) of Bangladesh.

The Component 5 contains two variables namely v13: Information Technology and v14: Information sharing with component loading 0.646 and 0.783, respectively. The examination of the impact of the supply chain management performance on the real estate industry (REI) of Bangladesh reveals that these two variables (v13 and v14) are significant. Since, all these variables are related to the Information Management in the supply chain covering the management issues of the information technology and information sharing, the component can be labelled as 'Information Management'. Hence, it has been proved from the Principal Component Analysis [Table 3] that 'Information Management' is a significant component in ensuring effective supply chain management performance of the real estate industry (REI) of Bangladesh.

Thus, components loading of the variables and percentage (%) of variance of the components as exhibited in the above Table 3 rejects the null hypothesis ($H_{0:}$ There is/are no factor(s) that affect(s) Supply Chain Management Performance of the Real Estate Industry of Bangladesh) and proves the alternate hypothesis (H_a: There is/are factor(s) that affect(s) Supply Chain Management Performance of the Real Estate Industry of Bangladesh).

11. Conclusion and Implications

The REI plays a significant role in the context of fulfilling the demand of the safe, secure, comfortable and quality habitation requirements of the inhabitants in addition to the economic development of the country. However, at present the REI of Bangladesh is not going through a stable growth phase time due to the lack of holistic stakeholder satisfaction. Hence, to mitigate this very problem, a prudent decision to ensure an uninterrupted supply chain maybe one sustainable option. It can be concluded that the role of an integrated SCM performance, especially having the implementation of the five factors is very crucial in achieving the above objectives. This implies that the concerned market players will be in considerably advantageous position by ensuring necessary policy measures for the proper management of the identified factors in their operation for a consistent business growth and development. With such a target,

the concerned marketer(s) first of all, will have to ensure due diligence in their performance management through appropriate sourcing of material, suppliers' consistent performance in logistics, inventory and delivery management. Secondly, they will have to ensure qualitative standard of their supply chain through caring management of trustworthy, committed, coordinated and collaborative relationship with suppliers, customers and other stakeholders. Thirdly, the marketer(s) will also have to ensure cost effective material supply together with continuous support from the concerned top level management. Fourthly, they will adopt customer orientated approach by assuring maximum customer satisfaction, customer service, customer responsiveness and flexibility. Finally, the marketer(s) will also have to ensure uninterrupted flow of information by sharing information through information technology. Thus, all the stakeholders including raw material suppliers, distributors of finished products, customers and final users maybe attracted and retained through the recommended measures to meet the very requirements of an integrated supply chain. From the analysis of this study, it is clearly evident that the identified five factors or components have positive role on the effective performance of the supply chain management of the REI of Bangladesh. So, the supply chain professionals of the real estate companies should ensure market oriented, relationship based, performance centric, cost effective uninterrupted information, material and top management support to ensure successful business. The findings of this study will help the policy makers of the concerned REI in understanding the effect of SCM factors on their business growth and thereby, developing and applying appropriate business strategies to further increase their stakeholder satisfaction. As a result, the business can grow through market share and profitability. So, it is clear that there is a favourable influence resulting in effective performance of the REI of Bangladesh by implementing the integrated SCM factors oriented strategy.

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Appendix

Table 1: Identification of Variables

Code	Items	Sources
v1	Cost	Stanley and Gregory, 2001
v2	Material flows management	Childerhouse, Lewis, Naim and Towill, 2003
v3	Management support	Fawcett, Ogden, Magnan and Cooper, 2006
v4	Customer satisfaction	Simchi-Levi et al., 2003
v5	Customer service	Banomyong & Supatn, 2011
v6	Customer responsiveness	Mehrjerdi, 2009
v7	Flexibility	Singh and Acharya, 2014
v8	Material sourcing	Canbolat et al., 2008; Lockamy and McCormack, 2004
v9	Supplier performance	Steward, Wu, and Hartley, 2010
v10	Logistics Management	Bowersox et al. (2007)
v11	Inventory Management	Gunasekaran, 2004
v12	Delivery performance	Alam et al, 2012
v13	Information Technology	O'Neill, 2008
v14	Information Sharing	Zhou and Benton, 2007
v15	Trust	Li, Rao, Ragu-Nathan,T.S. ,Ragu-Nathan,B., 2005
v16	Commitment	Fawcett, Ogden, Magnan and Cooper, 2006
v17	Coordination	Arshinder et al, 2007
v18	Collaborative Relationship	Bartlett, Julien and Baines, 2007; Ounnar, Pujo, Mekaouche and Giambiasi, 2007; Vereecke and Muylle, 2006
v19	Relationships with Suppliers	Ambrose et al., 2010; Chen et al., 2004
v20	Relationships with Customers	Fynes et al., 2005

Source: Literature Survey

Table 2: KMO and Bartlett's Test to Validate Factors Affecting SCM Performance

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.757
Bartlett's Test of Sphericity	Approx. Chi-Square	879.944
	Df	190
	Sig.	.000

Table 3: Communalities

	Initial	Extraction		Initial	Extraction
v1	1.000	.677	v11	1.000	.831
v2	1.000	.759	v12	1.000	.672
v3	1.000	.640	v13	1.000	.528
v4	1.000	.498	v14	1.000	.690
v5	1.000	.624	v15	1.000	.529
v6	1.000	.518	v16	1.000	.639
v7	1.000	.645	v17	1.000	.637
v8	1.000	.611	v18	1.000	.528
v9	1.000	.693	v19	1.000	.685
v10	1.000	.797	v20	1.000	.596

Extraction Method: Principal Component Analysis.

Table 4: Total Variance

A	B			C			D		
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	5.630	28.150	28.150	5.630	28.150	28.150	3.375	16.873	16.873
2	2.436	12.182	40.332	2.436	12.182	40.332	3.020	15.098	31.972
3	2.137	10.686	51.017	2.137	10.686	51.017	2.453	12.266	44.238
4	1.383	6.916	57.934	1.383	6.916	57.934	1.982	9.912	54.150
5	1.211	6.057	63.990	1.211	6.057	63.990	1.968	9.841	63.990
6	.971	4.857	68.847						

7	.916	4.582	73.429						
8	.818	4.088	77.517						
9	.718	3.589	81.107						
10	.660	3.301	84.408						
11	.504	2.518	86.926						
12	.475	2.373	89.299						
13	.383	1.915	91.214						
14	.357	1.787	93.001						
15	.317	1.587	94.588						
16	.300	1.498	96.086						
17	.267	1.335	97.422						
18	.208	1.041	98.463						
19	.184	.919	99.383						
20	.123	.617	100.000						

Table 5: Component Matrix[a]

	Component				
	1	2	3	4	5
v1	.287	.656	.342	.218	-.001
v2	.231	.643	.464	.257	-.103
v3	.304	.606	.409	-.009	.110
v4	.345	-.197	-.207	.373	.399
v5	.347	-.204	-.297	.521	.319
v6	.489	-.097	-.184	.485	-.020
v7	.573	-.373	.108	.392	-.111
v8	.706	-.125	.226	.087	-.197
v9	.678	-.349	.239	.129	-.194
v10	.645	-.245	.539	-.166	-.047
v11	.607	-.396	.442	-.283	.173
v12	.540	-.355	.380	-.235	.232
v13	.535	.106	-.218	.088	-.420
v14	.441	.001	-.314	-.109	-.621

v15	.577	.257	-.324	-.039	-.156
v16	.592	.232	-.444	-.143	.132
v17	.575	.452	-.128	-.054	.288
v18	.545	.406	-.107	-.175	.155
v19	.645	-.109	-.355	-.361	.041
v20	.593	.069	-.347	-.279	.202
Extraction Method: Principal Component Analysis.					
a. 5 components extracted.					

Table 6: Rotated Component Matrix[a]

	Component				
	1	2	3	4	5
v1	.007	.098	.814	.029	.061
v2	.039	-.052	.863	-.021	.101
v3	.141	.200	.749	-.113	-.076
v4	.107	.204	-.066	.654	-.114
v5	.019	.154	-.074	.771	-.002
v6	.109	.111	.087	.620	.318
v7	.486	-.065	.011	.537	.341
v8	.581	.138	.207	.221	.403
v9	.672	.027	.045	.296	.390
v10	.859	.074	.186	-.002	.135
v11	.890	.182	-.021	.028	-.063
v12	.786	.187	-.022	.070	-.119
v13	.090	.262	.121	.141	.646
v14	.064	.245	-.090	-.068	.783
v15	.022	.535	.161	.135	.445
v16	.010	.743	.058	.191	.218
v17	.071	.657	.411	.178	.007
v18	.109	.624	.342	.031	.090

v19	.305	.687	-.214	.064	.264
v20	.183	.729	-.059	.122	.113
Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.					
a. Rotation converged in 6 iterations.					

Table 7: Component Loadings

Name of Components	Variables	Component Loading*	Eigen value**	Component Interpretation (% of Variance Explained)**
Component 1: Performance Management	v8: Material sourcing	.581	5.630	28.150
	v9: Supplier performance	.672		
	v10: Logistics Management	.859		
	v11: Inventory Management	.890		
	v12: Delivery performance	.786		
Component 2: Relationship Management	v15: Trust	.535	2.436	12.182
	v16: Commitment	.743		
	v17: Coordination	.657		
	v18: Collaborative relationship	.624		
	v19: Relationships with suppliers	.687		
	v20: Relationships with customers	.729		
Component 3: Cost, Material and Management Support	v1: Cost	.814	2.137	10.686
	v2: Material flows management	.863		
	v3: Management support	.749		
	v4: Customer satisfaction	.654	1.383	6.916
	v5: Customer service	.771		

Component 4: Customer Orientation	v6: Customer responsiveness	.620		
	v7: Flexibility	.537		
Component 5: Information Management	v13: Information Technology	.646	1.211	6.057
	v14: Information sharing	.783		
Total Variance				63.990
Extraction Method: Principal Component Analysis.				
Rotation Method: Varimax with Kaiser Normalization. a. Rotation converged in 6 iterations				

Source: Field Survey