Effects of Supply Chain Management Practices on Customer Satisfaction: Evidence from Pharmaceutical Industry of Bangladesh

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Abstract

Purpose: Supply Chain Management (SCM) practices can significantly impact one aspect of organizational outcomes, i.e., customer satisfaction of drug manufacturers in the pharmaceutical industry. This study, therefore, seeks to find out the influencing dimensions of SCM practices and examine empirically the conceptual framework of proposed relationships between these dimensions and customer satisfaction.

Design/methodology/approach: A quantitative survey was carried out among the managers and executives of various drug manufacturers in the pharmaceutical industry of Bangladesh. A total of 160 respondents with a response rate of 48% participated in the study. Factor analysis and structural equation modeling using AMOS version 16.0 were employed as statistical techniques to carry out the objectives of the study.

Findings: The results of the study indicate that SCM practices as observed in the industry comprise three dimensions, namely, collaboration and information sharing, logistics design and IT infrastructure, and organizational culture (OC). However, while the first two exert their impact on customer satisfaction, OC does not have any influence on it.

Research limitations: The study is performed only in a particular industry and with a questionnaire survey. Future studies could extend the findings covering other industries as well as conducting a qualitative exploration of the pertinent dimensions of SCM practices.

Practical implications: The findings of the study have a significant bearing for the managers working in pharmaceutical industry. The dimensions and their constituent items offer a significant insight into the current SCM practices impacting customer satisfaction and room for potential improvements in this regard.

Originality/value: Few studies have been done on the influence of SCM practices on customer satisfaction in pharmaceutical industry in the context of a developing country. Besides, there is a dearth of large scale empirical investigation in this particular area.

A sophisticated quantitative technique like structural equation modelling is done to test the hypotheses of the study.

Keywords: Supply chain management (SCM) practices, Customer satisfaction, Pharmaceutical industry, Structural equation modelling
Paper Type: Research paper

Introduction

These days the competitive edge of a company over its rivals depends heavily on its ability to cope with multiple challenges to rein in cost, enhance product quality and offer superior customer service (Lei, 2007). With the changes in the current environment being unleashed at an exponentially faster rate, companies are thus bound to discard their conventional means of doing things in order to be more nimble, in a bid to garner the benefits of what Sull (2009) calls 'the upside of turbulence'. A very compelling reason for this is attributed to the fact that the competition is now being waged between or across supply chains, and not confined to only between companies any more (Seth *et al.*, 2006; Fynes *et al.*, 2005; Vickery *et al.*, 2003). As the pharmaceutical marketplace confronts daunting challenges with various stakeholders demanding the pharmaceutical products to be affordable, strategic planning would be of the essence (Holdford, 2005; Birdwell, 1994). For the pharmaceutical industry, it assumes special significance as medical commodities would require to be delivered through the supply chain timely and within the reach and means of the consumers to meet their needs and satisfaction (Enyinda, 2009).

The pharmaceutical industry in Bangladesh is one of the fastest growing sectors, which is on the brink of attaining self-sufficiency in meeting the country's domestic demand. Dominated mainly by the local manufacturers with their market share of around 87% and the rest by the multinational companies, the export earnings by the drug manufacturing firms now stand at approximately $27.54 million to more than 90 countries globally (Muktadir, 2011). This has been partly helped by the fact that Bangladesh, as a least developed country, currently enjoys some benefits in drug manufacturing as it is exempted by the Doha declaration from complying with patent protection until 2016 (Chowdhury, 2010). As this flexibility under the TRIPS (trade-related aspects of intellectual property rights) agreement will expire in a couple of years, this is likely to put the pharmaceutical industry in stiff challenges from its regional counterparts. As this industry in Bangladesh is playing such a vital role in country's economy through employment generation and boosting foreign exchange reserve, it is of utmost significance that the factors influencing the various dimensions of supply chain management (SCM) practices are looked into. The research questions set for this study are, therefore, two-fold: first, what are the influencing factors of SCM practices as being currently observed? Second, how do these factors impact on one aspect of organizational outcome, i.e., such as customer satisfaction (CS) of the drug manufacturers in the pharmaceutical industry of Bangladesh? The objective of the study is to address these two questions. This is very pertinent as there is a significant lack of studies performed in this regard, particularly from the perspective of a developing country.

The paper is structured as follows: following this introduction, a literature review is provided first, on the theories adopted in this study, and then on the dimensions of supply chain management practices and their impact on customer satisfaction demonstrating the theoretical framework of the study. Next, in the methodology section, instrumentation of the measurement items concerning the SCM practices and customer

satisfaction is provided by mentioning the articles that have been reviewed for this purpose. Besides, how data were collected and analyzed is also stated. In the findings section, first, the reliability measures of the pertinent variables are presented. Factor analysis for the dimensions representing the SCM practices is then highlighted. The three hypotheses are tested and illustrated through structural equation modelling technique. This is followed by a discussion of the findings vis-à-vis prior empirical studies and their managerial implications. Finally, concluding remarks and suggestions for possible future works are provided.

Literature Review

In this section, two theories are highlighted that are deemed relevant vis-à-vis supply chain management practices; these are: systems thinking theory and social capital theory. This is followed by a literature review of the dimensions of SCM practices leading to the development of the research hypotheses that are tested in this study.

Systems Thinking Theory

According to Senge (1990), system thinking theory calls for addressing various parts of a system from a holistic viewpoint and not in isolation of each other. In doing so, in tackling the problems in their entirety, the theory advocates for greater understanding of the problems or issues at hand through gauging patterns or the interrelationships that are at play among various entities of a system (Rubenstein-Montano *et al*., 2001). Such interrelationships or the evolving properties at work in the whole system, Senge (1990) argues, would, however, go missing, if and when the whole is broken into parts. This theory is thus tailored toward systematically explicating the dynamics that characterize the SCM practices. For instance, the organizational culture, the structure, the people inhabiting therein, the IT infrastructure that are in place within and across supply chain should be all taken into account for a sound understanding of these practices. The primacy of taking recourse to such an integrated approach is paramount as the lack of which would not ensure whether all the vital components are adequately looked into (Tsoukas, 1996; Schlange, 1995). The systems thinking theory thus sheds insight into the efficacy of various SCM enablers on organizational outcomes, such as customer satisfaction.

Social Capital Theory

Social capital theory focuses on the softer side of organizational issues (Ketchen Jr. and Hult, 2007). Its relevance vis-à-vis supply chain is premised on the fact that since entities in the chain comprise people spanning across firm boundaries, various social aspects, such as, their interrelationships, shared values, trust and confidence among each other in sharing information, etc. impact supply chain performance (Nahapiet and Ghoshal, 1998). In a typical supply chain, the objective of each entity is crafted so as to optimize its own performance at the expense of others resulting into a diminished output for the entire chain. As the business landscape changes to a competition of supply chain versus supply chain, these soft relationships are to be grounded on a solid footing that would yield a competitive edge for the whole supply chain.

Dimensions of Supply Chain Management Practices

Owing to the fact that SCM practices are a key to firm performance, this discipline has attracted a great deal of interest among academicians and practitioners alike over the past two decades (Kannan and Tan, 2005; Narasimhan and Kim, 2007). In particular, in

this era of globalization, how firms garner competitive advantages while coping with multifarious challenges, both domestic and international, has consumed a considerable amount of attention (Huo *et al.*, 2008; Kannan and Tan, 2005). As effective SCM provides benefits that transcend across the entities on both upstream and downstream sides, firms are realizing the potential of integrating their external supplier-firm-customer relationships and internal operational practices with a view to enhancing their level of competitiveness and performance as well as customer satisfaction (Ou *et al.*, 2010). A sound understanding of SCM practices thus assumes utmost importance in coping with the global competition and sustained profitability (Power *et al.*, 2001; Moberg *et al.*, 2002).

The extant literature sheds light on SCM practices from different perspectives with a shared objective of ultimately improving firm performance. As there is a lack of general consensus on a set of constructs that define the SCM practices, an appropriate way to present them is to logically group them into two broad categories: the 'soft' people-oriented constructs relating to inter-organizational rapport and information sharing among various supply chain entities as well as intra-organizational culture; and the 'hard' system-focused constructs addressing the technological and infrastructural issues such as logistics design, IT infrastructure (Burgess *et al.* (2006); Croom, 2001; Power *et al.*, 2001; Keller *et al.*, 2002).

In this study, three dimensions relating to both hard and soft aspects of SCM practices, namely, collaboration and information sharing, IT infrastructure and organizational culture with their hypothesized relationships on customer satisfaction are described below:

Collaboration and Information Sharing in Supply Chain on Customer Satisfaction

Supply chain integration comprises a set of firm's activities tailored to fostering its relationships with suppliers and customers; these are designed to harmonize supply chain activities with suppliers on the upstream side and enhance customer satisfaction on the downstream side through offering superior products (Petrovic-Lazarevic *et al.*, 2007). Managing supply chain calls for a need on the part of a firm to engage with its suppliers and customers in a productive relationship that will add value to the firm objectives (Tan, 2001). According to Stank (2001), firms increasingly seek to create competencies through entering and cementing their relationships with suppliers and customers as these result into supply chain excellence. Such long-term relationships as observed by Tompkins (2000) are to be grounded on trust and desire on their part to work in a cohesive manner so that no obstacles stand in the way of mutual transaction. This is echoed by Oliver and Delbridge (2002), who contend that this would lead to a win-win situation, through which entities in a supply chain can derive a host of benefits – managerial, technological as well as financial.

In this regard, it is pertinent to observe the impact among the supply chain parties of information sharing that would greatly strengthen both intra and inter-organizational integration (Narasimhan and Nair, 2005) and be the key to a seamless supply chain (Lee, 2000); this would be reflected in various ways, such as, diminished bull-whip effect as well as lower production and inventory costs, etc. (Lee, 2002; Huang and Gongopadhay, 2004; Raghunathan, 2003). The relevant and timely information sharing would entail aspects of various dimensions – from strategic to tactical (Huang *et al.* 2003) with the benefit ultimately accruing from the parties' ability in transforming that information into a supply chain strategy and superior performance (Ramayah and Omar, 2010; Moberg *et al.*, 2002), which would be reflected through enhanced customer satisfaction. Therefore, it can be hypothesized as:

H1: Collaboration and information sharing have a positive impact on customer satisfaction.

Logistics Design and IT Infrastructure on Customer Satisfaction

According to Towill *et al.* (2000), a robust supply chain design warrants efficient flow of materials, such as raw materials, work-in-process (WIP) and/or finished goods, across its various entities. Therefore, a vital aspect to be dealt with concerning a firm's operational issues relates to logistics network design. Such a network, according to Chin *et al.* (2004), would address various matters vis-à-vis inventory, modes of distribution and points of destination, information and communication technologies, etc. for optimum performance of the supply chain. With such a network in place, parties would be able to trim down costs relating to purchase, production, distribution and warehousing, guaranteeing the required level of service (Simchi-Levi *et al.*, 2000).

For integrating various logistics activities, for the positive outcomes stemming from internal operational practices, the role of IT has been investigated by a number of authors. According to Willaims *et al.* (1998), IT stands out as a key driver in this regard. This is in agreement with the study by Lancioni *et al.* (2000) that attaches considerable improvement in firm performances due to usage of internet and other technologies. This is also shared by Croom (2005) that attributes the development in devising the strategies and operational practices in managing supply chains to the employment of technology infrastructure in the organizations.

In this regard, Zailani *et al.* (2008) perform an empirical investigation vis-à-vis the impact of IT adoption in SC among the Malaysian manufacturing companies, focusing on four primary operational areas, namely, transaction processing, SC planning and collaboration, order tracking and delivery coordination, and material forecast. The authors argue that coupled with improved collaboration in sharing of resources, the first three areas exert significant impact on IT usage in supply chains. This is echoed in other studies that underscore the fact that should various communication software, tools or technologies, such as, enterprise resource planning (ERP), electronic data exchange (EDI), decision support system (DSS), etc. be in place, it would go a long way in enforcing a safe and seamless exchange of information across the supply chain; this would result into a reduction in costs and in lead time for the delivery of products to the customers (Chin *et al.*, 2004; Simchi-Levi *et al.*, 2000), culminating into improved customer satisfaction. It can thus be inferred as:

H2: Logistics design and IT infrastructure have a positive impact on customer satisfaction.

Organizational Culture on Customer Satisfaction

A key prerequisite for successful SCM is the change of corporate culture (Chin *et al.*, 2004); this is necessary as the prevalent culture only emphasizes organizational performance from the short-term viewpoint, which runs counter to the objectives of SCM to consistently achieve high performance and profitability benefiting all the entities in the supply chain (Tan *et al.*, 1998). Culture reflects the norms that pervade an organization and mould the behaviors and attitudes deemed appropriate and expected from its employees (Schwartz and Davis, 1981). A culture that stimulates trusting conduct, openness, inquiry and experimentation on the part of its employees will be of much benefit to supply chain members (Spekman *et al.*, 2002). In order to create such

an atmosphere, top management commitment, employee participation and employee training must be addressed.

Chen and Paulraj (2004) consider the role of top management critical to spreading the organizational norms and values as well as management styles in achieving superior performance. The role of top management leadership, as argued by Ou *et al.* (2010), can hardly be overemphasized as it is instrumental in effecting and nurturing the change in the mindset of employees; this is required for enhanced operational performance culminating into effective SCM practices. This view is shared by others (Cooper and Ellram, 1993; Monczka and Morgan, 1996), who contend that the absence of top management engagement in cultivating enduring relationships with external supply chain entities as well as with internal employees vis-à-vis products and processes would pose a serious challenge in optimizing supply chain benefits.

According to Chin *et al.* (2004, p. 510), 'participative management is a management style that actively seeks employee inputs, allowing employees to contribute to the resolution of work-related issues.' Apart from being actively involved themselves in crafting strategies vis-à-vis supply chain effectiveness, managers in the higher echelon of an organization should nurture practices that would foster participation of employees working at other levels as well. Such active participation, as observed by Oosthuizen and du Toit (1999), makes employees feel empowered and enhances their commitment toward their particular work as well as towards inculcating the virtues of continual learning and teamwork. The positive implication of employee participation in decision-making process would be reflected in cost savings and rise in productivity, contributing ultimately to the higher customer satisfaction. Thus, it can be hypothesized as:

H3: Organizational culture has a positive impact on customer satisfaction.

The hypothesized research model employed in this study is illustrated as follows in Figure 1:
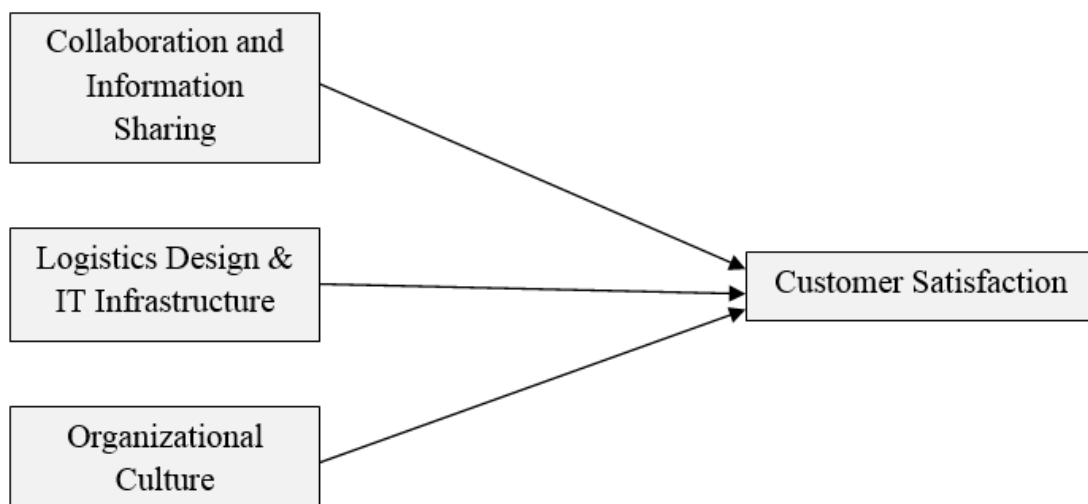

Figure 1: Hypothesized Research Model

Methodology

A questionnaire was designed using prior literature reviews; this was then subjected to expert reviews for content validity that resulted into some minor modifications in the phrasing of the questionnaire items. The questionnaire so developed contains items

regarding the dimensions of SCM practices and customer satisfaction. A 5-point Likert scale that asks respondents to offer their opinions ranging from 'strongly agree' to 'strongly disagree' regarding various facets of SCM practices as being observed in their respective companies is used. The various dimensions of SCM practices contain 18 items that are covered for this study; the studies reviewed for these dimensions include Singh and Power (2009), Kannan and Tan (2005), Li *et al.* (2005), Ou *et al.* (2010). For customer satisfaction, there are 5 items included for this study; the studies covered for this construct include Chen and Paulraj (2004), Han *et al.* (2007), Wu and Ding (2007).

Data Collection and Data Analysis

In order to understand the influencing dimensions of SCM practices in the pharmaceutical industry, questionnaires were sent to those people and working in those companies that have met certain criteria. The sampling frame contains the names of the drug manufacturers obtained from the Bangladesh Association of Pharmaceutical Industries (BAPI). The sampling technique employed in the study is stratified sampling that divides the population or the sampling frame into two categories based on market share: the top 10 companies having 65% against the rest. While all the top companies were taken into consideration, for the rest, a simple random sampling technique was applied by setting two criteria: one, for the companies that employ a minimum of 300 employees in order to ensure a minimum operating structure of each company; and, for the respondents, who take part in this study must be full-time professionals, such as, supply chain managers, product development managers, marketing and purchasing managers, executives in these departments as well as in engineering and quality assurance and all those familiar with the supply chain activities for more than a year.

After having screened out the responses that did not meet the above criteria as well as were incomplete, it is found that a total of 160 respondents with a response rate of about 48% participated in this study.

The data analysis is carried out by SPSS version 16.0. The reliability of the variables is measured by Cronbach alpha. The hypotheses of the study are tested by structural equation modeling using AMOS version 16.0. The adequacy of the structural model is measured by a number of indices, such as, Normed Chi-square, RMSEA and CFI, with their minimum threshold values taken as being less than 5, 0.08 and greater than 0.90, respectively (Hair *et al.*, 2010).

Study Findings

This section first highlights the demographic profile of the respondents and the reliability measures of the relevant variables. It then presents the findings of the factor analysis carried out in this regard, and illustrates the results of structural equation modelling providing the proof of validation (or the lack of it) of the research hypotheses tested in this study.

Demographic Profile of the Respondents

The respondents of the study comprise full-time executives working in various departments of the pharmaceutical companies in Bangladesh. Table 1 presents the profile of the respondents that includes their academic qualifications, departments they work in, their designation and length of service in their respective companies.

Table 1: Demographic profile of the respondents of the study

Demographic variable	Frequency	Percentage
Departments		
Supply Chain	32	20.0
Marketing/Distribution	39	24.4
Product Development	47	29.4
Engg/Quality Control	17	10.6
Others	25	15.6
Total	160	100
Designation		
General Manager	1	0.6
Dept. Head	43	26.9
Asst./Deputy Manager	38	23.8
Sr. Executive	56	35.0
Jr. Executive		13.8
Total	22	100
	160	
Length of service		
Less than 2 years	59	36.9
2-5 years	61	38.1
6-10 years	28	17.5
More than 10 years	12	7.5
Total	160	100

As can be observed from Table 1, out of 160 respondents, there is an overwhelming majority (about 80%) having masters degree followed by bachelors. Of the total, close to 45% work in supply chain and marketing departments who have to deal with others working outside of their organizations, and about 55% work inside such product development, engineering or quality control departments, etc. As far as their designation is concerned, it is almost evenly split between managers (departmental heads, assistant or deputy managers, 51%) and non-managers (senior and junior executives, 49%). Regarding their length of service, the highest percentage (38%) of them possess 2-5 years of experience followed very closely by those with less than 2 years (37%); the rest have experience of 6-10 years or above 10 years.

Reliability Analysis
The reliability tests as measured by Cronbach alpha are performed for the items of the relevant variables, and are presented in Table 2. Cronbach alpha with a value of 0.7 or above is considered adequate in measuring the internal consistency of an instrument. Since all alpha values are found to be above the threshold point of 0.7, reliabilities of the measurement instruments are considered adequate.

Table 2: Reliability of the Variables

Reliability	Items	Cronbach Alpha
Collaboration and Information Sharing	7	0.8133
IT Infrastructure	6	0.7654
Organizational Culture	5	0.7789
Customer satisfaction	5	0.7698

Factor Analysis

Factor analysis for SCM practices is carried out to ascertain the pertinent items representing the three factors, i.e., collaboration and information sharing, IT infrastructure, and organizational culture. In order to examine the appropriateness of the data, two measures are checked: Bartlett test of sphericity (to be significant at $p < 0.05$) and Kaiser-Meyer-Olin (KMO), the value of which is to be 0.6 or above. Factor extraction is performed through principal component analysis (PCA) and varimax rotation. Regarding the number of factors to be retained, eigen values above 1 is considered. Variables are sorted on each factor with a loading of 0.50 in the rotated component matrix.

A KMO value of 0.869 and Barlett's test of sphericity ($p < 0.001$) indicate, therefore, the appropriateness of such analysis in this study. The three factors with eigen values greater than 1.0 cumulatively account for 55.79% of the total variance explained.

The items loaded comprise three factors, namely collaboration and information sharing [5 items: SC4 (Customers are encouraged to provide feedback), SC2 (Suppliers are provided with information so that they can improve their quality and responsiveness), SC5 (Customer feedback is used to improve customer relations, processes, products and services), SC6 (The organization has systematic processes for handling customer complaints) and SC1 (The company seeks long-term stable relationships with suppliers)]; IT infrastructure [3 items: SC9 (Adequate investments are made in developing technology for SCM practice), SC10 (SCM software systems (like ERP, EDI) are used) and SC8 (The company creates compatible communication / Information system for supply chain members)]; and organizational culture [6 items: SC17 (Training and education in regard to SCM are adequate), SC18 (Participative management is used in decision-making), SC16 (Top and middle management are committed to improving supply chain performance), SC12 (Reduces waste through just-in-time, JIT) and SC7 (Creates a greater level of trust among supply chain members)], as shown in the rotated component matrix shown in Table 3.

Table 3: Rotated Component matrix (a)

	Component		
	1	2	3
SC4	0.797		
SC2	0.720		
SC5	0.702		
SC6	0.687		
SC1	0.664		
SC7		0.768	
SC17		0.726	
SC18		0.716	
SC16		0.657	
SC12		0.586	
SC15		0.528	
SC9			0.779
SC10			0.760
SC8			0.612

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 5 iterations.

Structural Equation Modelling: Testing of Hypotheses

After having done the factor analysis to obtain the three dimensions of SCM practices with their constituent items, structural equation modelling is employed to test the proposed three hypotheses of the study. Maximum likelihood estimation (MLE) is applied as the estimation technique. Figure 2 illustrates the full-fledged structural model demonstrating the impact of the three antecedents (collaboration and information sharing, IT infrastructure and organizational culture) on the customer satisfaction of the drug manufacturers in the pharmaceutical industry of Bangladesh.

The model is obtained after having revised the initial one that contains one item of customer satisfaction with a value of 0.33, well below the minimum threshold value of 0.50 thus necessitating exclusion of this item from the model. After deleting the item, the revised model in Figure 2 displays sufficient fit with the sample data as manifested by all the values of the fit indices in the Table 4 as well as all the items representing the constructs possessing minimum threshold values of above 0.50, thereby exhibiting adequate construct validity (Hair *et al*. 2010). The model highlights the fact that the three antecedents together account for 41% of the variance in customer satisfaction.

Table 4: Results of the Structural Model

Goodness-of-fit statistics	Revised model	Minimum threshold of the fit indices
Normed-Chi square	1.694	< 5.0
RMSEA	0.066	< 0.08
CFI	0.914	> 0.9

Table 5: Regression Weights: (Group number 1 – Default model)

			Estimate	S.E.	C.R.	P
Customer Sat	<---	Collaboration Info Sh.	.318	.146	2.177	.029
Customer Sat	<---	IT Infrastructure	.270	.160	1.689	.091
Customer Sat	<---	Org. Culture	.185	.133	1.394	.163

Chi- Square 218.508
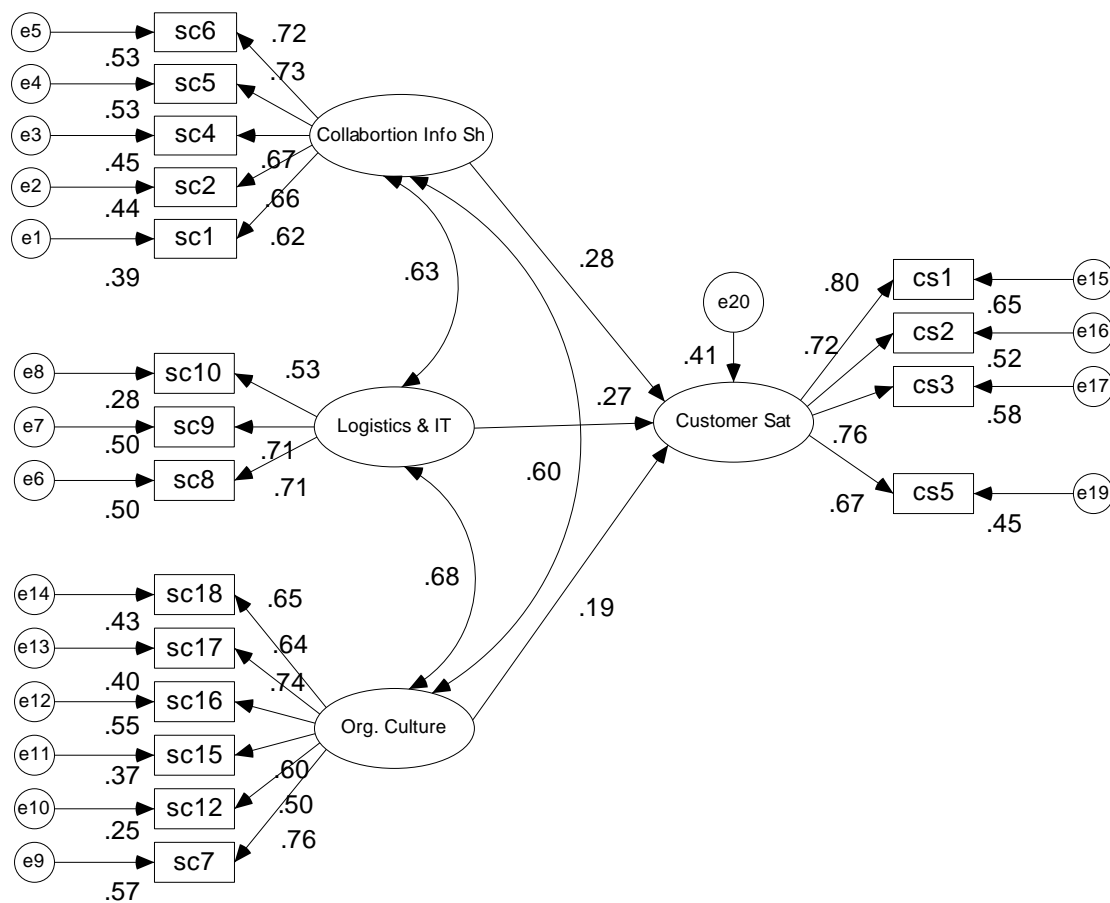Normed Chi-square = 1.694
RMSEA .066
CFI.914

Figure 2: Full-fledged Structural Model

From Figure 2 and Table 5, it is observed that two path co-efficients with values of 0.28 and 0.27 prove to be statistically significant at p < 0.05 and at p < 0.10, respectively. Thus it can be inferred from this study that while the hypotheses H1 (Collaboration Info Sharing → Customer Sat) and H2 (IT Infrastructure → Customer Sat) are supported, the model does not support the other hypothesis, namely, H3 (Org Culture → Customer Sat). Besides, the correlations amongst the antecedents are quite high (Collaboration Info Sh → IT Infra: 0.63; IT Infra → Org. Culture: 0.68; Collaboration Info Sh → Org. Culture: 0.60) as measured from the model.

Discussions and Managerial Implications
Role of Collaboration and Information Sharing: The study finds sufficient evidence of collaboration and information sharing among various supply chain entities in the

Bangladesh pharmaceutical industry. This is reflected on the upstream side of the supply chain through the companies' seeking long-term stable relationship with the suppliers as well as providing them with the necessary information that would help them in improving the product quality and responsiveness. On the downstream side of this chain, such collaboration is manifested through forging greater rapport with the customers. Customer complaints are taken into consideration and their feedback is used to improve their products, processes and services. And, this is done through the efforts of the marketing executives, through extensive sales and distribution network that are in place by the companies, particularly the top twenty ones. The study thus finds some evidence of the prevalence of systems thinking perspective, which is, however, more pronounced on the downstream side of the supply chain.

The study findings echo that of Ou *et. al.* (2010) arguing that a collaborative long-term relationship with suppliers facilitate in garnering positive results in an array of activities as reflected in superior product quality, diminished length of lead time, agile customer service. These are also in harmony with that of Singh and Power (2009), who observe that organizations would derive better results if they remain engaged in collaborative relationships with both customers and suppliers. The endeavor on the part of the companies in forging relationships, albeit on a limited scale, with their other counterparts in the supply chain translates into an enhanced customer satisfaction and other positive business outcomes. In this regard, it must be emphasized that managers would do well if such information sharing is tailored to achieving strategic imperatives, beyond the current practice of operational collaboration only.

Role of Logistics and IT Infrastructure: The study shows that various logistics and IT infrastructure are being designed and developed by the companies to improve their supply chain management practices. In this regard, adequate investments are made in developing technology, and various SCM software systems like SAP, EDI, etc., are being employed. The companies make continual efforts in creating compatible communication/information system for SC effectiveness.

As regards to the impact of such logistics design and IT infrastructure on customer satisfaction, the study demonstrates evidence of positive correlation, though moderate, between the two. This comes in line with the existing reality in the pharmaceutical industry as   these IT networks are geared more towards increasing internal operational efficiency, and not as much at promoting information sharing with suppliers. This is in accord with the Cagliano *et al*. (2006), who argue that while this serves the internal need of information exchange quite well, by not channelling it beyond the boundary, organizations fall short in developing closer coordination with suppliers as well as in reaping the benefits that these IT deployments (such as ERP or SAP) could otherwise offer to them. The fact that IT *per se* exerts moderate impact on supply chain efficiency lends credence to the empirical findings, reinforcing the paramount importance of nurturing human dimension or peoples' relationship spanning organizational boundaries in a supply chain (Mishra and Sharma, 2011).

The implications for the managers are, therefore, two folded: first, they have to realize that investments they are making in IT infrastructure must not be limited within the confines of their own organization; rather, such IT deployment should be designed keeping in mind the potential usage and benefits that might be derived by other entities in the entire supply chain. Second, they need to acknowledge the fact that ultimately, it is the people who would be the key to efficient use of these IT investments; they therefore should be imparted appropriate and sufficient training in this regard.

Role of Organizational Culture: The study shows that supply chain management practices as being adopted by the pharmaceutical companies are contingent upon a number of soft-organizational issues such as: imparting training and education to executives, participative management used in decision-making, commitment of top and middle management, reducing waste through just-in-time (JIT), and creating a greater level of trust among supply chain members. However, the study does not find any impact of organizational culture prevalent in the pharmaceutical companies on their customer satisfaction. This lends credence to the argument that various soft issues representing the social capital theory are not given adequate consideration as is otherwise warranted. The reasons for such a finding can be attributed to a number of aspects described below:

The training and education provided to the executives are confined mostly to those working in the supply chain or in the purchasing departments. Thus, people working in other departments are yet to appreciate the benefits that might be accrued from instituting supply chain initiatives across the organizational boundaries. Besides, in most of the companies, lack of adequate top management commitment is also visible; this does not, therefore, exert any effect on customer satisfaction. According to Khang *et al.* (2010), the support of top management is critical toward the implementation of supply chain initiatives through attaining an enduring relationship among various members in the supply chain. Apart from these, there is a dearth of trust that people working across organizational boundaries repose in one another, particularly those inside the organization with their counterparts on the upstream side of the supply chain. This lack of trust is evident from the large supplier base currently in place in the industry. All these result into a minimal cumulative effect on customer satisfaction. Managers in the pharmaceutical industry are thus required to nurture a strong commitment toward executing SC practices, and then ensure that it would cascade down to the lower levels as well. Training and education on the potentially significant gains from implementation of SC practices must be imparted organization-wide, and not confined to a particular department.

Conclusions, Limitations and Suggestions for Future Works

Supply chain management practices play an important role in reaping and retaining customer satisfaction in the pharmaceutical industry. This requires identifying, in the first place, the critical factors influencing these practices. The factor analysis done in this study demonstrates that there are three factors, namely, collaboration and information sharing among various members, logistics design and IT infrastructure, and organizational culture that represent SCM practices in the pharmaceutical industry of Bangladesh. As the structural equation modelling conducted in the study shows that out of three hypotheses, two are supported: collaboration and information sharing exert the highest impact of 0.28 (at $p < 0.05$), followed very closely by logistics design and IT infrastructure with 0.27 (at $p < 0.10$) on customer satisfaction; the other dimension, namely organizational culture does not reveal any significant influence on business performance. Overall, a variance of 41% in customer satisfaction is accounted for by the antecedents in this study.

 The study has a number of limitations: first, this is performed only in a particular industry and with a questionnaire survey. Future studies could extend the findings that would cover other industries; moreover, these may consider conducting a qualitative exploration of the dimensions of SCM practices, which may not be adequately captured through a quantitative survey alone. Apart from these, since this study is a cross-sectional one, any future study might perform longitudinal surveys that would better

convey the opinions of the respondents at different time periods, providing insights into the refinement of the pertinent items of these dimensions. From theoretical standpoint, the application of transaction cost theory could be examined besides the theories mentioned in the current study. Also, there is a room for further enhancement in the rigor of the study findings should a comparative analysis between the opinions of managers and non-managers as well as the influence of their boundary-spanning roles be investigated in any future study.

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