

Knowledge and Practices of Supply Chain Management: *A Study on Eskayef Bangladesh Ltd.*

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ABSTRACT

Supply Chain Management (SCM) is the process of planning, implementing and controlling the operations of the supply chain with the purpose to satisfy customer requirements as efficiently as possible. The broad objective of this study is to analyse the supply chain of Eskayef Bangladesh Ltd. It is observed that 23.3% respondents have reported that they know SCM very well followed by moderate knowledge (21.7%), sufficient knowledge (20%), somehow knowledge (20%) and 15% respondents have poor knowledge about SCM. Factor Analysis of the responses regarding the benefits of SCM reveals that shorter lead time has high mean (4.15) followed by reduced cycle time (3.97), reduced waste (3.80), competitive advantage (3.83), reduced cost (3.78), greater supply chain visibility (3.72), reduced inventory (3.62) etc. Only 3% of the drugs are imported, the remaining 97% come from local companies. Positive developments in the pharmaceutical sector have enabled Bangladesh to export medicine to global markets. By overcoming the underlying obstacles this sector can develop more and can be an effective exporting sector of Bangladesh.

Keywords: Supply Chain Management, Customer Relation Management, Point of Origin, Point of Consumption, Pharmaceutical Supply Chain, Principal Component Analysis

1.0 Prelude

Supply Chain Management (SCM) is the process of planning, implementing and controlling the operations of the supply chain with the purpose to satisfy customer requirements as efficiently as possible. Supply chain management spans all movement and storage of raw materials, work-in-process inventory and finished goods from point-of-origin (POO) to point-of-consumption (POC). SCM contributes and affects that supply flow through business for the purpose of improving performance, costs, flexibility etc, which bring the ultimate benefits of the end customers or consumers. The supply chain function includes many sub-areas such as: forecasting and planning, purchasing and procurement, logistics, operations, inventory management, transportation, warehousing, distribution, customer service, etc. However, it is difficult to find a standard model of Supply Chain Management operating in the business community particularly in the pharmaceutical sector.

Supply Chain Management (SCM) is the oversight of materials, information and finances as they move in a process from suppliers to manufacturers, to wholesalers, to retailers and to consumers. Supply Chain Management involves coordinating and integrating these flows both within and among companies. SCM is both a horizontal business function (i.e. managing the supply chain in a business) and a vertical industry sector (i.e. businesses involved in managing supply chains on behalf of their clients). A company may operate as a supply chain services provider within the vertical supply chain industry sector. However, each of the clients serviced by a company will employ supply chain staff within their business operating on a horizontal basis across their organizations. The present success of many companies is the result of their successful supply chain management system. With the help of well-organized SCM system a company takes satisfaction from their suppliers and also from the consumers. Through SCM an organization can transmit properly what they are looking from the suppliers and marketers. The supply chain management of pharmaceutical products deserves high priority as it is related to the life and death of men and animals around the world. The present study is an attempt to analyze the supply chain management of a renowned pharmaceutical company in Bangladesh namely Eskayef Bangladesh Limited.

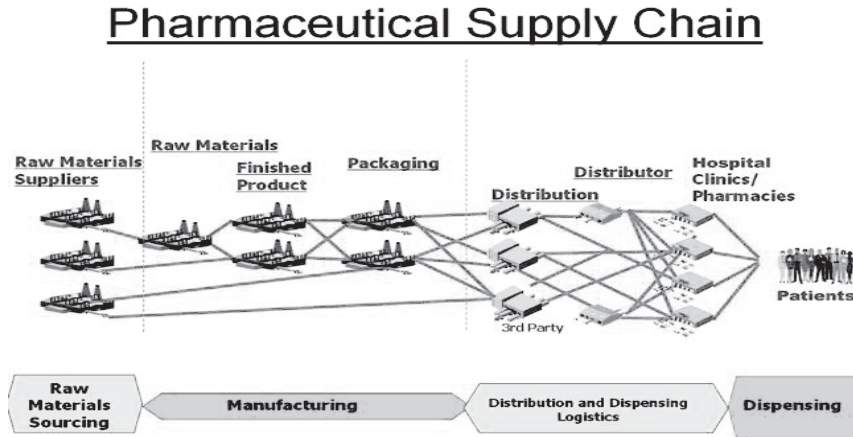
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1.1 A General View of Pharmaceutical Supply Chain

The pharmaceutical supply chain is somehow different from other supply chains of physical goods because of its urgency, importance, storage, transportation, regulation, etc. The following figures help understand SCM in the pharmaceutical sector.

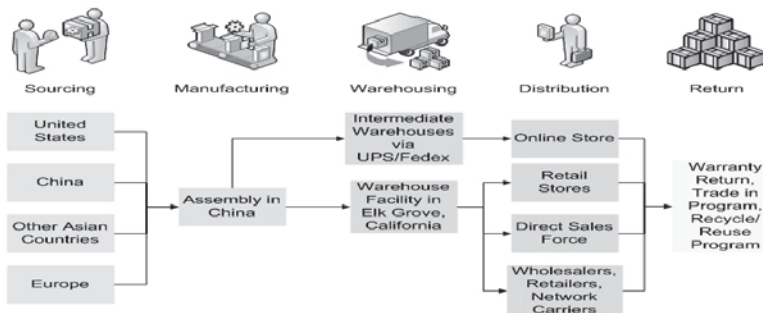
Figure 1: Pharmaceutical Supply Chain



Source: www.slideshare.net/pharma-chain/ accessed on 25-12-2015

The above figure shows a typical supply chain of pharmaceutical products. The chain starts with raw material sourcing and then gradually moves to manufacturing of finished products, packaging, distribution to distributors, hospitals or clinics, pharmacies and finally to the patients.

Figure 2: Operations of Pharmaceutical Supply Chain

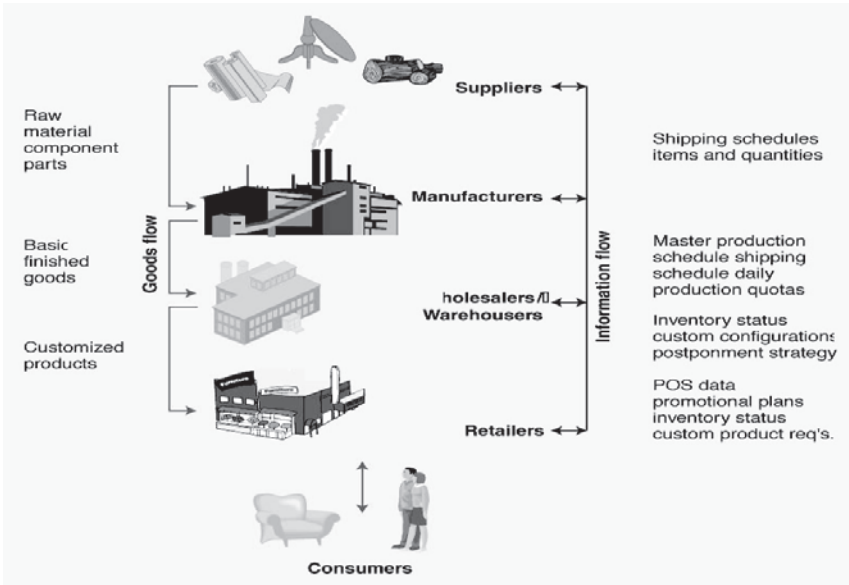


Source: www.slideshare.net/pharma-chain/ accessed on 28-12-2015

Figure 2 shows the operations of pharmaceutical supply chains. It includes sourcing raw materials from the United States, China, other Asian countries and Europe. It is assembled in China and then warehoused and distributed through online stores, retail stores, direct sales force and wholesalers, retailers and network carriers. It also shows warranty returns, trade in programs, recycles and reuse programs.



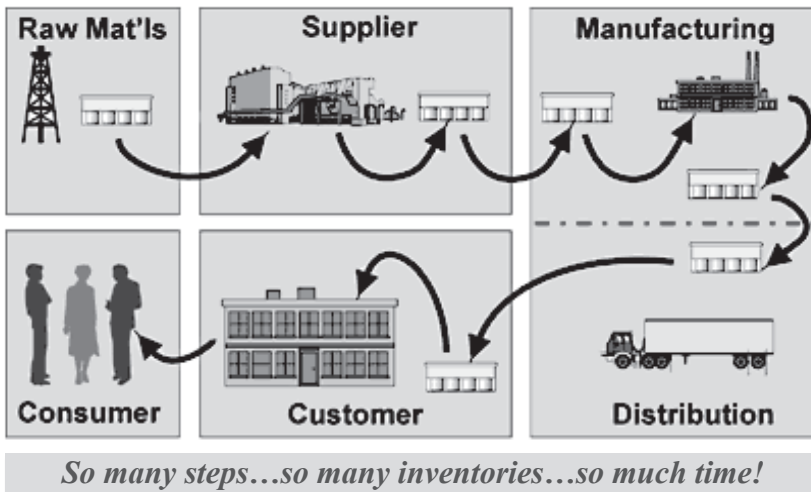
Figure 3: Flow of Goods and Information in SCM Processes



Source: www.slideshare.net/pharma-chain/ accessed on 25-12-2015

Figure 3 depicts the flow of goods and information in SCM processes. It includes raw material component parts, basic finished goods, customized products, suppliers, manufacturers, master production schedule, shipping schedule and daily production quotas, inventory status, custom configurations, postponement strategies, POS data, promotional plans etc. From the retailers the finished goods go to the end-user consumers.

Figure 4: Supply Chain Management: Raw Materials to Consumers



Source: www.slideshare.net/pharma-chain/ accessed on 25-12-2015



Figure 4 depicts the pictorial processes of SCM from raw materials to consumers. It includes the source of raw materials (producers), suppliers of raw materials, manufacturing, distribution (warehouses, wholesalers), customers (retailers, hospitals/clinics, pharmacies) and finally the consumers (patients).

According to Whewell (2009), the pharmaceutical supply chain covers drug research, development, manufacture, distribution and application through a range of healthcare services and ancillary businesses that help effective functioning of these different stages. The pharmaceutical and healthcare industry is hugely complex because it involves so many markets, products, processes and intermediaries. It is also globally heavily regulated and used by everyone in life. Ricci (2006) identified the importance of pharmaceutical companies taking control of the own distribution to maximize the potential of different channels and to protect patients from errors or defects occurred during repackaging or relabeling.

1.2 Statement of Problem

Eskayef Bangladesh Ltd. is one of the largest and fastest expanding pharmaceutical companies in Bangladesh. The company, headquartered in Dhaka - the capital city of Bangladesh, is also known as SK+F and is a part of the Transcom Group. Eskayef Bangladesh Ltd. was born from the old facilities of SmithKline & French in Bangladesh when the company was restructured to form GlaxoSmithKline in 2000. The pharmaceutical company is engaged in manufacturing and marketing a wide range of therapeutic drugs, bulk pellets and animal health and nutrition products with annual sales surpassing 60 million US dollars. The company started its production of pharmaceuticals with the manufacture of generic products for the domestic market but has since moved into bulk products and the veterinary market. SK+F currently manufactures and markets 28 different animal health products in 57 different dosage forms. Eskayef Bangladesh Ltd. has been showing a significant outcome in exporting medicines to many countries. Eskayef Bangladesh Ltd. has started supplying medicines in 16 countries like Germany, UAE, Nepal, Bhutan, Sri Lanka, Myanmar, Vietnam, Ghana, Iraq, Indonesia, Kenya, Guatemala, Belize, Yemen, Macau and Somalia. Given the increased attention of achieving effective supply chain management particularly in pharmaceutical industries around the globe, this study will seek to assess the supply chain management of a leading pharmaceutical company in Bangladesh namely Eskayef Bangladesh Ltd. The study has been designed to analyse the supply chain management of the organization and to identify the knowledge gap in this emerging field.

1.3 Objectives of the Study:

In view of the context and research questions, the broad objective of this study is to analyse the supply chain of Eskayef Bangladesh Ltd. The specific objectives are as follows:

- To assess the extent to which the supply chain function of Eskayef has been operating;
- To understand the supply chain management of Eskayef;
- To evaluate the supply chain sustainability.
- To identify the barriers and challenges of the supply chain of Eskayef
- To make recommendations for overcoming the challenges and to design an effective supply chain management



1.4 Hypotheses:

The following hypotheses are set in this study:

- (a) H_0 : Respondents do not have sufficient knowledge about SCM.
 H_1 : Respondents have sufficient knowledge about SCM.
- (b) H_0 : Respondents do not hold positive view on SCM.
 H_1 : Respondents hold significant positive view on SCM.
- (c) H_0 : Respondents do not identify the benefits of SCM.
 H_1 : Respondents significantly identify the benefits of SCM.
- (d) H_0 : Respondents do not identify the challenges of SCM.
 H_1 : Respondents significantly identify the challenges of SCM.

1.5 Literature Review:

A number of books, articles, reports, web-sites on Supply Chain Management have been studied for this research work. It has been found that literature with specific focus on this sector in Bangladesh is not sufficient. However, a brief review of literature has been carried out. 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). A Supply Chain is that network of organizations which are involved through upstream and downstream linkages in the different processes and activities that produce value in the form of products and services in the hands of the ultimate customer or consumer (Lysons and Farrington, 2010). Supply Chain Management is the management of a network of retailers, distributors, transporters, storage facilities and suppliers that participate in the sale, delivery and production of a particular product (Chopra and Miendel, 2005). Handfield and Dhinagaravel (2005) defined pharmaceutical supply chain as “the integration of all activities associated with the flow of and transformation of raw materials through to the end-user, as well as associated information flows, through improved supply chain relationships to achieve a sustainable competitive advantage”.

Dubey and Kumar (2007) mentioned that effective supply chain management can impact and improve upon virtually all business processes, such as data accuracy, operational complexity reduction, supplier selection, purchasing, warehousing and distribution. The benefits of SCM are included as quicker customer response and fulfillment rates, shorter lead time, greater productivity and lower costs, reduced inventory supply throughout the chain, improved forecasting precision, fewer suppliers and shorter planning cycles. The pharmaceutical industry is a more than \$500 billion global business that requires a tight, safe, and efficient supply chain. Modern pharmaceutical products rely on ingredients and materials from across the globe (Kaye, 2010).

The line between a company’s internal operations and its external environment, in the opinion of Graves (2009), are becoming increasingly blurred. He stated that no area exemplifies this better than the supply chain where pharmaceutical manufacturers have to coordinate their own activities with those of partner organisations, healthcare providers and patients. He also noted that without a clear understanding of the context surrounding the process of delivering a drug to market, the chain can become a tangled web.

Svantesson (2009) has stated that pharmaceuticals, being high value goods, demand a safe process at all hubs in the chain, and security measurements must be harmonized and rigorously checked across the operating lanes with its sub-warehouses and on/off loading places.





He further stated that the importance of utilizing as few on/off loading places and changes of transport mode is one of the challenges for a time effective and secure solution; this is at a minimized cost level. The goals of the pharmaceutical supply chain, as indicated by Chopra and Miendel (2005), obviously emphasize regulatory compliance and safety of products, but also include leveraging information to be more responsive to the needs of consumers. They noted that the unique nature of the supply chain for pharmaceuticals makes managing complex information for supply chain effectiveness challenging, but clearly the rewards for doing so are significant. They also indicated that companies that excel in supply chain operations perform better in almost every financial measure of success. Supply chain excellence that improves demand-forecast accuracy leads to 5% higher profit margins, 15% less inventory, up to 17% stronger “perfect order” ratings, and 35% shorter cash-to-cash cycle times. According to Chopra and Miendel (2005), many of these findings come from the Consumer Products (CP) Industry, where supply chain excellence means tightly aligning operations with consumer demand to become “demand driven”.

Lambert *et. al.* (1998) identified eight SCM processes such as Customer Relationship Management (CRM), Customer Service Management (CSM), Demand Management, Order Fulfillment, Manufacturing Flow Management, Supplier Relationship Management, Product Development and Commercialization, Returns Management. In the perception of Chopra and Miendel (2005) the pharmaceutical supply chain needs a ubiquitous technology framework that includes: item-level data management; standards for available data and how it will be accessed and maintained; data-sharing infrastructure to accommodate cost efficient management and retrieval of data. They also emphasise on reliable trust environment to determine who can access information, if information provided can be certified as authentic, and what can be done with information provided or accessed.

In the opinion of Chopra and Miendel (2005), while item-level data management related to events within the enterprise may provide some incremental value, the potential for revolutionary value comes from the ability to link item-level data to events and observations outside the enterprise. In order to leverage item-level data across enterprises, standards are needed to ensure interoperability. The research work carried by Privett and Gonsalvez (2014) identified the top ten challenges of global pharmaceutical supply chain such as lack of coordination, Inventory management, absent demand information, human resource dependency, order management, shortage avoidance, expiration, warehouse management, temperature control, shipment visibility.

1.6 Justification of the Study

Supply Chain Management addresses supply chain strategies, supply chain planning, procurement, logistics, asset management and product lifecycle management. Supply Chain Management is a crucial tool for economy, efficiency and effectiveness in sourcing, manufacturing, processing, inventory management, logistics, transport, distribution and customer satisfaction. SCM is also important for achieving competitive advantages over the business rivals through a stronger relationship, closer and collaborative cooperation as well as supplier development. SCM also contributes in reducing cost of production and distribution through elimination of waste, compliance with standards and quality, promoting ethical sourcing, curbing unethical practices and diversity and equality in the workplace throughout the supply chain. The study will seek to assess the supply chain management in pharmaceutical industries. So far, there are no comprehensive study in this regard in Bangladesh. The proposed research will attempt to fill up this gap.



2.0 Methodology of the Study

Methodology is an important part of any research work because without choosing and adopting an appropriate method, a systematic investigation is not possible. Research methodology refers to the science of studying how research can be conducted scientifically or how research problem is systematically solved. Method is originated from two Greek words such as 'Meta' and 'Hodos' meaning a way of conducting a work systematically. Research method is a process which consists of various techniques or steps of gathering data or information, processing and presenting of collected data and analyzing data (Abedin, 2005). The method of research is a process of establishing a general proposition of gathering and weighing evidence (Hans Raj, 1987). The broad objective of this study is to evaluate the supply chain management of EK+F. The study follows cross section data analysis techniques and tools for identified different aspects of SCM of EK+F. The survey method of field investigation is utilized and standard tools are applied to achieve the objectives of this study.

2.1 Data Sources and Methods of Data Collection

Primary Source

The data from the primary sources are obtained from field surveys of the relevant respondents. Total number of respondents is 150. The respondents are retailers, executives, consumers and medical services officers. This method is applied to assess the stakeholders' opinions towards the process, benefits, views, knowledge, risks of the supply chain management of Eskayef Bangladesh Ltd. The suggestions for achieving an effective supply chain are also taken from the respondents. Data are collected from both staff and managers of Eskayef and Transcom Distribution Company, Retailers of Eskayef's products, and end customers through structured interviews and administration of questionnaire.

The distribution of samples is shown in Table 1:

Table 1: Distribution of Respondents

| <i>Category of Respondents</i> | <i>Frequency</i> | <i>Location</i> | <i>Types of Sampling</i> |
|--------------------------------|------------------|---|--------------------------|
| Retailers | 60 | Dhaka = 15 Chittagong = 15 Khulna = 15 Rajshahi = 15 | Types of Sampling |
| Executives | 30 | Dhaka TDCL = 15 EK+F = 15 | Types of Sampling |
| Consumers | 30 | Dhaka | Types of Sampling |
| N | | 120 | |

Secondary Sources

Secondary sources include published official statistics, reports, documents, laws, ordinances, books, articles, periodicals of different domestic and international agencies etc. Annual reports of Eskayef, different reports and statistics on the pharmaceutical sector in Bangladesh have been used.



2.2 Data Analysis and Presentation

Data processing

The collected data from secondary sources have been processed in an orderly manner so that it can be used for econometric modeling. The survey data from primary sources are arranged and scrutinized carefully on the basis of the completed questionnaire. Appropriate processing steps such as editing, coding, classification and tabulation are followed carefully.

3.0 Analysis of Data and Discussion of Findings

Primary data collected through field survey with respect to the research objectives of the study. These include an examination of the perception of customers (retailers), consumers, executives of the supply chain of management of Eskayef Bangladesh Limited, an assessment of the availability and affordability of good quality and efficacious pharmaceutical products, an evaluation of the challenges and constraints affecting the distribution process and adherence to Supply Chain Management and best practices for effective and efficient healthcare delivery.

3.1 Analysis of Data of the Retailers (Pharmacy Level)

Total sample size for retailer respondents is 60 equally drawn fifteen from each four major cities in Bangladesh. The distribution of respondents from the retail sector has been shown in Table 2:

Table 2: Distribution of Respondents (Retailers)

| <i>Valid</i> | <i>Frequency</i> | <i>Percent</i> | <i>Valid Percent</i> | <i>Cumulative Percent</i> |
|--------------|------------------|----------------|----------------------|---------------------------|
| Dhaka | 15 | 25.0 | 25.0 | 25.0 |
| Chittagong | 15 | 25.0 | 25.0 | 50.0 |
| Khulna | 15 | 25.0 | 25.0 | 75.0 |
| Rajshahi | 15 | 25.0 | 25.0 | 100.0 |
| Total | 60 | 100.0 | 100.0 | |

Source: Field Survey, January 2016

The reliability statistics of the sample is shown by Cronbach's alpha which is 0.93.

| Cronbach's Alpha | Cronbach's Alpha Based on Standardized Items | No. of Items |
|------------------|--|--------------|
| 0.93 | 0.93 | 15 |

Source: Field Survey, January 2016



The mean variance, co-variances and item-wise correlations are shown in Table 4:

Table 4: Summary Item Statistics

| | Mean | Minimum | Maximum | Range | Maximum/ Minimum | Variance | N of Items |
|----------------------------|-------|---------|---------|-------|---------------------|----------|---------------|
| Item Means | 3.664 | 3.267 | 4.150 | 0.883 | 1.270 | 0.059 | 15 |
| Item Variances | 0.912 | 0.541 | 1.690 | 1.149 | 3.123 | 0.076 | 15 |
| Inter-Item Covariance's | 0.349 | -0.090 | 0.662 | 0.753 | -7.328 | 0.027 | 15 |
| Inter-Item Correlations | 0.401 | -0.103 | 0.806 | 0.909 | -7.846 | 0.036 | 15 |

Source: Field Survey, January 2016

The Anova with Tukey's Test for Non-additivity has been shown in the Table 5 and Table 6. The F-statistic is significant at 5% level. The Hotelling's T-squared Test is found significant at 5% level.

Table 5: ANOVA with Tukey's Test for Non-additivity

| | | | Sum of Squares | df | Mean Square | F | Sig. |
|----------------|---------------|---------------|-------------------|-----|----------------|-------|-------|
| Between People | | | 341.996 | 59 | 5.797 | | |
| Within People | Between Items | | 49.929(a) | 14 | 3.566 | 81.49 | 0.000 |
| | Residual | No additivity | 0.695(b) | 1 | 0.695 | 1.236 | 0.267 |
| | | Balance | 464.042 | 825 | 0.562 | | |
| | | Total | 464.738 | 826 | 0.563 | | |
| | Total | | 514.667 | 840 | 0.613 | | |
| Total | | | 856.662 | 899 | 0.953 | | |

Grand Mean = 3.66

Source: Field Survey, January 2016

a Kendall's coefficient of concordance $W = 0.058$

b Tukey's estimate of power to which observations must be raised to achieve additivity = 1.701

Table 6: Hotelling's T-squared Test

| Hotelling's T-Squared | F | df1 | df2 | Sig |
|--------------------------|-----------|-----|-----|-------|
| 79.365 | 4.42 0 | 14 | 46 | 0.000 |

Source: SPSS Output of Field Survey, January 2016



Table 7: Intra-class Correlation Coefficients

| | Intraclass Correlation(a) Lower Bound | 95% Confidence Interval | | F Test with True Value 0 | | | |
|------------------|--|-------------------------|-------|--------------------------|------|-----|-------------|
| | | Upper Bound | Value | df1 | df2 | Sig | Lower Bound |
| Single Measures | 0.383(b) | 0.296 | 0.491 | 10.302 | 59.0 | 826 | 0.000 |
| Average Measures | 0.903(c) | 0.863 | 0.935 | 10.302 | 59.0 | 826 | 0.000 |

Two-way mixed effects model where people effects are random and measures effects are fixed.

- a Type C intraclass correlation coefficients using a consistency definition-the between-measure variance is excluded from the denominator variance.
- b The estimator is the same, whether the interaction effect is present or not.
- c This estimate is computed assuming the interaction effect is absent, because it is not estimable otherwise.

Source: Field Survey, January 2016

Retailers’ Knowledge about Supply Chain Management

Retail Respondents’ knowledge about SCM of EK+F is shown in the following Table 8. It is observed that 23.3% respondents have reported that they know SCM very well followed by moderate knowledge (21.7%), sufficient knowledge (20%), somehow knowledge (20%) and 15% respondents have poor knowledge about SCM.

Table 8: Respondent’s Knowledge about SCM

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|-------|------------|-----------|---------|---------------|--------------------|
| Valid | poor | 9 | 15.0 | 15.0 | 15.0 |
| | Somehow | 12 | 20.0 | 20.0 | 35.0 |
| | Moderate | 13 | 21.7 | 21.7 | 56.7 |
| | Very Well | 14 | 23.3 | 23.3 | 80.0 |
| | Sufficient | 12 | 20.0 | 20.0 | 100.0 |
| | Total | 60 | 100.0 | 100.0 | |

Source: Field Survey, January 2016

Respondents’ View about SCM

The results show that only 25% respondents reported that they identified SCM as Data Collection, Supplier, Purchasing, Warehousing, Stocktaking and Distribution. While 46.7% respondents viewed SCM as Supplier Selection, Purchasing, Warehousing, Stocking, Distribution, 12% viewed SCM as warehousing and distribution and only 6% considered SCM as distribution.



Table 9: Respondent's View about SCM.

A. Data Collection, Supplier, Purchasing, Warehousing, Stocktaking, Distribution

| | Frequency | Percent | Valid Percent | Cumulative Percent |
|----------------|-----------|---------|---------------|--------------------|
| Valid Yes | 15 | 25.0 | 100.0 | 100.0 |
| Missing System | 45 | 75.0 | | |
| Total | 60 | 100.0 | | |

Source: Field Survey, January 2016

B. Supplier Selection, Purchasing, Warehousing, Stocking, Distribution

| | Frequency | Percent | Valid Percent | Cumulative Percent |
|----------------|-----------|---------|---------------|--------------------|
| Valid Yes | 28 | 46.7 | 100.0 | 100.0 |
| Missing System | 32 | 53.3 | | |
| Total | 60 | 100.0 | | |

Source: Field Survey, January 2016

C. Warehousing, Distribution

| | Frequency | Percent | Valid Percent | Cumulative Percent |
|----------------|-----------|---------|---------------|--------------------|
| Valid Yes | 12 | 20.0 | 100.0 | 100.0 |
| Missing System | 48 | 80.0 | | |
| Total | 60 | 100.0 | | |

Source: Field Survey, January 2016

D. Distribution

| | Frequency | Percent | Valid Percent | Cumulative Percent |
|----------------|-----------|---------|---------------|--------------------|
| Valid Yes | 6 | 10.0 | 100.0 | 100.0 |
| Missing System | 54 | 90.0 | | |
| Total | 60 | 100.0 | | |

Source: Field Survey, January 2016





3.2 Benefits of SCM

Multiple Response Analysis (MRA) is carried out to identify the benefits of SCM. Only 2.8% respondents identified no impact of SCM, 38.1% respondents reported high impact of SCM, 31% viewed medium impact. In regards to heavy impact about 20.7% respondents opined that SCM has heavy impact on the supply chain. The results are shown in Table 9:

Table 9: Impacts of the Benefits of SCM (Retailers)

| Benefits(a) | Responses | | Percent of Cases |
|-----------------|-----------|---------|------------------|
| | N | Percent | N |
| No Impact | 25 | 2.8% | 41.7% |
| Moderate Impact | 67 | 7.4% | 111.7% |
| Medium Impact | 279 | 31.0% | 465.0% |
| High Impact | 343 | 38.1% | 571.7% |
| Heavy Impact | 186 | 20.7% | 310.0% |
| Total | 900 | 100.0% | 1500.0% |

a Group

Source: Field Survey, January 2016

Factor Analysis of the responses regarding the benefits of SCM reveals that shorter lead time has high mean (4.15) followed by reduced cycle time (3.97), reduced waste (3.80), competitive advantage (3.83), reduced cost (3.78), greater supply chain visibility (3.72), reduced inventory (3.62), etc. The results are shown in Table 10:

Table 10: Descriptive Statistics of the Indicators of SCM Benefits

| Indicators | Mean | Std. Deviation | Analysis N |
|---|------|----------------|------------|
| Superior Customer Value | 3.27 | 1.300 | 60 |
| Reduced Cost | 3.78 | .825 | 60 |
| Cooperative Organizational Relationships | 3.58 | 1.046 | 60 |
| Effective Business Process | 3.47 | .929 | 60 |
| Information Sharing | 3.68 | .965 | 60 |
| Integrated Relationships | 3.78 | .958 | 60 |
| Shorter Lead Time | 4.15 | .799 | 60 |
| Reduced Waste | 3.80 | .755 | 60 |
| Reduced Cycle Time | 3.97 | .736 | 60 |
| Improve Responsiveness to Customer Requirements | 3.63 | 1.025 | 60 |
| Greater Supply Chain Visibility | 3.72 | .993 | 60 |
| Enhanced Quality and Service | 3.42 | .979 | 60 |
| Competitive Advantage | 3.83 | .905 | 60 |
| Improved Supply Chain Communications | 3.27 | .972 | 60 |
| Reduced Inventory | 3.62 | .993 | 60 |

Source: Field Survey, January 2016



KMO and Bartlett's Test is used to measure sampling adequacy of influencing factors to examine the appropriateness of factor analysis. Here the KMO value is 0.768 revealing the sampling adequacy of factor analysis. The Bartlett's test of Sphericity (Table 11) indicates that Chi-Square value i.e. 632.94 with 105 degree of freedom meaning that overall significant of the analysis.

Table 11: KMO and Bartlett's Test

| | |
|--|---------------------|
| Kaiser -Meyer -Olkin Measure of Sampling Adequacy. | 0.768 |
| Bartlett's Test of Sphericity | Approx. Chi -Square |
| | 632.935 |
| | df |
| | 105 |
| | Sig. |
| | 0.000 |

Source: Field Survey, January 2016

3.3 The Communalities of the Factors

Extraction Method: Principal Component Analysis is used to find the importance of the factors. Here shorter lead time (0.857), reduced cycle time (0.838), reduced waste (0.825), improved supply chain communications (0.790), integrated relationship (.0.762), information sharing (0.691) are the most important factors for the benefits of SCM. The results are shown in Table 12:

Table 12: The Communalities of the Factors

| Indicators | Initial | Extraction |
|---|---------|------------|
| Superior Customer Value | 1.000 | 0.282 |
| Reduced Cost | 1.000 | 0.724 |
| Cooperative Organizational Relationships | 1.000 | 0.602 |
| Effective Business Process | 1.000 | 0.713 |
| Information Sharing | 1.000 | 0.691 |
| Integrated Relationships | 1.000 | 0.762 |
| Shorter Lead Time | 1.000 | 0.857 |
| Reduced Waste | 1.000 | 0.825 |
| Reduced Cycle Time | 1.000 | 0.838 |
| Improve Responsiveness to Customer Requirements | 1.000 | 0.649 |
| Greater Supply Chain Visibility | 1.000 | 0.761 |
| Enhanced Quality and Service | 1.000 | 0.709 |
| Competitive Advantage | 1.000 | 0.745 |
| Improved Supply Chain Communications | 1.000 | 0.790 |
| Reduced Inventory | 1.000 | 0.548 |

Extraction Method: Principal Component Analysis

The extraction sums of squared loadings that component 1 has 45.05% variance, component 2 has 17.65% and component 3 has 7.23% variance.

Source: Field Survey, January 2016





The total variance explained of the factor analysis is shown in Table 13. The initial eigenvalues for components 1, 2 and 3 are respectively 6.758, 2.65 and 1.09. It reveals that the component 1 has alone explained 45.07% of variance while component 2 has explained 17.66%, Component 3 has explained 7.27%. Other components are insignificant in terms of explaining total variance of the model. The rotation sums of squared loadings for component 1 is 4.82 (32.16%), 3.49 (23.28%) for component 2 and 2.18 (14.55%) for component 3.

Table 13: Total Variance Explained

| 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 | 6.758 | 45.057 | 45.057 | 6.75 | 45.057 | 45.057 | 4.8 | 32.159 | 32.159 |
| 2 | 2.648 | 17.656 | 62.713 | 2.64 | 17.656 | 62.713 | 3.49 | 23.276 | 55.435 |
| 3 | 1.091 | 7.273 | 69.986 | 1.09 | 7.273 | 69.986 | 2.18 | 14.551 | 69.986 |
| 4 | .838 | 5.587 | 75.573 | | | | | | |
| 5 | .657 | 4.383 | 79.956 | | | | | | |
| 6 | .628 | 4.185 | 84.141 | | | | | | |
| 7 | .560 | 3.731 | 87.872 | | | | | | |
| 8 | .401 | 2.672 | 90.545 | | | | | | |
| 9 | .344 | 2.295 | 92.840 | | | | | | |
| 10 | .318 | 2.121 | 94.962 | | | | | | |
| 11 | .251 | 1.673 | 96.635 | | | | | | |
| 12 | .207 | 1.383 | 98.017 | | | | | | |
| 13 | .148 | .984 | 99.001 | | | | | | |
| 14 | .093 | .618 | 99.619 | | | | | | |
| 15 | .057 | .381 | 100.000 | | | | | | |

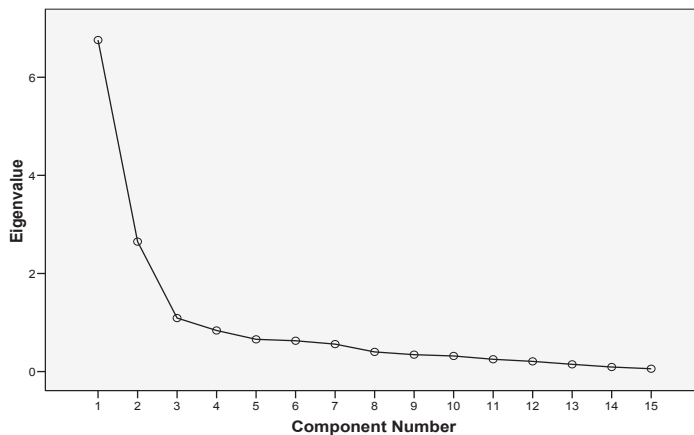
Extraction Method: Principal Component Analysis

Source: Field Survey, January 2016

The Scree Plot for Principal Component Analysis is shown in Figure 5:

Figure 5: Scree Plot for Principal Component Analysis

Scree Plot



3.4 Component Matrix Analysis

The weight of each factor in each component is shown in Table 14:

Table 14: Component Matrix(a)

| Indicators | Component | | |
|---|-----------|-------|-------|
| | 1 | 2 | 3 |
| Superior Customer Value | .492 | -.148 | .135 |
| Reduced Cost | .737 | -.404 | .137 |
| Cooperative Organizational Relationships | .650 | -.300 | .300 |
| Effective Business Process | .738 | -.398 | .104 |
| Information Sharing | .698 | -.430 | .139 |
| Integrated Relationships | .733 | .474 | .003 |
| Shorter Lead Time | .646 | .250 | -.614 |
| Reduced Waste | .753 | .492 | .125 |
| Reduced Cycle Time | .727 | .383 | -.404 |
| Improve Responsiveness to Customer Requirements | .680 | .430 | -.031 |
| Greater Supply Chain Visibility | .757 | -.349 | -.258 |
| Enhanced Quality and Service | .772 | -.282 | .184 |
| Competitive Advantage | .656 | -.519 | -.214 |
| Improved Supply Chain Communications | .432 | .633 | .450 |
| Reduced Inventory | .471 | .546 | .168 |

Extraction Method: Principal Component Analysis
a 3 components extracted

From the component matrix it is found that 12 factors have high influence on the benefits of SCM. These have enhanced quality and service (0.772), greater supply chain visibility (0.757) reduced waste (0.753), effective business process (0.737), reduced cost (0.737), reduced cycle time (0.727), information sharing (0.698), improved responsiveness to customer requirements (0.680), competitive advantage (0.656), cooperative organizational relationships (0.650). Components 2 and 3 are not important as most of the factors have negative coefficients.





The rotated weight of each indicator for each component is shown in Table 15:

Table 15: Rotated Component Matrix(a)

| Indicators | Component | | |
|--|-----------|-------|-------|
| | 1 | 2 | 3 |
| Superior Customer Value | .490 | .194 | .066 |
| Reduced Cost | .832 | .126 | .126 |
| Cooperative Organizational Relationships | .742 | .225 | -.038 |
| Effective Business Process | .822 | .118 | .156 |
| Information Sharing | .821 | .087 | .102 |
| Integrated Relationships | .248 | .738 | .394 |
| Shorter Lead Time | .176 | .279 | .865 |
| Reduced Waste | .280 | .811 | .298 |
| Reduced Cycle Time | .204 | .505 | .736 |
| Improved Responsiveness to Customer Requirements | .228 | .665 | .394 |
| Greater Supply Chain Visibility | .719 | .022 | .494 |
| Enhanced Quality and Service | .793 | .256 | .120 |
| Competitive Advantage | .761 | -.142 | .382 |
| Improved Supply Chain Communications | .031 | .882 | -.105 |
| Reduced Inventory | .047 | .724 | .147 |

Method: Principal Component Analysis

Rotation Method: Varimax with Kaiser Normalization

a Rotation converged in 5 iterations

Table 16 shows the component transformation. Here component 1 has more weight as compared to component 2 and component 3.

Table 16: Component Transformation Matrix

| Component | 1 | 2 | 3 |
|-----------|-------|------|-------|
| 1 | .742 | .515 | .430 |
| 2 | -.627 | .760 | .172 |
| 3 | .238 | .397 | -.887 |

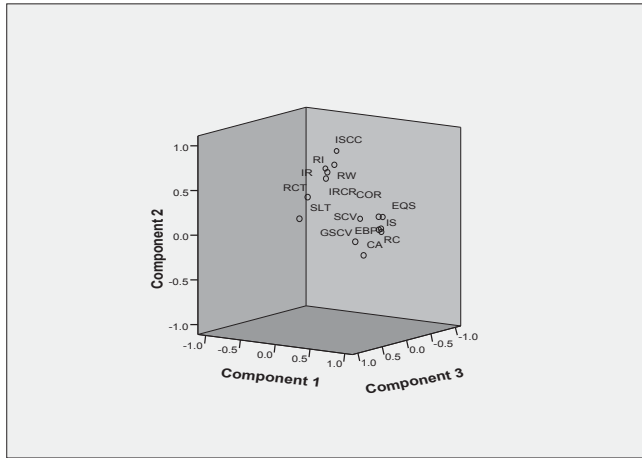
Extraction Method: Principal Component Analysis

Rotation Method: Varimax with Kaiser Normalization



Figure 6: Component Plot in Rotated Space

Component Plot in Rotated Space



The component score coefficients are shown in Table 17:

Table 17: Component Score Coefficient Matrix

| Indicators | Component | | |
|--|-----------|-------|-------|
| | 1 | 2 | 3 |
| Superior Customer Value | .118 | .044 | -.088 |
| Reduced Cost | .206 | -.010 | -.091 |
| Cooperative Organizational Relationships | .208 | .072 | -.222 |
| Effective Business Process | .198 | -.020 | -.063 |
| Information Sharing | .209 | -.020 | -.097 |
| Integrated Relationships | -.031 | .193 | .075 |
| Shorter Lead Time | -.122 | -.102 | .557 |
| Reduced Waste | -.006 | .244 | -.021 |
| Reduced Cycle Time | -.099 | .018 | .399 |
| Improved Responsiveness to Customer Requirements | -.034 | .164 | .097 |
| Greater Supply Chain Visibility | .109 | -.136 | .235 |
| Enhanced Quality and Service | .192 | .045 | -.119 |
| Competitive Advantage | .148 | -.177 | .182 |
| Improved Supply Chain Communications | -.004 | .378 | -.297 |
| Reduced Inventory | -.041 | .254 | -.071 |

Extraction Method: Principal Component Analysis
Rotation Method: Varimax with Kaiser Normalization
Component Scores



3.5 Regression Analysis:

Table 18: Model Summary(b)

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate | Change Statistics | | | | | Durbin-Watson |
|-------|-----------------|----------|-------------------|----------------------------|-------------------|-----------------|----------|-----|-----|---------------|
| | R Square Change | F Change | df1 | df2 | Sig. F Change | R Square Change | F Change | df1 | df2 | Sig. F Change |
| 1 | .527(a) | .278 | .053 | 1.265 | .278 | 1.235 | 14 | 45 | .28 | 2.055 |

- a. *Predictors:* (Constant), Reduced Inventory, Competitive Advantage, Shorter Lead Time, Improved Supply Chain Communications, Cooperative Organizational Relationships, Effective Business Process, Improved Responsiveness to Customer Requirements, Information Sharing, Integrated Relationships, Enhanced Quality and Service, Reduced Cycle Time, Reduced Cost, Greater Supply Chain Visibility, Reduced Waste
- b. *Dependent Variable:* Superior Customer Value

Table 19: ANOVA(b)

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|-------|------------|----------------|----|-------------|-------|---------|
| 1 | Regression | 27.680 | 14 | 1.977 | 1.235 | .285(a) |
| | Residual | 72.054 | 45 | 1.601 | | |
| | Total | 99.733 | 59 | | | |

- a. *Predictors:* (Constant), Reduced Inventory, Competitive Advantage, Shorter Lead Time, Improved Supply Chain Communications, Cooperative Organizational Relationships, Effective Business Process, Improved Responsiveness to Customer Requirements, Information Sharing, Integrated Relationships, Enhanced Quality and Service, Reduced Cycle Time, Reduced Cost, Greater Supply Chain Visibility, Reduced Waste
- b. *Dependent Variable:* Superior Customer Value

3.6 Supply Chain Challenges:

From the responses of 30 officials from SK+F and TDCL the following challenges have been identified:



3.6 Supply Chain Challenges:

From the responses of 30 officials from SK+F and TDCL the following challenges have been identified:

- Lack of coordination
- Inventory management
- Absent demand information
- Human resource dependency
- Order management
- Shortage avoidance
- Expiration
- Warehouse management
- Temperature control
- Shipment visibility

The results of field survey reveals that 86.7% respondents have identified lack of coordination as a challenge to SCM while 80% as inventory management, 80% as order management, 33.3% as absent demand management, 50% as human resource management, 20% as shortage avoidance, 53.3% as expiration management, 66.7% as warehouse management, 63.3% as temperature control and 66.7% as shipment visibility.

Table 20: Frequency Distribution of Challenges

| Challenges | Frequency | | | |
|---------------------------|-----------|------------|----|------------|
| | Yes | Percentage | No | Percentage |
| Lack of Coordination | 26 | 86.7 | 4 | 13.3 |
| Inventory Management | 24 | 80 | 6 | 20 |
| Absent Demand Information | 10 | 33.3 | 20 | 66.7 |
| Human Resource Dependency | 15 | 50 | 15 | 50 |
| Order Management | 24 | 80 | 6 | 20 |
| Shortage Avoidance | 6 | 20 | 24 | 80 |
| Expiration | 16 | 53.3 | 14 | 46.7 |
| Warehouse Management | 20 | 66.7 | 10 | 33.3 |
| Temperature Control | 19 | 63.3 | 11 | 36.7 |
| Shipment Visibility | 20 | 66.7 | 10 | 33.3 |

Source : Field Survey, 2016

As a group 60% respondents identified supply chain management challenges as yes while 40% as no.

Table 21: Challenges Frequencies (Group)

| Challenges | Responses | | Percent of Cases |
|-------------------|-----------|---------|------------------|
| | N | Percent | N |
| SCMC ^a | Yes | 180 | 60.0% |
| | No | 120 | 40.0% |
| Total | | 300 | 100.0% |

a. Group

Source : Field Survey, 2016



4.0 Recommendations

From the analysis of the results obtained from the surveys, the following recommendations have been made to enable 'Eskayef Bangladesh Limited' to achieve its main vision to lead the national pharmaceutical market, to be recognized as a multinational conglomerate from Bangladesh and stand out as a model of efficiency and trust to our collaborators, consumers, healthcare professionals and society. These include:

1. 'Eskayef Bangladesh Limited' should employ more marketing staff for effectively distributing its products to a wider customer base.
2. 'Eskayef Bangladesh Limited' should continue to produce the high quality pharmaceutical products but at a less production cost so the prices of its products would be cheaper to ensure that low level income earners can also patronize them since the poor in Bangladesh form a larger proportion of the population.
3. To help the distribution chain, 'Eskayef Bangladesh Limited' should occasionally organize education seminars for communities to help them know the usage of drugs and the possible adverse effects of their abuse. It is widely known in Bangladesh that not all sick people go to the hospital or ask their pharmacists for correct medication, they rather purchase medicines from drug peddlers and unapproved retailers.
4. 'Eskayef Bangladesh Limited' should improve its data collection and communication systems. These would enhance information flow within the Company and promote the implementation of new strategies and directives. It would also help to reduce its bad debts since customers can be followed up effectively to pay whatever they purchase. Good data collection system would help it improve on its forecasting system to reduce the shortages it encounters in order to effectively meet the needs of its customers.
5. 'Eskayef Bangladesh Limited' should buy more distribution vans to improve its supply chain system.
6. The Government of Bangladesh should encourage the development of local pharmaceutical manufacturing capacity by reducing or waiving off some of the taxes on pharmaceutical raw materials also called active pharmaceutical ingredients (APIs). In addition, the government should encourage expansion of the local pharmaceutical companies by giving tax reliefs to companies with branches or offices in most if not all regional capitals and district capitals of the country.
7. Government should discourage foreign pharmaceutical companies for considering and/or taking Bangladesh as a dumping site for the substandard or disapproved products by other national food and drugs authorities.
8. Medicine export should be increased to LDCs: Some companies are aggressive to enter the highly regulated overseas markets, such as, USA, Australia, Europe, Canada, France and Gulf countries. However, the practical observation is that getting export status to those countries requires huge investment in the manufacturing plant to achieve certification from different international drug regulatory authorities, highly sophisticated documentation and huge initial capital investment. Actually, the export volume to the highly regulated countries will not be easily feasible; rather we can perform pretty well can potentially increase our export if the exporters become more attentive to LDCs. Among 50 LDCs, only Bangladesh has its strong fundamental and modern manufacturing base, hence we can easily share the drug market of rest of the LDCs. So considering the practical situation, the LDCs should be the targeted markets of our pharmaceuticals, of course, side by side, moderately regulated and highly regulated markets may be explored gradually. However, we can establish joint-venture, tool manufacturing and contract manufacturing business with the companies of developed countries, not only for exporting medicines.



9. Establishing export cell by the govt./private Consultancy firms may promote Pharma export: Government can establish specialized Export Cell to promote exports of pharmaceuticals to grab and capitalize the huge export opportunities in LDCs. Some private consultancy firms having experience and expertise in drug export professionally can be engaged to assist the pharmaceutical companies who do not have the technical and expertise know-how to go through the entire process of export, or have lacking in documentation skills or even do not have the skilled manpower to deal with the drug export. Thus, consultancy firms can play a significant role to explore export to maximum countries, accelerate export activities and to reduce the overall cost of export. Even some small companies having International Marketing Department (IMD) can explore the benefits of outsourcing by hiring Export consultants to reduce its overhead expenditure and make a comparative study of cost-benefit ration to justify having IMD.

4.1 Conclusions

The pharmaceutical sector has already been declared as the thrust sector by the government of Bangladesh. Bangladesh has built a strong baseline and is going towards the self-sufficiency for the production of medicine. Meanwhile, some companies have started to produce vaccine, insulin, anticancer drugs, etc. Our pharmaceutical industries are successful in domestic market. Now, it's the time to grow our international market because we are passing golden time getting the opportunity of patent exemption by the TRIPS until 2030. Besides the above discussing points, providing cash incentive by the govt. to the medicine exporters, like RMG may encourage pharmaceutical exporters. International fair arrangement by Export Promotion Bureau (EPB) is a very effective way to search buyers and to establish business in a new country. A lot of initiatives have been taken by BAPI in different times, such as, high level pharmaceuticals delegation team visited foreign countries to explore export initiated by BAPI. This organization also upheld the demand and urged to the government and other concerning authorities for API Park, bioequivalence test laboratory, central drug testing laboratory, cash incentives, problems in remit transfer and sample sending etc. But many issues are yet to resolve. We have already wasted our valuable time and still losing to build our infrastructure for export. The government should really be attentive to remove all the obstacles and solve all the problems to see the pharmaceutical sector as a vital player in the international market.

From the study it is found that 'Eskayef Bangladesh Limited' has an effective supply chain management strategy even though there is still room for improvement. 'Eskayef Bangladesh Limited' provides good quality and efficacious medicines that are affordable and available to all levels of income earners in Bangladesh. 'Eskayef Bangladesh Limited' does this by importing both patented and generic medicines from the world's leading pharmaceutical companies so that nationals from all over the world in Bangladesh can have their trusted brands of medicines. Again, 'Eskayef Bangladesh Limited' produces some of the medicines locally from an ultra modern factory plant in Tongi and distributes them through its own wholesales and other members of the pharmaceutical distribution chain to make sure accessibility of good quality and efficacious medicines at affordable prices. Moreover, the Bangladesh pharmaceutical industry has challenges and constraints. These include: the under development of manufacturing capacity, growing threat of counterfeit and diverted medicines from Asia, weaknesses in implementation of intellectual property rights, focus of local production on Over-the-Counter (OTC) medicines, inability for local manufacturers to produce essential medicines that meet standards for international tenders.



Other constraints are poor pharmaceutical coverage for the majority of Bangladeshis, high concentration of retail pharmacies in major cities and rural areas, unmet professional human resource development and high mark-ups at every stage of the supply chain. As a result, the price of medicines is on the increasing trend. Some of the challenges facing 'Eskayef Bangladesh Limited' include lack of funds for some expansion projects such as taking charge of its own pharmaceutical distribution chain and buying more vans to improve its distribution network. In addition to these, lack of government subsidies on taxes for privately owned companies (for instance high utility bills) and high taxes on imported raw materials increased the cost of local production.

The sector needs adequate support from the government to develop the API Park to make the medicine products more competitive in global markets. The establishment of central drug testing laboratory is also required to strictly maintain high standards of medicine and a bio-equivalence testing facility to the clinical testing, which is prerequisite to register our products in the regulated markets. Manufacturers also need an uninterrupted supply of power and gas to the production units and special economic zones for the pharma industry with tax benefits, collaboration between the industry and universities is required to promote research activities particularly in developing specialized drug delivery systems.

References:

- Chopra, Sunil and Meindl, Peter. (2005), *Supply Chain Management: Strategy, Planning, and Operation*, 6th ed. Pearson.
- Dubey, Jayashree, Kumar, M.L Sai. (2007). *Supply Chain Management*. New Century Publications, Second edition.
- Enyinda C I, et al (2009). "Improving Strategic Risk Management Within Pharmaceutical Supply Chain". *International Journal of Business, Marketing, and Decision Sciences*, Volume 2, Number 2.
- Enyinda C, Briggs C, Bachkar K. "Managing risk in pharmaceutical global supply chain outsourcing: applying analytic hierarchy process model". In ASBBS Annual Conference: Las Vegas; 2009.
- Graves S. (2009). "New Challenges to Emergency Management of Pharmaceutical/Healthcare Supply Chain Disruptions". *World Pharmaceutical Frontiers*.
- Handfield R B, Dhinagaravel V (2005). *Future Trends In Pharmaceutical and Biotech Distribution: White Paper*. NC State University Publishers.
- Hans Raj, *Theory and Practice in Social Research* (4th ed., New Delhi: Sarjeet Publications, 1987), p. 95.
- Kaye S. (2010). *Meeting the Pharmaceutical Industry's Global Supply-Chain Challenge*.
- Kotahari, C. R. *Research Methodology: Methods and Techniques*, 2nd ed. New Delhi: New Age International Publishers, 1990, p. 8.
- Lambert, Douglas, M. et. al, "Supply Chain Management: Implementation Issues and Research Opportunities", *The International Journal of Logistics Management*, vol 9, no. 2, 1998.
- Lysons, Kenneth and Farrington, Brian. *Purchasing and Supply Chain Management*, 8th ed. Pearson.



- M. Zainul Abedin, A Hand Book of Research (2nd Revised ed., Book Syndicate: Dhaka, 2005), p. 51.
- M. Zainul Abedin, A Handbook of Research. 2nd Revised ed.; Dhaka: Book Syndicate, 2005, p. 50.
- Privett, Natalie and Gonsalvez, David. (2014) “The top ten global health supply chain issues: Perspectives from the field”. Operations Research for Health Care. Vol. 3, Issue 4, pp. 226-230.
- Ricci, M.T. (2006). Revolution in the Pharmaceutical Supply Chain Drug Discovery & Development.
- Svantesson, M. (2009). Facing Challenges in the Pharmaceutical Supply Chain. GDS Publishing Ltd.
- Whewell, R. (2009). “Supply Chain in the Pharmaceutical Industry: Strategic Influences and Supply”. Journal of Information Engineering and Applications. www.iiste.org ISSN 2224-5782 (print) ISSN 2225-0506 (online), Vol.4, No.8, 2014, 39.
- www.slideshare.net/pharma-chain/accessed on 25-12-2015.

