A Survey on Factors Affecting Supply Chain Management Effectiveness: A Case of Textile Sector in Sri Lanka

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Abstract—The modern world is streaming towards the simplification of processes, reengineering and reformations of management to increase the effectiveness of manufacturing, thus practices innovative concepts, state of art technologies, best management strategies and approaches. Supply Chain Management is one such critical management approach to manage the flow of goods and services from its origin to destination effectively and efficiently. Supply Chain Management is executed in industries throughout their value chain. The apparel industry is a major industry in the world which practices supply chain management. When it comes to Sri Lanka, the apparel industry is a vital contributor to the economy and effectiveness is the key player of achieving stakeholder expectation and increasing the bottom line of the industry. The purpose of this study is to identify the factors affecting supply chain management effectiveness in the Sri Lankan textile industry. A questionnaire survey was conducted to collect primary data. The sample size was 130 with a response rate of 79%. The questionnaire consisted of nineteen factors identified through an extensive literature review. A likert scale of five options was used to capture the responses. Respondents for the questionnaire were managers, assistant managers, executives and operation analysts. In the analysis KMO and Bartlett Test have used to evaluate the reliability and the significance of the study. SPSS statistical software was used for the analysis. Varimax rotated component matrix was used to determine the coefficient of the equations. Only twelve of them affect to the research model. According to the analysis 11 factors were significant and five factors strongly affect to the effectiveness of Supply Chain Management of textile industry of Sri Lanka. They are planning, quality, sourcing, communication and procurement. Recommendations are provided related to the affecting factors as organizations need to concentrate their effort on developing these factors. Organizations are suggested to use planning tools and communication tools to improve sharing of information among supply chain partners which helps increase the transparency and planning tools such as MRP, MRPII, ERP, VMI, DRP to improve the planning process.

Keywords—Textile industry, Supply chain management, Effectiveness, Sri Lanka

I. INTRODUCTION

A. Background

Simultaneous to globalization, the contemporary business environment is highly competitive and organizations have to face many challenges with the dynamic nature of the environment. Globalization has also led to the necessity of corporation or rather at a higher level, collaboration between different entities involved. Therefore supply chain management has become essential for organizations to move towards a higher level of collaboration and gain competitive advantage over their competitors.

Supply chain management can be defined as “planning, implementing and controlling the flow of information, materials and services from raw material and component suppliers to the manufacturing of the finished product for ultimate distribution to the end customer” (Michigan State University). Further it is stated as “It’s a systematic integration of processes for demand planning, customer relationship collaboration, order fulfillment or delivery, product or service providing, manufacturing or operations planning and control, supplier relationship collaboration, life cycle support, and reverse logistics and their associated risks. These processes, which employ a combination of people, systems and technology, can be performed by the firm itself or in collaboration with external supply chain partners” (Michigan State University). This statement depicts the importance of supply chain management as it covers the systematic planning of integration right from the beginning of sourcing to the ultimate consumer. It also takes into account the reverse flow of goods which is from the consumer to the supplier. Proper integration and management of the reverse flow is vital now with the environmental concerns and practices of recycling and reusing. In order to gain the benefits, effective supply chain management must be practiced.
When looking at the apparel industry there are many parties involved in the supply chain as most of the world renowned brands have outsourced their manufacturing to the developing countries. The practice of outsourcing results in a greater need for supply chain integration as there are many intermediaries involved in the business process. Therefore the greater importance for effective management of the supply chain to maximize the potential benefits.

B. The Sri Lankan Apparel Industry

The apparel industry is growing at a significant pace, which urges the companies to search for better ways to create and deliver superior values to customers (Hasarali, Mayadunne, Weerakoon, Samarasinghe, Weligodapola, & Thelijjagoda, 2012). In 2005 U.S.-Sri Lanka bilateral trade totalled U.S. $2.2 billion, which mostly consisted of Sri Lankan apparel. After liberalization of the economy in 1977, the apparel industry in Sri Lanka started growing rapidly and during 1990s, it grew at 18.5% annually (Hasarali, Mayadunne, Weerakoon, Samarasinghe, Weligodapola, & Thelijjagoda, 2012). This gradually led to the replacement of tea by apparel as the nation’s largest foreign exchange earner. It was Sri Lankan rupees 3.8 billion and predicted that it will be about 4.2 billion in 2014 (Sri Lanka Central Bank Annual Report 2013). Therefore this industry has immensely contributed to the wealth of the nation by being the highest industrial employment generator and the highest foreign exchange earner. The Sri Lankan apparel industry caters to many world renowned high-end brands which include Victoria’s Secret, Liz Claiborne, Pierre Cardin, Nike, Donna Karan, Ralph Lauren, Tommy Hilfiger, Nautica and Gap. Therefore Sri Lanka’s apparel industry has to be well ahead of other competitors in order to retain these customers.

As the complexity of the supply chain increases due to increase of suppliers, more manufacturing plants, increased demand, geographically dispersed distribution centers with wide consumer networks, the industry has to adapt successfully to all potential challenges. Therefore the purpose of this study was to identify the factors which affect supply chain management effectiveness with respect to the textile industry of Sri Lanka.

II. METHODOLOGY AND EXPERIMENTAL DESIGN

Primary data was used for this study. Data collection was done through a questionnaire survey. The questionnaire consisted of nineteen questions which are related to the evaluation of the nineteen factors which were identified through the literature review. The nineteen independent factors were marketing plans, market forecasting methods, a good supplier selection, machine upgrading planning, industrial planning, underutilized capacity planning, quality management and quality policy objectives responsibility and quality planning, quality assurance, quality improvements, sourcing practices, strategic, relationship with supplier, the degree of strength of the relationship with the supplier, a formal sourcing approach, responsive time of retailers, relationship with suppliers and their level of trust and commitment, government support, uncertainty aspects from overseas, information sharing risk sharing obtaining mutual benefits and coordinating plans with suppliers and information sharing obtaining mutual benefits and coordinating plans with customers. The Likert scale with five options was used to capture the responses. The sample size of the study was 130 and the response rate was 79%. Respondents of the questionnaire were Managers, Assistance Managers, Executives and other staff officers whose job role was directly related to their supply chain management systems. The population of the study was export oriented apparel manufacturers and the technique used in the study was non probability sampling method as used in a similar study in Pakistan by (Nabila, Saeed, & Lodhi, 2013). Judgmental sampling method was used to include the major export oriented apparel manufacturers of Sri Lanka.

The conceptual framework has been developed by referring previous studies and related literature (Figure 1).

![Conceptual framework](image)

Once the conceptual framework was developed the factors which come under each independent factor was identified through literature.
As per the Eigenvalue rule five factors affect the model and Table 2 depicts the values of Initial Eigenvalues, Extraction Sums of Squared Loadings, and Rotation Sums of Squared Loadings. All factors greater than 1 which generated by SPSS define the research model. There are five factors of which the Initial Eigenvalues is greater than 1 while rest of the other twelve factors are having less than 1 Initial Eigenvalues values.

Varimax method is used to determine the effectiveness and verifications. Results of the rotation method of varimax is shown in Table 3. Factors which are having greater than 0.5 value are considered as significant factors. Accordingly the factors Marketing Plans, Machine Upgrading Planning, Industrial Planning, Underutilized Capacity Planning, A Formal Sourcing Approach, Responsive Time of Retailers, Relationship with Suppliers and Their Level of Trust and Commitment, Uncertainty Aspects from Overseas, Market Forecasting Methods, A Formal Sourcing Approach, The Degree of Strength of the Relationship with the Supplier, The Degree of Strength of the Relationship with the Supplier, Sourcing Practices, Strategic Relationship With Supplier and Information Sharing, Obtaining Mutual Benefits and Coordinating Plans with Customers lies within the significant region.

With these factors the following functions can be defined:

Factor 1 = f (Marketing Plans, Machine Upgrading Planning, Industrial Planning, Responsive Time of Retailers, Inventory planning, Underutilized Capacity Planning, Planning Tools, Production Plans)

Factor 1 can be named as Planning Factor.

Factor 2 = f (Outsourcing, Inventory planning)

Factor 2 can be named as Sourcing Factor

Factor 3 = f (Quality Management and Quality Policy, Objectives, Responsibility and Quality Planning)

Factor 3 can be named as Quality Factor

Factor 4 = f (On time Deliveries, On Time Financial Flow)

Factor 4 can be named as Procurement Factor

Factor 5 = f (Information Sharing, Obtaining Mutual Benefits and Coordinating Plans with Customers)

Factor 5 can be named as Communication Factor

IV. DISCUSSION AND CONCLUSION

A. Discussion

According to the results of the study there are five main factors which influence the effectiveness of supply chain
management in the apparel industry in Sri Lanka. The total variance explained by these factors is 70.4%. The factors are planning, sourcing, communication, reliability and quality. This gives a clear insight that the organizations have to focus their efforts more on these factors in order to increase their supply chain effectiveness.

Parameters which affect the factor of planning are marketing plans, machine upgrading planning, industrial planning, underutilized capacity planning, a formal sourcing approach, responsive time of retailers, relationship with suppliers and their level of trust and commitment, uncertainty aspects from overseas.

Parameters which affect the factor of sourcing are market forecasting methods and formal sourcing approach. Parameters of the factor of quality are quality management and quality policy, objectives, responsibility and quality planning. Parameters which affect the factor of procurement are on time financial flow and on time delivery. Parameters which affect the communication factor are information sharing and obtaining mutual benefits and coordinating plans with customers.

Table 2: Total Variance Explained

<table>
<thead>
<tr>
<th>Component</th>
<th>Initial Eigenvalues</th>
<th>Extraction Sums of Squared Loadings</th>
<th>Rotation Sums of Squared Loadings</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
<td>% of Variance</td>
<td>Cumulative %</td>
</tr>
<tr>
<td>1</td>
<td>7.990</td>
<td>42.054</td>
<td>42.054</td>
</tr>
<tr>
<td>3</td>
<td>2.139</td>
<td>11.259</td>
<td>66.519</td>
</tr>
<tr>
<td>5</td>
<td>1.078</td>
<td>5.673</td>
<td>78.407</td>
</tr>
<tr>
<td>6</td>
<td>.953</td>
<td>5.017</td>
<td>83.424</td>
</tr>
<tr>
<td>7</td>
<td>.776</td>
<td>4.086</td>
<td>87.510</td>
</tr>
<tr>
<td>8</td>
<td>.632</td>
<td>3.328</td>
<td>90.838</td>
</tr>
<tr>
<td>9</td>
<td>.449</td>
<td>2.363</td>
<td>93.201</td>
</tr>
<tr>
<td>10</td>
<td>.370</td>
<td>1.945</td>
<td>95.146</td>
</tr>
<tr>
<td>11</td>
<td>.297</td>
<td>1.562</td>
<td>96.708</td>
</tr>
<tr>
<td>12</td>
<td>.175</td>
<td>.921</td>
<td>97.629</td>
</tr>
<tr>
<td>13</td>
<td>.126</td>
<td>.661</td>
<td>98.290</td>
</tr>
<tr>
<td>14</td>
<td>.116</td>
<td>.609</td>
<td>98.898</td>
</tr>
<tr>
<td>15</td>
<td>.093</td>
<td>.488</td>
<td>99.386</td>
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<td>16</td>
<td>.059</td>
<td>.313</td>
<td>99.699</td>
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<tr>
<td>17</td>
<td>.031</td>
<td>.165</td>
<td>99.864</td>
</tr>
<tr>
<td>18</td>
<td>.014</td>
<td>.076</td>
<td>99.940</td>
</tr>
<tr>
<td>19</td>
<td>.011</td>
<td>.060</td>
<td>100.000</td>
</tr>
</tbody>
</table>
**Table 3. Rotated Component Matrix**

<table>
<thead>
<tr>
<th>Rotated Component Matrix$^a$</th>
<th>Component</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Marketing Plans</td>
<td>.891</td>
</tr>
<tr>
<td>Outsourcing</td>
<td>.333</td>
</tr>
<tr>
<td>A Good Supplier Selection</td>
<td>-.041</td>
</tr>
<tr>
<td>Machine Upgrading Planning</td>
<td>.755</td>
</tr>
<tr>
<td>Industrial Planning</td>
<td>.682</td>
</tr>
<tr>
<td>Responsive Time of Retailers</td>
<td>.887</td>
</tr>
<tr>
<td>The Degree of Strength of the Relationship with the Supplier</td>
<td>-.428</td>
</tr>
<tr>
<td>Quality Assurance</td>
<td>-.654</td>
</tr>
<tr>
<td>Quality Improvements</td>
<td>-.136</td>
</tr>
<tr>
<td>On time Deliveries</td>
<td>.076</td>
</tr>
<tr>
<td>On Time Financial Flaw</td>
<td>.048</td>
</tr>
<tr>
<td>Quality Management and Quality Policy, Objectives, Responsibility and Quality Planning</td>
<td>-.051</td>
</tr>
<tr>
<td>Inventory planning</td>
<td>.560</td>
</tr>
<tr>
<td>Underutilized Capacity Planning</td>
<td>.851</td>
</tr>
<tr>
<td>Planning Tools</td>
<td>.756</td>
</tr>
<tr>
<td>Government Support</td>
<td>.349</td>
</tr>
<tr>
<td>Production Plans</td>
<td>.814</td>
</tr>
<tr>
<td>Information Sharing, Risk Sharing, Obtaining Mutual Benefits and Coordinating Plans with Suppliers</td>
<td>-.612</td>
</tr>
<tr>
<td>Information Sharing, Obtaining Mutual Benefits and Coordinating Plans with Customers</td>
<td>.145</td>
</tr>
</tbody>
</table>

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

$^a$ Rotation converged in 6 iterations.

**B. Conclusion**

The factor analysis method has been applied in this research to identify the main factors which affect the supply chain effectiveness of the Sri Lankan apparel industry. Through the study five main factors have been identified as planning, sourcing, quality, procurement and communication. It could be concluded that organizations should focus intensively on the functions of planning, sourcing, quality, procurement and communication in order to improve the effectiveness of their supply chain. Use of proper planning tools and communication tools simplify processes and improve accuracy. Sharing information among supply chain partners using proper communication tools increase the transparency and facilitate quick decision making to face dynamic situations. Therefore it could be recommended that communication tools such as: Electronic Fund Transfer (EFT), Electronic Data Interchange (EDI), Intranet, Extranet, Value Added Network (VAN) and planning tools such as: Material Requirement Planning (MRP), Manufacturing Resources Planning (MRP II), Enterprise Resource Planning (ERP), Data Warehouse (DW), Vendor Managed Inventory (VMI), Distribution Requirement Planning (DRP), Customer Service Management (CRM) must be utilized by organizations. For sourcing proper sourcing procedures should be formulated and supplier
evaluation has to be performed. For the procurement function the reliability of delivery has to be improved and standard procurement procedures must be used. For the quality function, use of appropriate quality tools, quality assurance systems and quality standards have to be practiced.

As further research this study can be expanded to other industries to identify factors which affect the effectiveness of those particular industries. Also as further research the identified factors can be used to develop models for the supply chain effectiveness in the apparel industry.

REFERENCES


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Dilani Ransrini Ratnajeewa is currently attached to the Department of Management and Finance in the General Sir John Kotelawala Defence University and is lecturing in the field of Transportation, Logistics and Supply Chain Management. She is interested in research in the field of logistics, supply chain and sustainability.

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