# Factors Influencing Supply Chain Responsiveness in the Apparel Industry in Sri Lanka

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## Abstract

*The main purpose of this paper is to present the findings of research carried out to identify the factors influencing the supply chain responsiveness in the apparel sector of Sri Lanka. Even though supply chain responsiveness is a contemporary issue hardly any research has been done in Sri Lanka on this topic. Supply chain responsiveness is very relevant to the apparel industry, which is accountable for more than half of the industrial exports of Sri Lanka. Firstly, factors influencing the supply chain responsiveness were identified through the literature review, and later a questionnaire survey was conducted among 33 large apparel companies in Sri Lanka. The findings revealed that the supply chain responsiveness is highly correlated to Organizational Factors, Mutual Understanding, Flow of Information and Relationship and Decision Making. However, there is a correlation only when these factors are taken together but not individually except Mutual Understanding. The findings will be useful for managers and policy makers in the apparel industry to improve the responsiveness in their organizations and the industry.*

*Key words* *Apparel Industry, Flexibility, Sri Lanka, Supply Chain Management, Supply Chain Responsiveness,*
*Paper Type* *Research paper*

## Introduction

Today's business environment is more global and competitive than it has been in the past. The contemporary business is characterised by shorter product life cycles, rapid new product introductions, increasingly knowledgeable, well informed, and sophisticated customers. These forces supply chains to be more responsive, i.e. the contemporary supply chains are expected to respond or react rapidly, effectively and efficiently to changes in the marketplace so as to sustain, and furthermore to create competitive advantage. This paper presents the findings of research carried out to identify the factors influencing the supply chain responsiveness in the apparel sector of Sri Lanka.

Supply chain responsiveness literature is highly normative with research studies primarily being based on case studies (Holweg et. al, 2005). Reichhart and Holweg (2007) have stated that responsiveness has become one of the key themes in research in Supply Chain Management area. Even though much research has been conducted in various industries in different countries, for example in the textile and apparel industry in Hong Kong (Lam and Postle, 2006), firms from different industries in the USA (Gunasekaran et. al, 2008), manufacturing firms in North America (Handfield and Bechtel, 2002), fashion industry in the UK (Christopher et. al, 2004) and multiple sectors in the UK (Godsell et. al, 2006) hardly any research on supply chain responsiveness has been done in Sri Lanka. The apparel pipelines in the fashion industry have been notoriously long, complex and inflexible and the long buying cycles of these organizations have made them inappropriate for the demands of the modern fashion industry and the increasingly demanding fashion consumers (Čiarnienė and Vienažindienė, 2014). Therefore, SC responsiveness is very important

for firms in the apparel industry that are supplying garments to the very competitive and volatile fashion retail industry. After the liberalization of the economy in Sri Lanka in 1977, apparel became one of the most important sectors of the economy. According to Export Development Board (EDB) (2016) of Sri Lanka, the apparel industry possesses an impressive partnership portfolio which includes world renowned labels such as Victoria's Secret, Gap, Liz Claiborne, Next, Jones NewYork, Nike, Tommy Hilfiger, Pink, Triumph, Ann Taylor, Speedo, Abercrombie & Fitch, Land's End, Marks & Spencer and Intimissi. Nearly 60% of the industrial exports from Sri Lanka were apparel in 2015. Textile, Wearing Apparel and Leather products industry has attracted the largest foreign direct investment in manufacturing sector Sri Lanka. So in this context, this will be a significant research with a high practical value as well.

**Literature Review**

**Supply Chain Management**

The main concept of this research is supply chain management. Due to its interdisciplinary origin and evolutionary nature, there is no generally accepted definition of SCM in the literature (Feldmann and Muller, 2003). The Council of Supply Chain Management Professionals (CSCMP) (2004) defines SCM as "SCM encompasses the planning and management of all activities involved in sourcing and procurement, conversion, and all logistics management activities, including coordination and collaboration with suppliers, intermediaries, third-party service providers, and customers". According to Slack et al. (2013), "Supply chain management is the management of the interconnection of organisations that relate to each other through upstream and downstream linkages between the process that produce value to the ultimate consumer in the form of

products and services." Thus, the supply chain encompasses all activities involved in the production and delivery of a final product or service, from the supplier's supplier to the customer's customer.

**Supply Chain Responsiveness**

Supply chain responsiveness is defined as the capability of promptness and the degree to which the supply chain can address changes in customer demand (Prater et al., 2001; Lummus et. al, 2003; Duclos et. al, 2003; Holweg et. al, 2005). Reichhart and Holweg (2007) have concluded that responsiveness has different types, both in terms of the unit of change (product, volume, mix and delivery responsiveness) and in terms of the time horizon affected (short, medium or even long-term responsiveness). However, the concepts supply chain flexibility and supply chain responsiveness are not the same. Unclear separation of flexibility and responsiveness is a key shortcoming of existing definitions of responsiveness (Reichhart and Holweg, 2007). Supply chain flexibility refers to the ability of the supply chain to adapt to internal or external influences, whereas supply chain responsiveness is the ability of the supply chain to rapidly address changes and requests in the marketplace (Holweg et. al, 2005). Responsiveness should thus be considered as a concept that is solely customer focused, and its measurability depends on where the system boundaries are drawn and thereby on the definition of the system's customers. Gunasekaran et. al, (2008) provide a number of case studies of successful responsive supply chains (CEMEX, AT&T, Libbey Inc., Nissan and Wedgwood) based on data collected from the internet and from the literature. Findings of research carried out by Qrunfleh and Tarafdar (2013), revealed that supply chain responsiveness is associated with enhanced firm performance.

**Factors influencing the Supply Chain Responsiveness**

The objective of this research was to identify the factors influencing the supply chain responsiveness. Many types of research have been carried out to find the factors influencing the supply chain responsiveness in various industries in various countries. For example, Singh (2015) has identified 17 factors, some are process oriented, and some are result oriented, from the literature for analyzing SC responsiveness. These factors are top management commitment, strategy development, resource development, trust development, information sharing between SC members, risk and reward sharing, collaborative decision making, use of IT technology, co-ordinated SC, accurate forecasting of data, integrated inventory management, lead time reduction, agility of SC, agreed vision and goals, long-term relationship between SC members, availability of point of sales data and responsiveness in SC. Handfield and Bechtel (2002), have identified Human-specific asset investments, Site-specific asset investments, Contracts, Trust, and Buyer-dependence (on supplier) as variables that have an impact on supply chain responsiveness. Therefore, it is clear that as an initial step, different authors have identified different factors of SC responsiveness from different perspectives. Hence, the authors of the present research also adopted the same approach and factors identified by the other researchers were found from the literature. Table 01 shows the factors most commonly identified by various researchers.

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Table 01: Factors influencing Supply Chain Responsiveness in

Organizations: A literature survey

| Factor | Definitions | Literature |
|---|---|---|
| Organizational Factors | Factors related to the internal aspect of the organization, such as structure, vision, training, etc. | Arshinder and Deshmukh, 2007; Gowen and Tallon, 2003; Othman and Ghani, 2008; Mentzer et. al, 2001; Cousins and Menguc, 2006; Droge et. al, 2004. |
| Mutual Understanding | The level of understanding between organizational members as well as key suppliers and groups of interest. | Bianchi and Saleh, 2010; Ballou et. al, 2000; Mentzer et. al 2001; Droge et. al, 2004; Cousins and Menguc, 2006. |
| Flow of Information | The path data takes from its original setting to its end users. In an organization, the informational flow is the facts, ideas, data and opinions that are discussed throughout the company | Fawcett et. al, 2009; Lee, 2000; Cachon and Fisher, 2000; Mentzer et. al, 2001; Cousins and Menguc, 2006; Droge et. al, 2004; Minnich and Maier, 2006. |
| Relationships and Decision Making | Maintaining or building strong, healthy relationships with its key suppliers, customers and employees. The level of independence and power managers have in making supply chain decisions. | Mehrjerdi, 2009; Li et. al, 2008; Mentzer et. al 2001; Droge et. al, 2004; Minnich and Maier, 2006; Handfield and Bechtel, 2002 |

**Organizational Factors**

In supply chain management, a firm is effective in coordination when more emphasis is on developing its human resources/ employees through training (Gowen and Tallon, 2002). In order for the supply chains to be responsive, the goals and vision of supply chain members should not be

different; it should be a collective vision which every member of the organisation understands and one that can be easily communicated (Arshinder and Deshmukh, 2007).

Organizational culture has a significant influence on the management of a global supply chain for improved flexibility and responsiveness. McAfee et. al (2002) have discussed the effects of culture and human resource management policies on SCM strategies.

## Mutual Understanding

The trust between firms takes a key part in strategy formulation for the supply chain. It is something by which the cost of the supply chain can be reduced. Actually, it is mutual confidence which describes that no party exploit the other party. For the better flow of information, trust is a major factor. There will be a conflict of interest when individuals prefer their risk and rewards instead of risk and reward of the supply chain. Trust and supply chain member's commitment is very vital for increasing the performance of supply chain in the countries that are developing (Bianchi and Saleh, 2010).

## Flow of Information

Information sharing is usually achieved through the increased use of information technology or a closer integration between supply chain partners (Bagchi and Skjoett-Larsen, 2002). Various authors also take a more critical view of the extent to which information systems can solve supply chain problems and increase their responsiveness, pointing out that other inter-organizational aspects, such as trust (Minnich and Maier, 2006) and further process coordination and organizational integration (Lee,

2000). Bagchi and Skjoett-Larsen (2002) provide a concise overview of the most common characteristics of organizational integration which include joint design teams, process and quality teams, joint performance measurement and problem-solving, amongst others. According to Rich and Hines (1997), at the highest level of integration a company, i.e. an externally integrated company, integrates the supply base with the demands of the consumer in a transparent system of materials and information exchange and it seeks deliberately to manage the interfaces between companies to generate a flexible and responsive system of long-term collaboration.

**Relationships and Decision Making**

The term "relationships" covers a lot of ground in the supply chain management. There are strategic relationships, tactical relationships, transactional relationships, internal relationships, and possibly more. There are also relationships among members of the supply chain community (Ackerman and Bodegraven, 2007). The collaborative relationship is a mean of achieving the advantages of vertical integration without owning the means of production and facing the inherent risks of advances in technology or changes in the law. Ackerman and Bodegraven (2007) stated that there are limits to how many working relationships any company can effectively maintain. Still, it is important to maintain high trust, high communication, mutually beneficial relationships with key suppliers and customers, whether they are called partnerships or not.

Decision making is the frequency and impact of decisions made within the supply chain and their direct influence on firm performance. Supply chain management relies on real-time information flows at a number of different

levels to ensure optimal decision process efficiency and customer satisfaction (Clements et. al, 2006). Understanding the supply chain decision context is important in the current dynamic business environment as it facilitates joint management of supply chains which leads to competitive advantage (Mentzer, 1993).

According to the reviewed literature, it was apparent that there were various models and methods that can be used when attempting to measure the responsiveness of supply chains in the chosen industry. These models vary in degree of complexity, and the degree of qualitative and quantitative parameters that are used in the evaluation procedure.

**Methodology**

If the research starts with theory and designs a research strategy to test the theory, then the deductive approach is used. If the research starts by collecting data to explore a phenomenon and generate  or build theory, then the inductive approach is used (Saunders et al., 2016).  Since this research started by reviewing existing literature, it can be concluded that deductive approach was used in this research. Therefore, four independent variables; Organizational Factors, Mutual Understanding, Flow of Information and Relationship and Decision Making and a dependent variable; Supply Chain Responsiveness were identified from the reviewed literature as a prelude to developing a set of hypotheses to achieve the objectives of the research.

**Research hypotheses**

In order to achieve the objectives of the research, a set of hypotheses were developed based on the literature reviewed in the earlier section. For

example, in relation to the organizational factors, the following hypotheses were used.

Null hypothesis: There is no relationship between the level of organizational factors and the level of responsiveness of the supply chain in the Sri Lankan apparel sector.

Alternative hypothesis: There is a significant relationship between level of organizational factors and level of responsiveness of the supply chain in the Sri Lankan apparel sector

Similar kind of hypotheses was developed for the other three variables as well.

**Data collection and research instrument**

A quantitative study involving the administration of questionnaire was conducted in order to test the relationship between the identified variables. Different constructs to measure the variables were identified from the literature on past research. All the constructs selected for the study were measured through a 5-point Likert Scale. Altogether there were 52 statements in the questionnaire (See Table 02) in addition to few questions regarding information of the respondents such as experience and information regarding the company such as size and the products. In order to obtain a maximum response online as well as paper-based questionnaires were used for data collection. Lee and Lings (2008), recommends three steps to make an instrument more valid and useful. Firstly, get a colleague to look at the questionnaire and next test the questionnaire at the field by conducting few interviews. Finally, conduct a pilot study. Hence, the questionnaire was scrutinised by an academic who is familiar with the subject matter and a supply chain manager for

understanding and accuracy before being administered. Based on their feedback questionnaire was reviewed and modified.

**Sample**

According to Lee and Lings (2008), the probability sample is more often an ideal than a reality, and it is very common to use the non-probability sample in research carried out in the area of Social Sciences. According to them, the two criteria that need to be addressed in selectin a non-probability sample were whether the sample provides any data of interest in order to test the theory and whether the sample selected is systematically different from the variables or characteristics of the population. Even though Supply Chain Responsiveness may be important for any organization, the selected variables are not much relevant for small organizations. Therefore, forty large apparel manufacturers, where more than a thousand workers are employed were contacted personally to inquire their willingness to participate in the survey. Among them, only 37 companies were willing to participate in the survey. Since the unit of analysis was the factory; one questionnaire was filled by a senior manager who is responsible for supply chain on behalf of each organization.

**Data analysis**

Twenty five respondents filled questionnaire through Google Forms and 12 respondents returned the printed questionnaires. However, 4 questionnaires were not used for analysis because they were incomplete. Finally, only 33 responses were used for the analysis. Even though the sample size seems small, when considering the fact that there are only 71 members of the Sri Lanka Apparel Exporters Association, this is fairly a representative number. SPSS statistical software was used to analyse the

data. Correlation and partial correlation were the main statistical techniques used for analysis.

Analysis of the work experience of the respondents revealed that 4 (12%) of them have experience between 1 – 5 years, 21 (64%) have experience between 6 – 10 and 8 (24%) of them have more than 10 years' experience. By considering this distribution, it can be safely assumed that respondents have answered the questions with a good understanding and hence the responses are trustworthy.

**Test of Reliability**

According to Tavakol and Dennick (2011), Cronbach's Alpha provides a measure of the internal consistency of a test or scale. Internal consistency should be determined before a test can be employed for research or examination purposes to ensure validity. According to them, there are different reports about the acceptability of alpha ranging from 0.70 to 0.95. Since all alpha values for the dimensions used in the questionnaire of the present research are between .750 and .891, the reliability of the research instrument can be regarded as good.

Table 02: Test of Reliability

| Dimensions | Number of Items | Cronbach's Alpha |
|---|---|---|
| Supply Chain Responsiveness | 12 | .807` |
| Organizational Factors | 12 | .826 |
| Mutual Understanding | 6 | .854 |
| Flow of information | 9 | .750 |
| Relationships & Decision Making | 12 | .891 |

**Test of Hypotheses**

Correlation analysis was employed to test the hypothesis. According to Field (2009), whether to test the correlation is significant, the sampling distribution has to be normally disturbed. Contemporary literature suggests that Shapiro-Wilk is a better test than Kolmogorov-Smirnov test for testing normality (for example Razali and Wah, 2011; Saculinggan and Balase, 2013) and even Ghasemi and Zahediasl (2102) argue that K-S test, should no longer be used owing to its low power of testing normality. Shapiro- Wilk test results carried out on each of the variables of the present research given in Table 03 show that all the variables are normally distributed.

Table 03: Tests of Normality

|  | Shapiro-Wilk | | |
| --- | --- | --- | --- |
|  | Statistic | df | Sig. |
| Supply Chain Responsiveness | .959 | 33 | .244 |
| Organizational Factors | .960 | 33 | .251 |
| Mutual Understanding | .966 | 33 | .369 |
| Flow of information | .968 | 33 | .418 |
| Relationship and Decision Making | .976 | 33 | .648 |

In the next step, the correlation among the Responsiveness and other variables were found and the results are shown in Table 04. These results do not support any of the null hypotheses mentioned above. Therefore it can be concluded that level of Responsiveness in the Supply Chain has positive relationships with a level of Organizational Factors, Mutual Understanding, Flow of Information and Relationship and Decision Making.

Table 04: Test of Correlation among variables

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

| | | Responsiveness | Organizational Factors | Mutual Understanding | Flow of Information | Relationship and Decision Making |
|---|---|---|---|---|---|---|
| Responsiveness | Pearson Correlation | 1 | .544** | .631** | .584** | .477** |
| | Sig. (2-tailed) | | .001 | .000 | .000 | .005 |
| Organizational Factors | Pearson Correlation | | 1 | .824** | .568** | .746** |
| | Sig. (2-tailed) | | | .000 | .001 | .000 |
| Mutual Understanding | Pearson Correlation | | | 1 | .610** | .575** |
| | Sig. (2-tailed) | | | | .000 | .000 |
| Flow of Information | Pearson Correlation | | | | 1 | .647** |
| | Sig. (2-tailed) | | | | | .000 |
| Relationship and Decision Making | Pearson Correlation | | | | | 1 |
| | Sig. (2-tailed) | | | | | |

However, a different picture emerges when the partial correlations are considered. According to Field (2009), a correlation between two variables in which the effects of other variables held constant is known as a partial correlation. The objective of finding partial correlation was to examine the direct effect of each individual variable on the level of responsiveness in the absence of other variables.   The partial correlations between the level

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of responsiveness and each of the other variables, while the rest of the variables are made constant, are given in Table 05.

Table 05: Partial Correlation between Responsiveness and other variables

| Variable | Pearson Correlation | Sig (2-tailed) |
|---|---|---|
| Organizational Factors | -0.018 | .927 |
| Mutual Understanding | .301 | .000 |
| Flow of Information | .270 | .149 |
| Relationship and Decision Making | .041 | .831 |

According to values given in Table 05 only Mutual Understanding shows a significant correlation when the other variables are made constant. i.e. when the impact of other variables is removed only the Mutual Understanding shows a significant correlation with Supply Chain Responsiveness.

**Discussion**

Findings of the present research support all the research hypotheses developed based on the literature and presented in section 3 above. The findings revealed that the Supply Chain Responsiveness is highly correlated to Organizational Factors, Mutual Understanding, Flow of Information and Relationship and Decision Making. Therefore, the findings of the present research also confirm the previous literature given in section 2.

Further, the analysis revealed that strong correlations exist among the dependent variables as well. i. e. dependent variables are related to each

other. This confirms some of the previous research findings. For example, according to Bianchi and Saleh (2010), for better flow of information, trust is a major factor, and according to Clements et. al (2006), supply chain management relies on real-time information flows at a number of different levels to ensure optimal decision-making process. Further analysis of partial correlations revealed that except Mutual Understanding other three dependent variables have no significant correlation with Supply Chain Responsiveness on its own. Therefore, it can be inferred that only when all except Mutual Understanding, the factors are taken together they have correlations with Supply Chain Responsiveness but not individually. This finding is in line with the findings of a previous research as well. In a research done by using three case studies from automotive and electronics industry Holweg (2005) found that dimensions of responsiveness interdependent. He argues that excelling in one dimension of responsiveness is not useful if that is not aligned to the other dimensions. Even though the dimensions of responsiveness identified by Holweg (2015) are different from the dimensions used in the present research, the similarity of interdependence is comparable.

The practical importance of the findings of the research is that the mentioned factors have a combined effect on Supply Chain Responsiveness. But only the Mutual Understanding has an effect on Supply Chain Responsiveness as an individual variable. Previous researches also have shown that Mutual understanding factors such as understanding between suppliers, customers and employees have a positive effect on supply chain and supply chain responsiveness (Fawcett et. al, 2001; Mentzer et al., 2001; Droge et al., 2004; Cousins and Menguc, 2006; Das et al., 2006).

**Implications for the Apparel Industry**

After an extensive literature review, Reichhart and Holweg (2007) have identified the external requirements and internal determinants of supply chain responsiveness. The external requirements they have found, Demand Uncertainty, Demand Variability, Product Variety, Lead Time Compression and Demand Volatility and Seasonality exactly match with the characteristics of the apparel industry. Further, as per Hum and Parlar (2014), time-based supply chain responsiveness is very important to organization work in a make-to-order (or assemble-to-order) environment that has a supply chain with different tired suppliers that are based in different geographical locations and the lead times are different in each element of the supply chain. The characteristics that are mentioned by these authors also match with the apparel industry. Therefore, supply chain responsiveness is particularly important for the apparel industry. According to Central Bank of Sri Lanka (2015), apparel industry accounts for 43.4% of the total exports and 58.17% of the industrial exports from Sri Lanka. Fashion markets are synonymous with rapid change and, as a result, commercial success or failure in those markets is largely determined by the organization's flexibility and responsiveness (Christopher et. al, 2004). Therefore, the managers of the apparel industry may use the findings of this study to improve the responsiveness of their organizations. There are two main implications for managers. Firstly, an increase of the level of Mutual Understanding among supply chain members will lead to higher level of Supply Chain Responsiveness. Secondly, in the case of organizational factors, flow of information, mutual understanding  and relationship and decision making, they are to be implemented together in order to improve the level of supply chain

responsiveness as they have a combined effect on Supply Chain Responsiveness

**Limitations and further research**

There are several limitations to the present study. Only the managers' perceptions were measured in this study. It was one of the limitations. Secondly, in the present research, only four factors were selected from the literature to test the impact on responsiveness. But there may be other factors such as top management commitment, for example, Talib and Hamid (2014). The present research was basically a quantitative research. If interviews were held with supply chain managers, i.e. a qualitative study was also added, a better perspective would have been received. The present research was limited to the apparel sector. This research can be extended to other emerging manufacturing sectors as well.

**Conclusion**

The objective of this research was to identify the factors influencing the supply chain responsiveness in the appeal industry of Sri Lanka. Organizational Factors, Mutual Understanding, Flow of Information and Relationship and Decision Making were identified from the previous literature as factors influencing the responsiveness of the supply chain. The findings of the present research confirm the findings of the previous research given in the existing literature. However, the important finding to note is that except mutual understanding others do not have correlations with Supply Chain Responsiveness individually. All the factors have a combined effect on the Supply Chain Responsiveness. Therefore, in order to make their supply chain responsive, managers of the apparel sector must adopt all the identified factors in combination rather than in isolation.

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