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Association Between Sourcing Issues And Logistics Performance Variables In Apparel Exports: An Empirical Analysis Of Sourcing Intermediaries

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ASSOCIATION BETWEEN SOURCING ISSUES AND LOGISTICS PERFORMANCE VARIABLES IN APPAREL EXPORTS: AN EMPIRICAL ANALYSIS OF SOURCING INTERMEDIARIES

Pinaki Dasgupta*
Anupama Gupta**

Abstract

The purpose of this paper is to investigate the relationship of apparel sourcing issues and logistics performance variables of apparel exports from India. Cross sectional data has been collected and correlation technique is used to analyze the data set from a pilot study conducted amongst sourcing heads of 37 companies located in Delhi and NCR. Questionnaire used for the study and the scales are based on the study conducted by Ruamsook et al (2007). Data acquired electronically showcased that International sourcing issues, information system capability and communication infrastructure have been rated with least satisfaction scores by sourcing intermediaries. Among nine logistics performance variables, on time receipt and cycle time consistency scored lowest on the satisfaction rating. These two identified time related logistics performance variables are closely associated with information system capability and communication infrastructure variables. Product quality and production capability are more strongly associated with logistics performance variables than other three international sourcing issues. The survey data and analysis focused on apparel sourcing intermediaries based in national capital region (NCR), India. This research will help to understand that how sourcing intermediaries, who locally represent international apparel buyers, perceive about the existing sourcing issues in doing business with garment manufacturing houses and how these sourcing issues are correlated with logistics performance variables.

JEL Classification: M10, M16.

Keywords: Apparel exports, Sourcing intermediaries, International Sourcing Issues, Logistics Performance Variables

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1. Introduction

Apparel is one of the oldest and largest export industries in the world. Most nations produce for the international textile and apparel market making this one of the most global of all industries (Gereffi, 1999). It is the typical 'starter' industry for countries engaged in export-oriented industrialization and it played a leading role in many developing economies like India.

As per International Trade Statistics 2010 of WTO India ranked 21st in world merchandise trade with value of exports 163 billion dollars and India's clothing exports shared 5% of world clothing exports in 2009 with increase of 1% from 2005. India's textile and clothing industry is one of the largest contributing sectors of India's exports. As per annual report of ministry of textiles (2010-2011), government of India this industry accounts for 14% of industrial production, which is 4% of GDP; employs 35 million people and accounts for nearly 12% share of the country's total exports basket. Readymade Garments account for almost 45% of the total textiles exports. EU countries, USA & UAE are the biggest buyers of Indian garment exports along with many other countries like South Africa, Brazil, Australia, etc. But India hasn't been able to tap the full growth potential of this trade and its share of world garment exports have experienced decline during the last decade. It was predicted that after quota regime China, and to a lesser extent India, would acquire major share in US and EU markets. This largely proved true for China, though not for India. Indian garment exports haven't been able to touch the post quota growth projections whereas other Asian countries like Vietnam, Cambodia and Bangladesh have performed well. High power and transaction cost, increased cost of raw material, labour and other input costs are affecting the profitability of garment units in India. Moreover financial sector melt down and economic slowdown in international markets also hit garment exports in last few years. Along with many challenges mentioned, textile ministry annual report also highlighted about various constraints of infrastructure and technology.

Infrastructure and technology are key drivers of apparel export supply chain. From product development process till the delivery of goods overseas, infrastructure and technology has a crucial role to play at every stage of apparel export order. International buyers, apparel manufacturers, intermediaries and logistics service providers manage all stages of supply chain and face many sourcing issues related to product sampling, production, lead time, quality, inventory, transportation etc. Majority of apparel business runs on indirect exporting mode. Since apparel buyers are placed overseas, they have sourcing intermediaries in export zone to manage day to day apparel export business in coordination with apparel manufacturing units.

2. Background to the study

Apparel business is governed by fashion. Fashion is a broad term that typically encompasses any product or market where there is an element of style that is likely to

be short-lived. Fashion apparel business is planned annually under many seasons and sub seasons and product attributes and aesthetics keep on changing. Fashion markets typically exhibit the characteristics like short life cycles, high volatility, low predictability and high impulse purchasing (Christopher et al, 2004).

There are three critical lead-times that must be managed by fashion retail organizations that seek to compete successfully in fashion markets:

(i) time-to-market,

(ii) time-to-serve,

(iii) time-to-react

Fast fashion is relatively new business concept wherein the time lines are shrinking more and global sourcing is becoming more challenging (Christopher et al, 2004; Barnes and Greenwood, 2006; Doyle et al, 2006). The apparel industry is a prototypical buyer-driven commodity chain because it generates a highly aggressive pattern of global sourcing through a variety of organizational channels, including giant cost-driven discount chains (Wal-Mart, Kmart, or Target), upscale branded marketers (Liz Claiborne, Tommy Hilfiger, Nautica), apparel specialty stores (The Limited, The Gap), and burgeoning private label programs among mass merchandise retailers (JC Penney, Sears). Buyer-driven commodity chains are characterized by highly competitive, locally owned, and globally dispersed production systems. Profits in buyer-driven chains derive from unique combinations of high-value research, design, sales, marketing and financial services that allow the retailers, branded marketers and branded manufacturers to act as strategic brokers in linking overseas factories with evolving product niches in the main consumer markets (Gereffi,1999).

Apparel supply chain structure is indeed complex and results in long buying cycles. In the fashion industry, apparel pipelines have been notoriously long, complex and inflexible (Barnes and Greenwood, 2006; Johnson, 2002). Getting the right information to the right people at the right time is the biggest challenge. Equally important is visibility to the entire product and sourcing team with a documented history of product changes. The flow chart below (Fig.1) explains the apparel export supply chain where the major links are, Retailers and Brand Owners, Wholesalers or Distributors, Sourcing Intermediaries, Raw Material Suppliers and Apparel Manufacturing Export Houses. Most of the big retailers and brand owners source directly through intermediaries and in that case wholesalers and distributors do not come in picture, thus making sourcing decisions in global apparel market a challenging task. Generally the export orders have bulk quantities and smooth execution of orders becomes a daunting task. Selection of right supplier in terms of production capabilities, working environment, etc. is not easy. Due to factors including language and custom barriers, communications hurdles, and the sheer number of producers scattered across the world it forces retailers to rely on sourcing intermediaries to manage export orders (Christerson & Appelbaum,1995; Garg, 2002; Abernathy, Volpe & Weil, 2005)

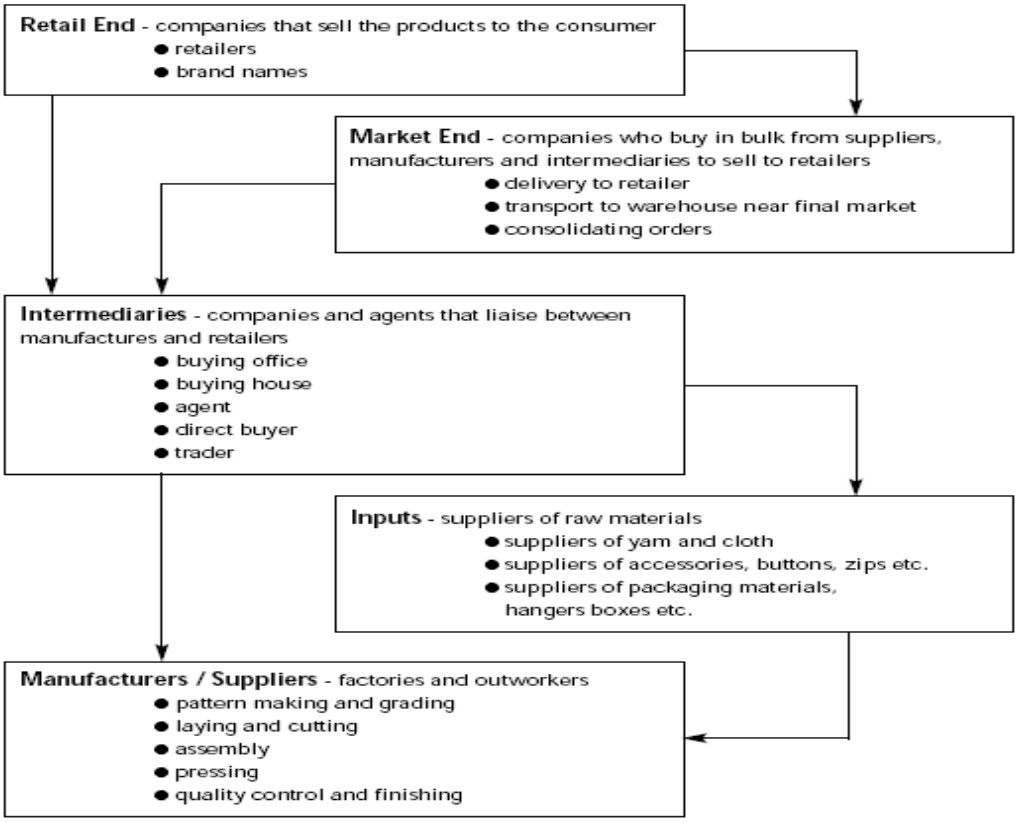

Fig. 1: Five stages of participation in a Garment Industry Supply Chain[1]

Apparel export supply chain starts when retailer/brand wants to source offshore due to various reasons. A retailer/brand sends a sample garment to either an intermediary or a manufacturer. The manufacturer supplies a copy of the sample and a price quote. If the retailer/brand name's design and sourcing team approve of the cost, time, quality, quantity and delivery - an order is placed. Many times manufacturers bag order on their own product developments which they showcase to the buyers in international fairs, visits, etc. Once order is placed, it is the manufacturer who sources the right material to make a good sample. The manufacturer may decide to finish all the work in the factory, or to subcontract parts of the order to smaller manufacturers further down the chain. These smaller manufacturers may also decide to subcontract part of the order to other manufacturers or homeworkers.

Quality control process ensures expected level of quality and checks on the technical specifications instruct. The retailers/brands want to ensure the quality level and also do inspection at production and post-production stage through intermediaries. This is because the retailer/brand name does not want to be stuck with bad merchandise even if they have the right to send it back (Hurley et al, 2003).

When intermediaries give go ahead to the ready garment shipment then the further process of transportation is organised so that shipment reaches destinations at right

[1]Source- Action Research on Garment Industry Supply Chains Women Working Worldwide, www. cleanclothes.org/ftp/03-www-action_Research.pdf

time. Arrival of cargo to the distribution warehouses; at right time without any damage is also a challenging task. Apparel supply chain activities require an efficient coordination between buyers, manufacturers and sourcing intermediaries.

The sourcing intermediaries are of various kinds and they play an important role in international trade. They enhance the productivity of host economies, improve efficiency of distribution, open up new markets, provide marketing technology, credit, managerial training and minimize costs incurred in overcoming barriers to trade. At the firm level, they speed up the flow of information in the supply chain and improve communication between buyer and seller (Fig. 2). They coordinate the flow of materials and resources between customers and suppliers. Intermediaries help clients search for new opportunities to trade, new sources of products, new materials and design, new ways in which supply and demand can be integrated.

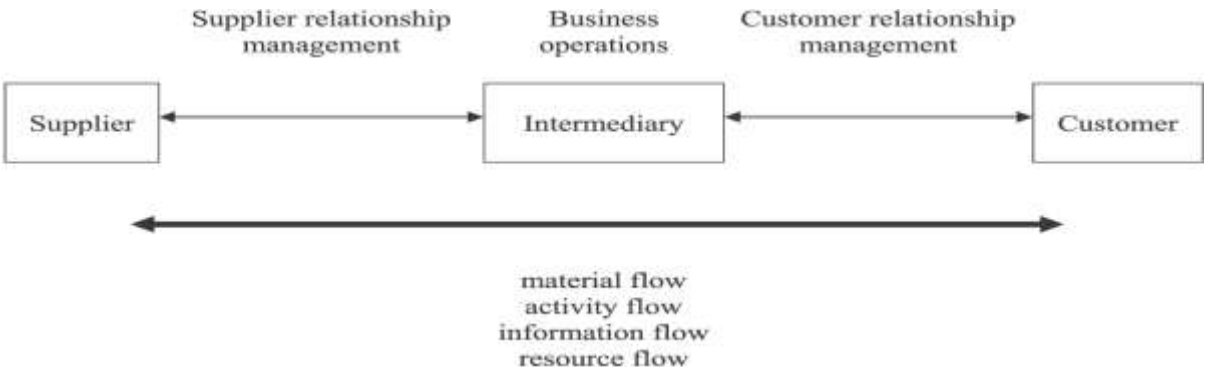

Fig. 2: The basic unit in the supply chain (Fung et al, 2007)

Their main responsibilities are to communicate between buyer and supplier, problem solving, identification of suitable suppliers, expansion of supplier base, supplier quality control, execution of export orders (sampling, production and transportation) with desired quality and service levels, lead time management, product development assistance to buyers, assistance to suppliers in raw material sourcing, etc). Raw material sourcing may or may not happen through sourcing intermediaries. Sourcing agents/offices have many expertises like apparel niche technical knowledge, awareness of cultural differences, political and economic trends and issues. Network production contacts for various apparel product categories and abilities to ensure that the flow of production is moving and evolving with changing market demands and dynamic political arenas. These functions are especially critical in international sourcing where buyers and sellers are separated by geographical and cultural distances. (Fung et al, 2007; Hurley et al, 2003; Cook, 2004; Cao et al, 2008)

By employing international sourcing, firms have been able to reduce costs, improve quality, and become more flexible and innovative. The lowering of trade barriers has encouraged this procurement alternative (Fraering & Prasad, 1999). Where price is a motivating factor to source from low cost countries, quality of the product on the other hand may also become an issue. There are many other existing challenges and risk in

global sourcing which includes transportation delays, the lack of technology and capacity of foreign sources, the lack of proper inventory management, cultural and language differences, foreign exchange rate fluctuations, duty/customs regulations, trade regulations, lack of knowledge of foreign business practices, nationalism and political and economic stability. These challenges and risk in global sourcing can be categorized into Logistic support, quality and reliability, cultural differences and regulations (Cho & Kang, 2000; Teng & Jaramillo, 2005).

Many researchers and reports have contributed work on global sourcing challenges which are compiled by Ruamsook et al, 2009. The global sourcing challenges identified by various researchers are Transportation and logistics cost, Delivery performance, Logistics infrastructure, Local logistics Industry competence, Business environment, Manufacturing and supplier capability, communication network and information technology.

The main contributions of information technology are to improve company's ability to gain visibility in its own systems and make capturing, analyzing and sharing information much easier. Information technology and electronic communication infrastructure help manufacturers to manage apparel supply chain activities much more efficiently by using technology like of RFID, EDI, ERP, telecommunications (Froza & Vinelli, 2000; Chandra and Kumar,2000; Byoungho Jin,2006; Froza & Vinelli ,1997; Johnson, 2002; Gamage,2006; Kumar and Arbi,2007; Mossinkoff and Stockert,2007;Moon and Ngai,2008). The speed, cost, accuracy, and reliability of advanced technology have raised buyer's expectation for high responsiveness and greater visibility. Manufacturing and supplier capability indicates towards the production efficiency to make right product in right time and quantity with right specifications. Business environment entails local laws, cultures and norms, political stability, currency exchange rate fluctuation, and domestic market nationalism.(Ruamsook et al,2009; Cho & Kang,2000) These factors may affect the lead time, cost and quality of the product to a great extent.

The logistical challenges currently faced by the entire international apparel industry include poor quality of physical infrastructure services such as road, rail, waterways, port services, and interfaces, policy and institutional constraints—such as procedural red tape, inadequate enforcement of contracts, poor definition and enforcement of rules of engagement, delays in customs, delays at ports and border crossings, pilferage in transit, and highly restrictive protocols on movement of cargo (Subramaniam & Arnold, 2001; Nuruzzaman & Haque, (2009); Hasan & Alim (2010). The delivery date is often not met for a number of reasons, such as the lack of container trucks, overloading, rough handling of freight, defective containers, discrepancy of standards as well as a lack of understanding between shippers and logistics providers. Sometimes traffic restrictions that ban heavy vehicles from entering major cities, regulatory restrictions and local protection regulations, lack of well-trained local work force (Lanfeng Yu, 2011) are major hindrances too. Logistics inefficiencies harm the competitiveness of private firms through their effects on both cost and time. The costs relate not only to the direct costs of transporting products but also goods in transit incur indirect costs such as inventory holding costs. The longer the transit time, the higher are the costs. Other

indirect costs are incurred when delivery times and reliability are uncompetitive, severely affecting a country's position in highly competitive international markets demanding just-in-time delivery (Hausman et al, 2005).

In spite of all existing challenges manufacturing off-shoring to Low Cost Countries is a well-established trend and is expected to touch US$4,000-US$4,500 billion by 2015. (CII- McKinsey, 2004). The increased need for global competitiveness is driving many firms, particularly those in fashion industries, to identify and establish relationships with suppliers in low-cost-countries (Bowersox, Closs & Cooper 2010). Price being one the prime reasons to source products from Low cost countries(LCCs) like India, Mexico, other Latin American and East European countries (Eye for procurement, 2006 ; Ruamsook et al, 2009).

3. India's challenges in Logistical and Sourcing Issues

India has always been a very important sourcing destination for international buyers. The buyers always look forward to the diversified designs and products India can offer but they have many common challenges while doing business with Indian suppliers like (Singh Kamlesh, 2008; Verma 2002):

(a) logistical challenges in terms of transport, lead time, and infrastructure,

(b) use of out dated equipment and technology

(c) unsatisfactory product quality

(d) less competitive price structure due to economic growth

(e) different business culture

However, these challenges do not deter buyers to do business with Indian suppliers but certainly it affects the perception of buyers and may hamper long term business relationship. Efficient order processing can help suppliers to improve lead time (Kumar and Arabi, 2007). John Thoburn in his working paper (UNIDO, 2009) mentioned that buyers interviewed in Hong Kong, the global hub for Asian garment sourcing, in 2008 and 2009 have conflicting views on India, some very pessimistic, others seeing future potential.

It was argued that Indian suppliers, unlike the Chinese, do not understand the need to keep to schedules- *"an old industry, but hopelessly organised!".* Another buyer, more hopeful about India's potential, felt these problems could be overcome, but spoke of Indian companies often being too willing to take chances, and failing to realize the consequences of not filling orders properly. On the more positive side, this buyer noted that good Indian firms could effectively copy Chinese designs, but China could not copy the soft fashion garments made by India that sold successfully in the EU.

India ranked 47th amongst 155 countries under Logistics Performance Index (LPI) of 2010 (Connecting to Compete 2010, Arvis et al) and spends 13 per cent of GDP on logistics. There is huge scope of improvements in transport infrastructure, information

technology, telecommunication and energy production to match with trade growth (Sahay et al, 2003; McKinsey, 2010). The supply chain in India is extremely fragmented mainly due to the government policies and lack of coordination between industry and relevant trade bodies (NCAER Report, July 2009).

Ramachandran, 2001; Shetty, 2001; Samar Verma, 2002; Sahay et al, 2003; Chandra & Jain, 2007 have cited supply chain and logistics challenges related to infrastructure, transportation, regulatory issues, etc. Ray, 2005 and Wu & Lin, 2008 have focused on challenges of Indian sea ports. Ng & Gujar, 2009 have highlighted issues of dry ports. Sawhney and Sumukadas, 2005 have focused on issues of regulatory procedures with custom clearance.

Sourcing intermediaries who are involved in apparel exports face the effect of these infrastructural impediments in their day to day business along with other international sourcing challenges. The present study is an outcome of primary study conducted on these sourcing intermediaries keeping these challenges of International Sourcing and Logistics Performance Variables into account. It is directed towards analyzing the perception of these sourcing intermediaries on international sourcing challenges and logistics performance variables. The outcome of the study will provide insights at ground zero on some of the challenges faced on the two issues cited specifically and how a clear road map can be proposed for the Indian Apparel Industry to plan better for competing in the international markets.

4. Approach to the study

A descriptive research was undertaken to assess the perception of apparel sourcing intermediaries in terms of their satisfaction level towards various international sourcing challenges and logistics performance in apparel exports. A study by Ruamsook et al had identified 14 operational indicators which were sub classified into international sourcing issues and indicators of logistics performance. Five of these issues classified under the head of international sourcing were further sub-categorized as product, situation and process related. Ruamsook et al clarifies in the study that the list may not be exhaustive, however presents a substantial overview amongst the body of work done within the purview of international sourcing literature. The remaining nine logistics performance variables are sub-categorized under cost, quality and time related factors. These nine indicators are mentioned in Coyle et al (2009, pp. 118-129), were drawn from a survey-based book by Keebler et al. (1999).

The 14 indicators sub-classified under the International Sourcing Issues and Logistics Performance Variables are:

International sourcing issues -

I. Product quality (product related)
II. Production capability (process related)
III. Information system capability (process related)
IV. Business culture and practices(situation related)

V. Communication infrastructure(situation related)

Logistics performance variables-

I. On-time receipt (time)
II. Cycle-time consistency (time)
III. Cycle-time length (time)
IV. Accurate quantity and selection (quality)
V. Accurate invoice (quality)
VI. Delivery damage (quality)
VII. Safety stock levels (cost)
VIII. Product price (cost)
IX. Transportation costs (cost)

5. Research Methodology

Each of these fourteen indicators was measured for a satisfaction level of respondents on a seven-point Likert scale of satisfaction (7- highly satisfied; 1- highly dissatisfied). The questionnaire employed in the study by Ruamsook et al was taken as the base for preparation of tool for data collection. A mail based survey was employed to collect responses from the proposed sample (refer to Annexure A for the questionnaire). It was also proposed that the study will be conducted as a pilot in Delhi & NCR region of the country and based on the response received can be expanded across to the other major apparel sourcing hubs of the country like Bangalore, Chennai and Ludhiana. The outcome of the study as discussed in the ensuing pages is therefore, the output of the pilot employed across the Delhi and the NCR region.

5. i. Data collection: Sample Size and Profile

A total of 65 sourcing firms located in Delhi and NCR region were identified through the list obtained from AEPC (Apparel Export Promotion Council). The questionnaire was mailed to the sourcing heads of these 65 firms identified. The respondents were typically holding following positions:

(i) Country Head

(ii) Managing Director

(iii) Divisional Merchandise Manager

(iv) And Senior Merchandise Manager

All the respondents carried an average work experience of 15+ years and were experienced professionals having holistic knowledge of all work area verticals, particularly sourcing. The responses were received during the period of 45 days with 3 reminder mails. A total of 37 questionnaires were mailed back, resulting in an approximately 57 percent response rate. The 37 returned questionnaires were further screened, 3 of which were excluded from analysis as they were incomplete:

5. ii. Data Analysis

To analyze the collected data descriptive and inferential statistical tools have been used. The nine parameters were evaluated on a seven point scale, where 1 stood for highly dissatisfied to 7, which implied highly satisfied. Mean scores represented that following parameters amongst the sample were areas of concern:

(i) Information system capability

(ii) On-time receipt and

(iii) Communication infrastructure

The mean scores for them were between 3.5 and 4, indicating lower satisfaction levels. However, variables like Product quality and Accurate quantity and selection had higher mean scores, indicating greater degree of satisfaction. The mean value of ratings and their standard deviation is showcased in Table 1 below. Particularly, Information system capability has lower Standard Deviation scores, indicating greater degree of responsiveness regarding dissatisfaction about the sourcing issues that plague the sector.

Table 1: Mean and Standard Deviation for the International Sourcing Issues & Logistics Performance Variables

S.No.	Variables	Mean	Standard Deviation	N
1	Product quality	4.91	1.083	34
2	Communication infrastructure	3.97	1.193	34
3	Information system capability	3.71	.970	34
4	Production capability	4.26	1.136	34
5	Business culture and practices	4.18	1.218	34
6	On-time receipt	3.85	1.234	34
7	Cycle-time length	4.15	1.258	34
8	Cycle-time consistency	4.06	1.254	34
9	Accurate quantity and selection	4.91	1.288	34
10	Delivery damage	4.76	1.281	34
11	Accurate invoice	4.68	1.319	34
12	Product price	4.21	1.008	34
13	Safety stock levels	4.18	1.218	34
14	Transportation costs	4.24	1.415	34

All the nine Logistics performance variables have been categorized into three groups, namely time, quality and cost. Each of the sub-categorized variables then were tested for satisfaction scores using ANOVA technique to check whether they are independent or not (Malhotra and Dash 2010).

Hence, the variables, listed below along with the sub-category were tested.

1. Time:
    a. On-time receipt
    b. Cycle-time length and
    c. Cycle-time
2. Quality
    a. Accurate quantity and selection
    b. Accurate invoice
    c. Delivery damage
3. Cost
    a. Safety stock
    b. Product price
    c. Transportation costs

Table 2: The result of ANOVA for time related logistics performance variable

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	1.549019608	2	0.77451	0.496571429	0.610121463	3.088239626
Within Groups	154.4117647	99	1.559715			
Total	155.9607843	101				

The P value of the result is 0.61 which is higher than 0.05 and hence ANOVA result shows that the satisfaction scores of these three time related performance variables are not independent of each other.

Table 3: The result of ANOVA for quality related logistics performance variable

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	0.960784	2	0.480392	0.285992	0.751887	3.08824
Within Groups	166.2941	99	1.679739			
Total	167.2549	101				

The P value of the result is 0.751 which is higher than 0.05 and hence ANOVA result shows that the satisfaction scores of these three quality related performance variables are not independent of each other.

Table 4: The result of ANOVA for cost related logistics performance variable

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	0.058824	2	0.029412	0.019592	0.980602	3.08824
Within Groups	148.6176	99	1.501188			
Total	148.6765	101				

The P value of the result is 0.98 which is higher than 0.05 and hence ANOVA result shows that the satisfaction scores of these three cost related performance variables are not independent of each other.

Path Analysis (using SEM) has been used as a confirmatory analysis process for the nine factors chosen (refer to Annexure B for detailed results on Path Analysis) prior to the factor analysis.

Since category wise satisfaction scores of logistics performance variables are not independent of each other hence factor analysis technique has been used to calculate factor scores of time, quality and cost related logistics performance variables. Initial eigen values for time, quality and cost factors are mentioned below in Table 5, 6 & 7.

Table 5: For Time Factor, components are On-time receipt, Cycle-time length and Cycle-time

Total Variance Explained

Component	Initial Eigen values			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.272	75.718	75.718	2.272	75.718	75.718
2	0.529	17.632	93.350			
3	0.199	6.650	100.000			

Extraction Method: Principal Component Analysis.

Table 6: For Quality Factor, components are accurate quantity and selection, accurate invoice, delivery damage

Total Variance Explained

Component	Initial Eigen values			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.075	69.162	69.162	2.075	69.162	69.162
2	0.616	20.533	89.695			
3	0.309	10.305	100.000			

Extraction Method: Principal Component Analysis.

Table 7: For Cost Factor, components are Safety stock, Product price, Transportation costs

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.215	73.820	73.820	2.215	73.820	73.820
2	0.608	20.270	94.090			
3	0.177	5.910	100.000			

Further, Bivariate correlation analysis has been used amongst three calculated factors of logistics performance variables (time, cost and quality) and five variables of international sourcing issues as listed below in Table 8.

Table 8: Correlation amongst the 14 variables under International Sourcing Issues and Logistics Performance Variables

	International Sourcing Issues					Logistics Performance Variables		
	Product Quality	**Communication Infrastructure**	**Information system capability**	**Production capability**	**Business culture and practices**	**Time Factor**	**Quality Factor**	**Cost Factor**
Product Quality	1	.514**	.494**	.684**	.540**	.677**	.495**	.573**
Communication Infrastructure	.514**	1	.568**	.609**	.442**	.580**	.461**	0.168
Information system capability	.494**	.568**	1	.485**	.404*	.526**	.461**	.425*
Production capability	.684**	.609**	.485**	1	.732**	.782**	.683**	.554**
Business culture and practices	.540**	.442**	.404*	.732**	1	.529**	.560**	.476**
Time Factor	.677**	.580**	.526**	.782**	.529**	1	.734**	.628**
Quality Factor	.495**	.461**	.461**	.683**	.560**	.734**	1	.633**
Cost Factor	.573**	0.168	.425*	.554**	.476**	.628**	.633**	1

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

*. Correlation is significant at the 0.05 level (2-tailed).

6. Findings from the study

It has been found that time related logistics performance factor is highly correlated with product quality and production capability. It is also correlated with communication infrastructure but not strongly correlated with information system capability. Quality related logistics performance factor is highly correlated with production capability and cost related logistics performance factor is correlated with product quality. All three logistics performance factors are highly correlated among themselves. From the above mentioned average satisfaction score gap it can be interpreted that the top two international sourcing issues where sourcing intermediaries are facing more challenges are:

I. Information system capability
II. Communication infrastructure

Both these issues which are a part of the International sourcing issues have weak correlation with logistics performance.

Product quality and Production capability are more strongly associated with logistics performance factors than other three international sourcing issues, namely Communication infrastructure, Information system capability and Business culture practices. This is representation of the fact that most sourcing companies are emphasizing on the aspect of quality and capability of the product and production that is integral to the entire outsourcing process. Information system capability and communication infrastructure have been rated with least satisfaction scores by sourcing intermediaries and both of these are not showing strong correlation with any logistics performance factors. However, this being a pilot with limited sample response, further research work is required to validate this finding.

7. Limitations and directions for future research

This study is perception based and relational. In future study causal links may be established and other variables may be found out which mediate or moderate the relationships between international sourcing issues and logistics performance variables with larger data set.

This scope of the study can be further extended to apparel manufacturing export houses and other stake holders of apparel export logistics business with modifications to find and analyze their experiences and views. In the long run the industry stakeholders as listed below in Figure 3 can also be covered to get a 360^0 degree perspective on logistics issues and outsourcing issues that remain essential to the core.

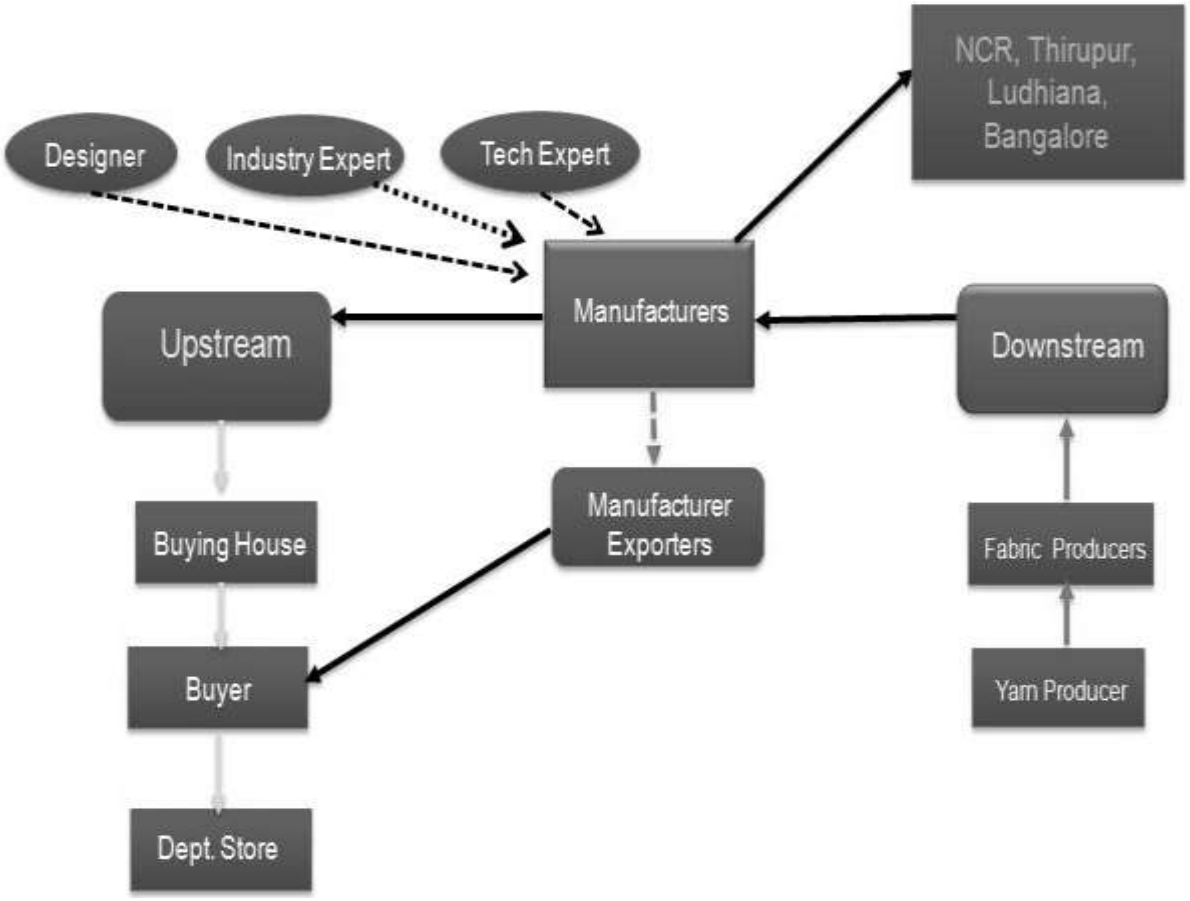

Fig. 3: Industry stakeholders of the Apparel Sector[2]

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[2] Source: Writer's own

REFERENCES

Abernathy, F.H., Volpe, A., and Weil, D., (2005), 'The Future of the Apparel and Textile Industries: Prospects and Choices for Public and Private Actors', Harvard Center for Textile and Apparel Research available at : *www.hctar.org/pdfs/GS10.pdf*

Adolf K. Y. Ng, Gujar G.C., (2009), 'Government policies, efficiency and competitiveness: The case of dry ports in India' , Transport Policy 16 (2009) 232–239

Ahsan, K. and Azeem, A.,(2010), 'Insights of apparel supply chain operations: a case study', Int. J. Integrated Supply Management, Vol. 5, No. 4, 2010

Apparel Export Promotion Council, India, (2010), 'AEPC Vision 2015 for the Apparel Sector', available at: www.aepcindia.com/files/aepc_vision_2015.pdf

Arvis, J.F., Mustra, M.A., Ojala,L. , Shepherd, B. and Saslavsky, D.,(2010), 'Connecting to Compete 2010', Trade Logistics in the Global Economy ,The International Bank for Reconstruction and Development/The World Bank, available at: *siteresources.worldbank.org/INTTLF/.../LPI2010_for_web.pdf*

Barnes, L., and Greenwood, G.L., (2006), 'Fast fashioning the supply chain: shaping the research agenda', Journal of Fashion Marketing and Management, Vol. 10 No. 3, pp. 259-271

Bedi, J.S., (2009), 'Assessing the Prospects for India's Textile and ClothingSector', NCAER, available at: www.technicaltextile.net/govt-policies/NCAER_CITI_nmcc_20091001. pdf

Bowersox, D.J., Closs, D.J., and Cooper, M.B.,(2010), Supply Chain Logistics Management, McGraw Hill Companies,2nd Indian Edition

Cao, N., Zhang Z., To, K.M. and Ng, K.P., (2008), 'How are supply chains coordinated? An empirical observation in textile-apparel businesses', Journal of Fashion Marketing and Management Vol. 12 No. 3, pp. 384-397

Chandra, P. and Jain,N., (2007), 'The Logistics Sector in India: Overview and Challenges', available at : www.iimahd.ernet.in/publications/data/2007-03-07Pankajchandra.pdf

Charu Chandra & Sameer Kumar,(2000), 'An application of a system analysis methodology to manage Logistics in a textile supply chain', Supply Chain Management: An International Journal, Volume 5,No. 5,2000,pp 234-244

Cho, J. and Kang, J., (2000), 'Benefits & Challenges of Global Sourcing: Perceptions of US Apparel Retail Firms', International Marketing Review, Volume 18 No.5, pp 542-561

Christerson, B. and Appelbaum, R.P.,(1995), 'Global and Local Subcontracting: Space, Ethnicity and the organisation of apparel production' , World Development, Volume 23,No. 8,1363-1374

Christopher, M. and Peck, H., (1997), 'Managing Logistics in Fashion Markets' , The International Journal of Logistics, Volume 8, Number 2, pp. 63-74

CII- McKinsey Report, (2004), 'Made in India, The next big manufacturing export story' , available at : www.mckinsey.com/.../india/mckinseyonindia/pdf/Made_in_India.pdf

Cook, C.N., (2004), 'The role of sourcing agents in global apparel supply chains: an exploratory study', North Carolina State University, available at: *krex.k-state.edu/dspace/bitstream/2097/4159/.../Celeste Cook2010.pdf*

Coyle,J.J., Langley,C.J., Gibson,B.J., Novack,R.A. and Bardi,E.J., (2009), A logistics Approach to Supply Chain Management, Cengage Learning,India Edition

Doyle, S.A., Christopher, M.M. and Morgan, L., (2006), 'Supplier management in fast moving fashion retailing', Journal of Fashion Marketing and Management Vol. 10 No. 3, pp. 272-281

Forza,C. and Vinelli, A.,(2000), 'Time Compression in production and distribution within the textile-apparel chain' ,Integrated Manufacturing Systems,11/2,(2000),138-146

Forza,C. and Vinelli,A.,(1997), 'Quick response in the textile-apparel industry and the support of information technologies', Integrated Manufacturing Systems,8/3,(1997),125-136

Fraering, M. and Prasad S., (1999), 'International sourcing and logistics: an Integrated model', Logistics Information Management Volume 12 . Number 6 pp. 451-459

Fung, P.K.O., Chen, I.S.N. and Yip, L.S.C., (2007), 'Relationships and performance of trade intermediaries: an exploratory study', European Journal of Marketing, Vol. 41 No. 1/2,pp. 159-180

Gamage, A.H.H., (2007), 'E-Business Impact on SCM in the apparel industry operating between a developing and a developed economy', available at : http://dspace.bucks.ac.uk/dspace/bitstream/handle/10239/132/Gamage,%20Asanka%20-%20Thesis%20Pdf.pdf?sequence=1

Garg, A. , (2002) , 'Assessing the value of agent certification in global sourcing: An exploratory study in apparel sourcing', available at : repository.lib.ncsu.edu / ir / bitstream / 1840.16 /741 /1/etd.pdf

Gereffi, G.,(1999), 'International trade and industrial upgrading in the apparel commodity chain' ,Journal of International Economics 48 (1999) 37–70

Hasan, M.R. and Alim,M.A.,(2010), 'Factors Affecting Supply Chain Management Efficiency in Cross Border Outsourcing: A case study of H&M and its Outsourcing Operations in Bangladesh', available at: gupea.ub.gu.se /bitstream /2077 /23882 /1/ gupea_2077_23882_1.pdf

Hurley, J., Hale, A. and Smith, J., (2003), 'Action Research on Garment Industry Supply Chains, Women Working Worldwide', available at: www.women-ww.org/documents/www_action_research.pdf

Jin, B., (2006), 'Performance implications of information technology implementation in an apparel supply chain', Supply Chain Management: An International Journal, 11/4 (2006) 309–316

Johnson, M. E., (2002), 'Product Design Collaboration: Capturing Lost Supply Chain Value in the Apparel Industry' ,Textile Digest, Nov 2002

Kumar, S. and Arbi, A.S. (2008), 'Outsourcing strategies for apparel manufacture: a case study', Journal of Manufacturing Technology Management, Vol. 19, No. 1, pp.79–31

Malhotra, N.K. and Dash, S (2010), Marketing Research An applied Orientation, Pearson Education, India,9th Edition

McKinsey Quarterly, (2010), 'Transforming India's logistics infrastructure', available at: www.mckinseyquarterly.com/Transforming_Indias_logistics_infrastructure_ 2670

Ministry of Textiles, Govt. of India, (2010-2011), 'Annual Report', available at: *texmin.nic.in/annualrep /arep.htm*

Moon, K.L. and Ngai , E.W.T., (2008), 'The adoption of RFID in fashion retailing: a business value-added framework' , Industrial Management & Data Systems, Vol. 108 No. 5, 2008,pp. 596-612

Mossinkoff, M.R.H. and Andreas, M. S.,(2007), 'Electronic integration in the apparel industry: the Charles Vo¨gele case', Journal of Fashion Marketing and Management, Vol. 12 No. 1, 2008,pp. 90-104

Nuruzzaman and Haque, A.,(2009), 'Lead Time Management in the Garment Sector of Bangladesh: An Avenue for Survival and Growth', European Journal of Scientific Research, ISSN 1450-216X Vol.33 No.4 (2009), pp.617-629

Ramachandran,V.,(2001), 'Export Competitiveness and the Market for Textiles: Key issues, evidence from firm interviews, and policy suggestions', available at : www.cid.harvard.edu/archive/india/pdfs/vr**textile**underreview1.pdf

Ramaswamy ,K. V., and Gereffi,G. ,(2000), 'India's Apparel Exports: The challenge of global markets',The Developing Economies, XXXVIII-2 (June 2000): 186–210

Ray, A.S., (2005), 'Managing port reforms in India: Case Study of Jawaharlal Nehru Port Trust (JNPT) Mumbai', Background paper prepared for the World Development Report, available at: http://siteresources.worldbank.org/INTWDR2005/Resources/477407-1096581040435/wdr2005_india_port_reform2.pdf

Ruamsook, K., Russell, D. and Thomshick, E. (2007), 'U.S. sourcing from low-cost countries: a comparative analysis of supplier performance', Journal of Supply Chain Management, Vol. 43, No. 4, pp.16–30

Sahay, B. S.,Cavale, V. and Mohan, R., (2003), 'The Indian Supply Chain Architecture Supply Chain Management': An International Journal, Volume 8, Number 2, pp. 93-106

Sawhney, R. and Sumukadas,N.,(2005), 'Coping with customs clearance uncertainties in global sourcing', International Journal of Physical Distribution & Logistics Management Vol. 35 No. 4, 2005,pp. 278-295

Shetty, S.A.,(2001), 'India's Textile and Apparel Industry: Growth Potential and Trade and investment opportunities', available at : www.usitc.gov/publications/332/PUB3401.pdf

Singh, K., (2008), 'Building Relationships with India's Suppliers: Exploring Perceptions of U.S. Apparel Industry Buyers', available at: *libres. uncg. Edu /ir /uncg /f /Singh_uncg_0154M_10063.pdf*

Sourcing in Low-Cost Countries Report, (March 2006), available at: www.eyeforprocurement.com/report.pdf

Teng, S.G. and Jaramillo, H., (2005), 'A model for evaluation and selection of suppliers in global textile and apparel supply chains', International Journal of Physical Distribution & Logistics Management, Vol. 35 No. 7, 2005, pp. 503-523.

Teng, S.G. and Jaramillo,H., (2006), 'Integrating the US textile and apparel supply chain with small companies in South America', Supply Chain Management: An International Journal 11/1 (2006) 44–55

Thoburn, J.,(2010), 'The Impact of World Recession on the Textile and Garment Industries of Asia,available at : www.unido.org/fileadmin/user_media/.../WP172009_Ebook.pdf

Verma,S.,(2002), 'Export competitiveness of Indian textile and garment industry', working paper no. 94,ICRIER, available at: www.icrier.org/pdf/WP%2094.pdf

W.H., Hausman, Lee, H.L., and Subramanian, U., (2005), 'Global Logistics Indicators, Supply Chain Metrics, and Bilateral Trade Patterns', Policy Research Working Paper 3773, World Bank, Washington, DC.

World Trade Organisation, (2010), 'International Trade Statistics', available at: www.wto.org/english/res_e/statis_e/its2010_e/its2010_e.pdf)

Wu, Y.C.J. and Lin,C.W.,(2008), 'National port competitiveness: Implications for India', Management Decision Vol. 46 No. 10, 2008,pp. 1482-1507

Yu, L., (2011), 'Logistics Barriers to International Operations: A Case Study of Japanese Firm in China' , International Conference on Economics and Finance Research, IPEDR vol.4,(2011) IACSIT Press, Singapore

ANNEXURE A

QUESTIONNAIRE

Dear Respondent,

This survey is aimed to rate different kind of operational challenges in apparel sourcing from NCR for exports. As you are involved in the sourcing from the NCR region, your inputs will be very helpful in the assessment. Thank you for your valuable time and feedback.

Rate the options seven-point Likert scale (7- very satisfied; 1- very unsatisfied)

You may bold or colour the option you will choose,

How satisfied is your sourcing team with the product quality provided by vendors?

1	2	3	4	5	6	7

How satisfied is your sourcing team with the transportation costs (till final destination) for the orders placed to vendors?

1	2	3	4	5	6	7

How satisfied is your sourcing team with vendors' ability of regular and on time communication?

1	2	3	4	5	6	7

How satisfied is your sourcing team with vendors' information system capabilities?

1	2	3	4	5	6	7

How satisfied is your sourcing team with vendors' ability to produce in right quantity and specification required?

1	2	3	4	5	6	7

How satisfied is your sourcing team with the similarity of vendors' business culture and practices to your company's?

1	2	3	4	5	6	7

How satisfied is your sourcing team with the on-time receipt of your order at specified location for further transit?

1	2	3	4	5	6	7

How satisfied is your sourcing team with order cycle time? (Order cycle time is defined as the time from when buyer places an order to the time when buyer actually receives the order)

1	2	3	4	5	6	7

How satisfied is your buyer with the consistency of the cycle time?

1	2	3	4	5	6	7

How satisfied is your sourcing team with the quantity and selection offered from vendors' to match your orders?

1	2	3	4	5	6	7

How satisfied is your sourcing team with the average level of damages of vendors' deliveries?

1	2	3	4	5	6	7

How satisfied is your sourcing team with the accuracy of vendors' shipping documentation procedure?

1	2	3	4	5	6	7

How satisfied is your sourcing team with the price quotations from the vendors?

1	2	3	4	5	6	7

How satisfied is your sourcing team with the average safety stock levels of raw materials by your vendors?

1	2	3	4	5	6	7

ANNEXURE B

SEM OUTPUTS ON A BASE MODEL

For Path Analysis, the nine factors identified as follows were reframed into six heads as per trade norms and practical usage in the apparel sector, particularly for logistics and related activities.

1. Time:
    a. On-time receipt
    b. Cycle-time length and
    c. Cycle-time
2. Quality
    a. Accurate quantity and selection
    b. Accurate invoice
    c. Delivery damage
3. Cost
    a. Safety stock
    b. Product price
    c. Transportation costs

These six factors identified from the nine above were:

1. Demand Rating
2. Supply Fabrics Rating
3. Supply Accessories Rating
4. Supply Labour Rating
5. Supply Port Rating
6. Supply Management Rating

One of the major factors in the apparel sector which is of increasing importance, particularly after the MFA phase out is the aspect of delivery lead time (as discussed in the opening paragraphs of the paper). The context of delivery lead time has been integrated into the six factors through the perspective of Demand and Supply forces that affect delivery lead time. As the respondents to the study are sourcing and buying houses they have focus on the demand and the supply factors from the point of view of the delivery lead time. The Demand rating here refers to the categorization of the demand from the buyers in terms of criticality of delivery issues, size of the actual buyers and other related issues that rate buyers on their importance. Supply Fabrics and accessories relate to the context of fabric (or yarn) and accessories affecting the production and the delivery lead time. Supply labour is related to the importance of labour as an important parameter towards delivery lead time. Particularly, with complains about labour shortage and rising rates, it also many a times affect delivery lead time. Supply port and management are referred to issues of port and transportation. These six factors identified are able to help in impacting the export turnover and the importance of the six factors are classified in Figure 4. It gives an understanding of how the factors are impacting the export turnover (in the context of delivery lead time).

A preliminary base model was made with the six listed; weights were assumed. Data set was assumed but biased towards expected values was drawn from experience. Confirmatory path analysis was done through AMOS which is based on SEM. The outputs are listed as follows in Figure 4 & 5.

Fig. 4: The variables which have been assumed based on the 9 factors

Discrepancy	49.733	0.000	46.960	CMIN
Degrees of freedom	21	0	21	DF
P	0.000		0.001	P
Number of parameters	7	28	7	NPAR
Discrepancy / df	2.368		2.236	CMINDF
Normed fit index	-0.059	1.000	0.000	NFI
Relative fit index	-0.059		0.000	RFI
Incremental fit index	-0.107	1.000	0.000	IFI
Tucker-Lewis index	-0.107		0.000	TLI
Comparative fit index	0.000	1.000	0.000	CFI
P for test of close fit	0.001		0.002	PCLOSE
Akaike information criterion (AIC)	63.733	56.000	60.960	AIC
Browne-Cudeck criterion	69.067	77.333	66.293	BCC
Bayes information criterion	87.163	149.719	84.390	BIC
Consistent AIC	80.542	123.234	77.768	CAIC
Hoelter .05 index	20		21	HFIVE
Hoelter .01 index	23		25	HONE

Fig.5: AMOS Output of the Six Factor Analysis

List of working papers of IIFT

Sinha, Deepankar (2010), "Multi-Dimensional Approach to Management of Port Life Cycle: The Case of Major Ports in India" Working Paper No: LD-10-01, Indian Institute of Foreign Trade, New Delhi and Kolkata. This paper can be downloaded from http://cc.iift.ac.in/research/Docs/WP/01.pdf

Raychaudhuri, Bibek and Chakraborty, Debottam (2010), "Export Potential at the State Level: A Case Study of Karnataka", Working Paper No: EC-10-02, Indian Institute of Foreign Trade, New Delhi and Kolkata. This paper can be downloaded from http://cc.iift.ac.in/research/Docs/WP/02.pdf

Nag, Biswajit (2011), "Comprehensive Economic Partnership Agreement Between India and Sri Lanka: Where Does it Lead?", Working Paper No: EC-11-03, Indian Institute of Foreign Trade, New Delhi and Kolkata. This paper can be downloaded from http://cc.iift.ac.in/research/Docs/WP/03.pdf

Sinha, Deepankar (2011), "Container Yard Capacity Planning: A Causal Approach" Working Paper No: LD-11-04, Indian Institute of Foreign Trade, New Delhi and Kolkata. This paper can be downloaded from http://cc.iift.ac.in/research/Docs/WP/04.pdf

Rastogi, K. Siddhartha (2011), "Welfare Assessment of SPS Standards: An Empirical Study of Indo-US Mango Trade Dispute", Working Paper No: EC-11-05, Indian Institute of Foreign Trade, New Delhi and Kolkata. This paper can be downloaded from http://cc.iift.ac.in/research/Docs/WP/05.pdf

Nag, Biswajit and Sikdar, Chandrima (2011), "Welfare Implications of India-ASEAN FTA: An Analysis using GTAP Model", Working Paper No: EC-11-06, Indian Institute of Foreign Trade, New Delhi and Kolkata. This paper can be downloaded from http://cc.iift.ac.in/research/Docs/WP/06.pdf

Datta, R.P. and Saha Sanjib (2011), "An Empirical comparison of rule based classification techniques in medical databases", Working Paper No: IT-11-07, Indian Institute of Foreign Trade, New Delhi and Kolkata. This paper can be downloaded from http://cc.iift.ac.in/research/Docs/WP/07.pdf

Dasgupta, Pinaki (2011), "Implications of Revenue Model for Social Networking Sites and Beyond", Working Paper No: MA-11-08, Indian Institute of Foreign Trade, New Delhi and Kolkata. This paper can be downloaded from http://cc.iift.ac.in/research/Docs/WP/08.pdf

Birudavolu, Sriram and Nag, Biswajit (2011), "A Study of Open Innovation in Telecommunications Services: A Review of Literature & Trends", Working Paper No: IT-11-09, Indian Institute of

Foreign Trade, New Delhi and Kolkata. This paper can be downloaded from http://cc.iift.ac.in/research/Docs/WP/09.pdf

Mitra, R.K. and Gupta, M.P. (2012), "Towards Validation of Key Success Factors of E-government Initiatives", Working Paper No: IT-12-10, Indian Institute of Foreign Trade, New Delhi and Kolkata. This paper can be downloaded from http://cc.iift.ac.in/research/Docs/WP/10.pdf

Rit, Bipradas (2012), "The Relationship between Inflation, inflation Uncertainty and Output growth in India ", Working Paper No: EC-11-11, Indian Institute of Foreign Trade, New Delhi and Kolkata. This paper can be downloaded from http://cc.iift.ac.in/research/Docs/WP/11.pdf

Chakraborty, Debashis; Banerjee, Pritam and Sengupta, Dipankar (2012), "Developing Country Coalitions in WTO Negotiations: How cohesive would IBSAC (India, Brazil, South Africa, China) be?", Working Paper No: EC-12-12, Indian Institute of Foreign Trade, New Delhi and Kolkata. This paper can be downloaded from http://cc.iift.ac.in/research/Docs/WP/12.pdf

Mitra, R.K. (2012), "Rise of E-Governance", Working Paper No: IT-12-13, Indian Institute of Foreign Trade, New Delhi and Kolkata. This paper can be downloaded from http://cc.iift.ac.in/research/Docs/WP/13.pdf

Chatterjee, Sushmita; Chaudhuri Ray, Bibek; and Datta, Debabrata (2012)," An Investigation into the Prospect of 3G Adoption in Kolkata: A Structural Equation Modeling Approach", Working Paper No: EC-12-14, Indian Institute of Foreign Trade, New Delhi and Kolkata. This paper can be downloaded from http://cc.iift.ac.in/research/Docs/WP/14.pdf