

UPGRADING IN THE INDIAN GARMENT INDUSTRY: A STUDY OF THREE CLUSTERS

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ABSTRACT

This paper examines the process of upgrading of the Indian garment industry through a survey of 100 firms in three clusters in Delhi National Capital Region (NCR), Tirupur, and Mumbai in 2012. Upgrading could be of three types: process, product, or functional. Product upgrading entails producing higher value added products and involves steps taken to upgrade product quality, introduction of new fabrics and raw materials, and reduction in reworking rates. Process upgrading occurs through the incorporation of more sophisticated technologies in production and/or reengineering. Process upgrading takes place through use of new production machinery, worker training, reduced delivery time, total quality programs, new organizational approaches, improvements in the production process, and increased use of computer programs and internet for business purposes. Functional upgrading involves moving to higher value functions and occurs through design, marketing, and branding; most value addition occurs in this stage of production. Most firms surveyed reported investing in some form of upgrading. Product upgrading was the least commonly reported type, followed by functional and process. Little or no upgrading was reported by domestic firms, mostly in Delhi NCR and in large firms. The governance structure of the value chain determines functional upgrading.

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I. INTRODUCTION

The garment¹ sector is labor intensive and has contributed to countries' industrialization efforts by helping them diversify from resource-based exports. In the past, countries like Japan have reaped the benefits of industrialization through exporting garments. Today, global exports in garments are dominated by countries like the People's Republic of China while Bangladesh and Viet Nam have also emerged as important players.

The garment industry provides employment to several million people worldwide, and is an important foreign exchange earner for many countries. For India, too, the textiles and garment industry is important since it is the second-largest employer² (after agriculture) and also contributes significantly to exports. In 2013, global textile exports were \$772 billion, of which India's share was 5.2%. India's textile and apparel exports amounted to \$40.2 billion in 2013, of which 57% was textiles and 43% was apparel. Apparel exports in 2013 from India were \$19 billion, registering an impressive increase of 24% over the previous year (WTO 2014).³

The textile and apparel value chain is organized around five main segments (Pickles 2012): raw material inputs (which includes cotton, wool, and silk for natural fibers as well as oil and natural gas for synthetic fibers), textiles (natural and synthetic fibers), apparel manufacturing, intermediaries (brand name, overseas buying offices, and trading companies), and marketing and retail. In this paper we focus on apparel manufacturing, which has four main stages of production: design, cutting, sewing, and embellishment.

There is extensive literature on the organization of the apparel value chains (Gereffi and Memedovic 2003). The literature is now examining the mechanisms through which firms and industries can undertake upgrading⁴ within global value chains to capture greater value added.⁵

Upgrading has been classified into four types: functional, product, process, and chain (Humphrey and Schmitz 2002).⁶ Functional upgrading involves moving to higher value functions and occurs through design, marketing, and branding, while product upgrading entails producing higher value added products. Product upgrading involves steps taken to upgrade product quality, introduction of new fabrics and raw materials, and reduction in reworking rates. Process upgrading occurs through the incorporation of more sophisticated technologies in production and/or reengineering, while chain upgrading leverages expertise gained in one industrial sector to enter another sector. Process upgrading takes place through the use of new production machinery, worker training, reduced delivery time, total quality programs, new organizational approaches, improvements in the production process, and increased use of computer programs and internet for business purposes.

¹ In this paper we use garment and apparel interchangeably.

² 45 million direct employment (Technopak 2012).

³ WTO, 2014. Statistics, International Trade Statistics. https://www.wto.org/english/res_e/statis_e/its2014_e/its14_merch_trade_product_e.htm (accessed on 18/1/2016)

⁴ Upgrading has been defined in the literature as "innovation producing and increase in the value added" (Morrison et al. 2008), "insertion into local and global value chains in such a way as to maximize value creation and learning" (Gereffi et al. 2001), shifts in activities that "increase the skill content of their activities and/or move into market niches which have entry barriers and are therefore insulated to some extent from these pressures" (Humphrey and Schmitz 2002), and "the capacity of a firm to innovate to increase the value-added of its products and processes" (Giuliani et al. 2005).

⁵ Based on the concept of high value manufacturing (HVM) defined in Kathuria et al. (2014), wearing apparel figures in the HVM index of India. Value added is a different concept and the definition of value added will vary from industry to industry: in the case of garments, certain kinds of embroidery or embellishments add value to the product.

⁶ In this paper we focus only on the first three types: product, process, and functional.

This paper examines the process of upgrading of the Indian garment industry through a 2012 survey of 100 firms in three clusters in Delhi National Capital Region (NCR), Tirupur, and Mumbai. Most firms surveyed reported investment in some form of upgrading.⁷ Product upgrading was the least commonly reported type, followed by functional and process. Functional upgrading is highest in exporters, firms in Delhi NCR, and large firms.⁸ Process upgrading is highest in firms that both export and sell domestically, in Tirupur, and among the medium-sized firms. Product upgrading is highest in domestic firms, in Delhi NCR, and in large firms. Little or no upgrading was reported by domestic firms, mostly in Delhi NCR and in large firms.

II. LITERATURE SURVEY

About 60% of world trade takes place through coordinated global value chains (GVCs) (UNCTAD 2013). GVCs are highly structured networks where the flow of products, knowledge, and resources are coordinated and serve as outlets for the exports of developing countries.

The concept of upgrading or making better products and making them more efficiently and moving into more skilled activities has been studied in the context of competitiveness (Kaplinsky and Morris 2001, Porter 1990). In the context of value chains, upgrading is defined as innovating to increase value added (Giuliani et al. 2005).⁹ Upgrading implies going up the value ladder and moving away from activities that are of lower value and where entry barriers are low (Giuliani et al. 2005).

There is evidence of East Asian garment firms moving from low-end activities to high-end activities such as designing and branding (Gereffi 1994, 1999). However, as the literature suggests, upgrading is not automatic, and even exporting through global value chains does not guarantee upgrading. Nor does it provide access to the whole range of activities needed for firms in developing countries to compete in the global economy. This brings in the issue of governance of such value chains and the kinds of governance structure that facilitate upgrading.

The issue of governance of global value chains (GVCs) has been examined by Gereffi (1999); Gereffi, Humphrey, and Sturgeon (2005); and Humphrey and Schmitz (2000).¹⁰ Chains often have governors or lead firms that largely determine production parameters and wield power over other firms in the chain. Chain governance is one of the factors likely to influence a firm's upgrading chances (Bair 2009, Schmitz 2004). Governance of value chains is important for developing countries as it defines their prospects for learning and earning (Schmitz 2006). Also, some activities are better remunerated than others, and it is in the interest of developing country firms to learn the skills to upgrade their positions in the GVCs. The ability to identify activities providing higher returns along value chains is the key to understanding the global appropriation of the returns to production (Giuliani et al. 2005).

⁷ Firms were asked to rate (on a scale of 1–5, where 1 is the lowest investment) their product, process, and functional upgrading.

⁸ This is based on the percent of firms reporting upgrading or scoring 3 or more in the scale of 1–5 and is reported in Table 1.

⁹ Innovation does not refer to discoveries or breakthroughs, but to marginal improvements of the products and processes that are new to the firm.

¹⁰ Gereffi et al. (2005) have developed a taxonomy that combines five governance categories based on combinations of the complexity of inter-firm transactions, the ability of participating firms to codify such transactions, and the capabilities of the supply base to fulfill the requirements of these transactions in an independent manner. These governance categories are (i) Market—with low buyer and low producer concentration, buyer not involved in product definition; (ii) Captive (quasi-hierarchical)—one firm exerts a high degree of control over other firms, high buyer dependency, high buyer concentration, buyer's competence in essential chain activities is higher than producer's; (iii) Modular—similar to captive except capability in supply base is high; (iv) Relational—complex interaction between buyer and seller; and (v) Hierarchy—which involves vertical integration.

Giuliani et al. (2005) discuss how differences in learning across sectors shape the role of global buyers in each sector and may help or hinder upgrading. Based on this argument, they develop a sectoral classification of upgrading in the context of Latin America. The categories are traditional manufacturing, natural-resource-based sectors, complex product industries, and specialized suppliers. In the case of traditional manufacturing, which includes textiles, footwear, etc., the sector is supplier dominated and major process innovations are introduced by the producers of inputs such as machinery and materials. Firms upgrade their product by developing or imitating new product designs, often interacting with large buyers who play an important role in shaping the design of final products and the specificities of the production process.

Giuliani et al. (2005) also examine the endogenous and exogenous factors that influence firm upgrading and note that the degree of cumulativeness of knowledge, codification, and complexity of the knowledge base influence the capacity and way firms upgrade.

Navas-Aleman (2011) suggests that it is rare for developing country manufacturers to design their own exports even when operating in GVCs, and even rarer for them to own export brands. As Keesing and Lall (1992) note, lack of design and marketing skills leaves firms from developing countries in a vulnerable situation in comparison with their global buyers. In this paper we highlight this aspect of chain governance in the context of garment manufacturing in India. In particular, we examine the product, process, and functional upgrading for firms surveyed in three clusters of India.

III. THE INDIAN GARMENT INDUSTRY

The Indian textile industry accounts for about 14% of the country's total industrial production, 4% of GDP, and 13% of total export earnings.¹¹ It is the second most important sector in terms of employment, after agriculture. It provides direct employment to about 45 million and indirect employment to 60 million people (Technopak 2012). India is in the top 15 exporters of textiles and clothing in the world.

India's textile exports increased from \$8 billion in 1995 to \$21 billion in 2009. From 2005 to 2010, exports of clothing (garments) increased from \$8.6 billion to \$10.6 billion, and exports of textiles doubled. In 2013, India's textile and apparel exports amounted to \$40.2 billion (57% textiles and 43% apparel).

The textile and clothing industry is a diverse and heterogeneous industry that covers a great number of activities, beginning with the transformation of raw materials into fibers, yarns, and fabrics. These in turn are used in a number of products, including garments. The textile and clothing sectors cover approximately 1,500 tariff lines of the Harmonized System (HS) of tariff nomenclature;¹² while the textile sector comprises chapters 50–60 and 63 of the HS nomenclature, clothing comprises chapters 61 and 62 of the same classification. The clothing sector covers articles of apparel and clothing, made-up textile articles and accessories. The clothing products in Chapter 61 are either knitted or

¹¹ Government of India, Ministry of Textiles, Textile Committee. 2011. *National Household Survey 2010*. Market for Textile and Clothing. pg. 23. New Delhi.

¹² The Harmonized Commodity Description and Coding System generally referred to as "Harmonized System" or simply "HS" is a multipurpose international product nomenclature developed by the World Customs Organization (WCO). It comprises about 5,000 commodity groups; each identified by a six digit code, arranged in a legal and logical structure and is supported by well-defined rules to achieve uniform classification. The system is used by more than 200 countries and economies as a basis for their Customs tariffs and for the collection of international trade statistics. Over 98 % of the merchandise in international trade is classified in terms of the HS (<http://www.wcoomd.org/en/topics/nomenclature/overview/what-is-the-harmonized-system.aspx>).

crocheted while apparel produced from woven textile fabrics fall under Chapter 62; hence, products are classified based on the underlying manufacturing process. The maximum value addition to textiles is done by the apparel sector, which is the last stage of the textile value chain.

The garment industry in India comprises both the domestic market and exports. In 2008, it was estimated that while the size of the domestic apparel market was \$15.0 billion, apparel exports were \$9.7 billion (Confederation of Indian Textile Industry). At current prices, the Indian textiles industry is pegged at \$55 billion, 64% of which services domestic demand (Ministry of Textiles). During the year FY 2011,¹³ garments accounted for 45% of total textile exports.

The Annual Survey of Industries reports that as per the Factory as defined under the Factories Act, 1948, there were 3,760 garment manufacturing units in FY 2010. This figure was 3,273 in FY 2002, and 3,627 in FY 2007. The Annual Survey of Industries collects data only for registered manufacturing firms. Micro, small, and medium-sized enterprises (MSMEs) are surveyed separately. The Fourth All India Census of MSMEs reported 214,557 registered MSMEs in FY 2007, but unregistered micro, small, and medium-sized units were not included in this enumeration.

The industrial structure in the garment industry is rather complex: the bulk of the units are small and medium-sized firms. Most of the production is organized in clusters. Major clusters are located in Bangalore, Delhi NCR, Kolkata, Ludhiana, Mumbai, Tirupur, and other cities. A study by Apparel Export Promotion Council (AEPC) in 2009 has estimated that 95% of the production is in the top 19 clusters, whose annual production is 8,900 million pieces. Of this, 6,800 million pieces fulfill domestic demand and 2,100 million pieces are exported. The total number of garment units in these 19 clusters is 33,371.

Estimates of Chapters 61 and 62 in Total Garment Products

India's top exports in ready-made garments in 2010 comprised cotton T-shirts (HS 610910); women's/girls' blouses, shirts, and shirt blouses of cotton (HS 620630); and men's/boys' cotton shirts (HS 620520). These were also the top three items in 2005. An assessment of knitted versus woven garments shows that based on certain assumptions,¹⁴ 47% of garments produced in the country in 2009 were knitted and 53% were woven.

Division between Men's, Women's, Boys', and Girls' Wear

In 2009 for the domestic market, men's wear accounted for 43% of total production (amounting to Rs66,300 million), while women's wear was 37% of the total (Rs 57,745 million). Boys' wear made up 10% of the total (Rs15,765) and girls' wear 9% (Rs14,190) (Technopak 2010).

¹³ FY refers to the fiscal year, which starts in April and ends in March. FY 2011 refers to the period from April 2010 to March 2011.

¹⁴ Kolkata and Howrah, which have turnover of Rs50 billion produces mostly knitted garments, while those from Metiaburz, with a turnover of Rs72 billion are primarily woven. The share of knitted products in total turnover is 40%. Mumbai, which has 30%–35% of total production, produces mostly knitted garments.

IV. METHODOLOGY

The primary survey for the study examined the nature of the garments value chain located in three clusters of the country. The objectives of the primary survey were the following:

- (i) documenting the firms' engagement in different types of supply chains (global, regional, and domestic) and their perspectives on the prevalence of such chains in the industry;
- (ii) examining different components of the supply chain;
- (iii) examining the governance structures of the supply chain;
- (iv) understanding the strategies adopted by firms related to process efficiency, product upgrading, and capacity to augment their functional position in the chain; and
- (v) examining the impact of incentives and regulatory regime on the firm's performance.

Design of the Survey

This paper is based on a combination of quantitative and qualitative methods for collection of primary data from firms engaged in garment manufacturing in India. Firms were selected randomly and invited to participate in the survey. Some firms refused to do so. A structured questionnaire was used and 100 firms from three clusters were surveyed. Questionnaires were administered to firms through face-to-face interviews during 2012.¹⁵ Information was also collected from other key stakeholders including industry associations. The key informant survey was used to understand the difference in the behavior of the clusters with industry associations.

As has been discussed previously, upgrading could be of several types: (i) process upgrading—which leads to improvements in the production system through acquisition of new machinery, implementing a quality control program, shortening delivery time, reducing waste, and in general providing more efficient transformation of inputs to output; (ii) product upgrading—which involves introducing new products, new designs, improving quality, and producing a more sophisticated final output; and (iii) functional upgrading—moving into different stages beyond production like original design, branding, and marketing.

The survey gathered information from large, medium-sized, and small firms in three industry clusters across the country. To learn about the different value chains, firms with and without export orientation were surveyed, including questions about the value chains in which they operate. This has enabled us to construct the global value chain through which some firms are supplying their products, as well the domestic chains. A few firms reported production linkages with Bangladesh, which has enabled us to capture the regional value chain. Other questions were related to the nature of upgrading undertaken. Some firms were interviewed multiple times to better understand their operational logistics.

The questionnaire was designed to capture each aspect of upgrading. Following Navas-Aleman (2011), firms were asked to rate (on a scale of 1–5, where 1 is the lowest) their investment in product, process, and functional upgrading. The 13 categories that they were asked to rate were (i) new production machinery (process upgrading), (ii) worker training and attainment of qualifications (process upgrading), (iii) reduction in delivery time (process upgrading), (iv) introduction or improvements in total quality programs (process upgrading), (v) introduction of new organizational and/or management

¹⁵ Forty questions were asked. The first few questions related to the nature of the firm and its operations. Firms were asked about their product, their markets, and their exports. Questions were also asked related to upgrading and ways to remove barriers to upgrading.

techniques (process upgrading), (vi) improvements in the production process (process upgrading), (vii) increased use of computer programs and internet for business purposes (process upgrading), (viii) steps taken to increase product quality (product upgrading), (ix) introduction of new materials and fabric to enhance product range (product upgrading), (x) reduction in reworking rates (product upgrading), (xi) design (functional upgrading), (xii) marketing (functional upgrading), and (xiii) branding (functional upgrading).

The average product, process, and functional upgrading index score was used to make comparison between firms and clusters.

V. FINDINGS

A. Validation of Value Chains

Global Value Chains

Based on the discussions with firms and industry associations, we note the presence of several chains in the garment industry in India. There are firms catering to global value chains, as well as selling to the domestic market. Firms in the Mumbai cluster are selling half of their output to the domestic market. We discuss the domestic value chain below. The global value chain is of two types: supplying to the European Union (EU) and the United States (US), and supplying to the Middle East market (or countries in South America). Most of the medium-sized and large firms are catering to the global value chains that are being sold in the EU and the US. There are some differences in those two chains: while the products for the US market are low value added garments that are sold in bulk, the products sold in the EU are higher value added but with lower quantities. The design, specification of inputs, standards of compliance, and the supply chain are largely determined by the buyer. The value chain catering to the Middle East market is different from the value chain in the EU and US markets. Firms in Delhi NCR are selling mostly to the EU and the US. Firms in Tirupur are selling to the Middle East as well as to the EU and the US. The design, specification of inputs and the supply chain is collaborative in this case. There is less importance attached to compliance and producers are supplying products under their own brand names. Other newer markets that were being explored by the firms include Japan, the Republic of Korea, Singapore, Latin America, South America, and East Africa. Some firms have production linkages with the South Asian countries, particularly Bangladesh, which we discuss below.

The coexistence of several value chains has also been found by Giuliani et al. (2005) in the case of Latin America. They suggest that different value chains coexist in the same cluster, with firms participating in domestic as well as global value chains, especially in traditional manufacturing. Evidence of different chains dominated by EU and US buyers are also prevalent in the Sinos Valley footwear cluster, where EU and US buyers dominate the global value chain, but there are minor chains oriented toward Brazilian and Latin American markets (Bazan and Navas-Aleman 2004). These different chains also have different governance structures: in the quasi-hierarchical chain, US buyers imposed their conditions concerning product design, marketing, and branding on Brazilian producers (Giuliani et al. 2005). There is also evidence from the two Mexican footwear clusters of Guadalajara and Leon, where firms participate in the domestic value chain (apart from the global value chain dominated by the US, where the design and product development is controlled by the US buyer) and in network chains (Giuliani et al. 2005). In the latter there is cooperation among firms (in design and product development), where firms have similar competencies and power.

Difference in Governance Structures in Global Value Chains

Raw materials

In supplying to the EU and the US as regards the source of raw materials, either of the following conditions could prevail:

- (i) The source and specification of the raw material is provided by the buyer—this is usually done when the firm is dealing with a buyer for the first time or the buyer has commissioned a mill for all the raw material required for production. In this case the producer has very low bargaining power.
- (ii) The specification is provided for the raw material, and the producer negotiates the price with the mills.
- (iii) The source and specification of accessories is always specified by the buyer. Usually they are imported from Hong Kong, China.

Raw materials are procured directly by producers and products sold under their own brand name in Middle East market.

Design¹⁶

There are three models followed in supplying products to the EU and the US:

- (i) The design and the source and specification of raw material are provided by the buyer.
- (ii) The design is provided by the buyer, and the producer and buyer collaborate on the decision regarding the type of material that would suit the design the best. The producer then procures the raw materials.
- (iii) The design is done by the producer in collaboration with the buyer.

In the Middle East market, the seller sells under its own brand name and hence has greater control over the value chain.

Product

- (i) US market—basic garments and large volume;
- (ii) EU market—high value added products with smaller volumes and high on fashion;
- (iii) Middle East—producers have spaces reserved in supermarkets, and supplies vary subject to demand.¹⁷

¹⁶ Not all firms supplying to the EU or the US answered this question—hence it is not possible to determine how many firms used designs specified by the buyer and how many were collaborative. However, firms did mention that in the case of higher value added products (like women's tops) the buyer most likely specifies the design as well as the fabric. A few firms mentioned that if the firm has a long-term relationship with the buyer, the design may become collaborative later while it may not be so initially. One firm mentioned that it had a design studio in Europe and others mentioned that they have agents in Europe.

¹⁷ Products sold in the Middle East included children's wear and garments for men and women.

Production standards

- (i) EU and US market—there are various standards that the factory has to meet and there are huge restrictions on outsourcing production. However, in the peak season, when production capacity is exhausted, outsourcing is allowed. Samples are approved by the buyer at every point of the production process (though this requirement may be reduced after the firms have been dealing with each other for a while), which considerably increases the time required for production. For example, after dyeing, tests are done on the fabric to check if they are azo-dye free, etc. Maintaining standards for production substantially increases the cost of production.
- (ii) Middle East—There are no such standards as in the case of the EU and the US.

Domestic Value Chains

The domestic value chain is organized in a different manner from the global value chains, and has two segments. The first segment caters to the lower- and middle-income market in the country. The producers have ready stock of different styles that are sold directly to wholesalers and multibrand outlets. In the case of retail brands, the design is collaborative or provided by the buyer. The buyer monitors the quality and delivery schedule of the garments. This segment is similar to global value chains. Firms largely own brands in the domestic value chain—which are sold through their own showrooms, multibrand outlets, and retail showrooms. One of the most important differences in the domestic segment is that the credit cycle is different from the export market.¹⁸ Apart from this, regulations toward quality, etc. are more lax.

The infrastructure used for garment production is common to both the export and the domestic markets. Volumes are larger in the export market (per order) than in the domestic market. The export market can have up to four production cycles in a year, while there are two cycles in the domestic market. The first is the festive season, which extends from August to mid-January and includes all the major festivals; and the second season is summer season, from March to May. The transactions in the export market are done through defined contracts, while the domestic market is a bit more flexible in terms of payment.

Emergence of Regional Value Chains

Some firms have reported that they have production linkages with Bangladesh.¹⁹ There are two models of production in the regional value chain: own factory and subcontracting. There are also two models for distributing the final output: directly exporting goods to the EU (taking benefits under Generalized Scheme of Preferences) and importing to India for sale in the Indian domestic market. Some of the advantages cited in the case of the regional value chain are

- lower labor costs,
- lower costs for sourcing inputs,
- lower energy costs,
- ease of availability of labor, and
- lax labor laws vis-à-vis India.

¹⁸ Some firms reported that recovery of payment from the domestic market is difficult while in the case of exporting, payment is prompt if all the papers are fine.

¹⁹ Products sold to Bangladesh included traditional clothing (*sherwani, jodhpuri*, etc.) as well as ladies' T-shirts.

Goods produced in Bangladesh and then imported to India are 5%–7% cheaper than goods produced domestically in India.

B. Types of Upgrading

As noted above, there are three kinds of upgrading: product, process, and functional. The upgrading survey was conducted in Delhi NCR, Mumbai, and Tirupur. One firm in Surat was also interviewed. Each firm surveyed was asked questions related to the different forms of upgrading and asked to respond using a scale of 1–5, with 1 being the lowest score (little or no upgrading). While 100 firms were interviewed for this purpose, responses are reported for 97 (some firms had to be removed from the sample due to missing observations on location of the firms and other major variables). Firms were also asked about the problems they faced in upgrading. Appendix A shows the scores recorded by the firms for each category of upgrading. Table 1 provides a summary of the responses recorded by the firms. It shows the count of firms reporting some form of upgrading, with a score of more than 3 counted as upgrading and a score of less than 3 as little or no upgrading.

Table 1: Summary of Upgrading Scores Reported by Firms

	Product Upgrading	Process Upgrading	Functional Upgrading	Product and Process Upgrading	Functional, Product, and Process Upgrading	Little or No Product Upgrading	Little or No Process Upgrading	Little or No Upgrading
Domestic	12/25 (48)	12/25 (48)	11/25 (44)	7/25 (28)	4/25 (16)	13/25 (52)	13/25 (52)	6/25 (24)
Exporters	18/44 (41)	28/44 (64)	22/44 (50)	14/44 (32)	12/44 (27)	26/44 (59)	16/44 (36)	10/44 (23)
Domestic and Exporter	10/28 (36)	23/28 (82)	12/28 (43)	9/28 (32)	3/28 (10)	18/28 (64)	5/28 (18)	4/28 (14)
Total	40/97 (41)	63/97 (65)	45/97 (46)	30/97 (31)	19/97 (19)	57/97 (59)	34/97 (35)	20/97 (21)
Delhi NCR	15/25 (60)	14/25 (56)	17/28 (61)	12/25 (48)	12/28 (42)	10/25 (40)	11/25 (44)	8/25 (32)
Mumbai	18/37 (49)	23/37 (62)	19/37 (51)	12/37 (32)	6/37 (16)	19/37 (51)	14/37 (38)	6/37 (16)
Tirupur	6/34 (18)	26/34 (76)	9/34 (26)	6/34 (18)	1/34 (3)	28/34 (82)	8/34 (23)	6/34 (18)
Total	39/96 (41)	63/96 (66)	45/96 (47)	30/96 (31)	19/96 (20)	57/96 (59)	33/96 (34)	20/96 (21)
Small	16/39 (41)	25/39 (64)	19/39 (49)	13/39 (33)	8/39 (20)	23/39 (56)	14/39 (36)	8/39 (20)
Medium	20/52 (38)	35/52 (67)	23/52 (44)	14/52 (27)	9/52 (17)	32/52 (61)	17/52 (33)	10/52 (19)
Large	4/6 (67)	3/6 (50)	3/6 (50)	3/6 (50)	2/6 (33)	2/6 (33)	3/6 (50)	2/6 (33)
Total	40/97 (41)	63/97 (65)	45/97 (46)	30/97 (31)	19/97 (19)	57/97 (59)	34/97 (35)	20/97 (21)

NCR = National Capital Region.

Note: The table reports how many firms reported upgrading (score of 3 or more on a scale of 5) by the total number of respondents in that category. In the first cell, 12 out of 25 firms have reported upgrading. Figures in parentheses are the percentage of firms reporting upgrading in that category.

Several points emerge from the table. Most firms reported upgrading in one or more categories. Product upgrading was the least commonly reported type, followed by functional and process. Functional upgrading is highest in exporters, firms in Delhi NCR, and the largest firms. Process upgrading is highest among firms that both export and sell domestically, in Tirupur, and among the medium-sized firms. Product upgrading is highest within the domestic category, in Delhi NCR, and in the large firms. Little or no upgrading is most common in domestic firms, firms in Delhi NCR, and large firms. This should not be interpreted to mean that domestic firms in Delhi NCR are not upgrading—all the firms in our Delhi NCR sample are exporters. Rather each of these categories should be seen

independent of the other. The highest score, a perfect 5, was reported by a small Mumbai firm supplying the domestic market, while the lowest score was reported by a small exporter from Tirupur. The market to which the firm is supplying is important, too, since a low level of upgrading is reported in firms with quasi-hierarchical structures (Humphrey and Schmitz 2000). It is more fruitful to examine each category of upgrading, as we do below.

Process Upgrading

Process upgrading takes place through the use of new production machinery, worker training, reduction in delivery time, total quality programs, introduction of new organizational approaches, improvements in the production process, and increased use of computer programs for business purposes. The lowest score was recorded for increased use of computer programs for business purposes while the highest score was for reduction in delivery time (Appendix A). Seventeen firms reported that they did not use computer programs for business purposes, while all firms except one in the sample reported reduction in delivery time. All except five firms reported introduction of new production machinery and all except six reported worker training. Total quality programs were introduced by all except eight firms, all except five reported improvements in the production process, and all except seven had introduced new management techniques.

Product Upgrading

Product upgrading involves steps taken to upgrade product quality, introduction of new fabrics and raw materials, and reduction in reworking rates. Of the firms in our sample, introduction of new fabrics and raw materials scored the lowest (22 had not introduced any new fabrics), while the highest rate was recorded for steps taken to improve product quality (all but 3 had done so), and 9 reported no reduction in reworking rates. India faces a particular problem with respect to material since its strength lies in cotton textiles. India's strength is in polyester²⁰ among manufactured fiber while other manufactured fibers are used the world over.²¹

Functional Upgrading

Of all the forms of upgrading, the most difficult is functional upgrading. Functional upgrading involves upgrading through design, marketing, and branding. However, most value addition occurs in this stage of production. Investing in functional upgrading can create valuable development options, especially for firms that depend on finding new buyers for survival (Giuliani et al. 2005).

Our survey revealed that almost all the firms are involved in functional upgrading. The lowest score, as expected, was for branding, while the highest score was for design. In the sample, 13 firms reported that they are not doing branding, 11 reported no involvement in marketing, and 5 reported no involvement in design. Most of the firms not doing branding also reported no involvement in marketing, and many had no involvement in design as well. As discussed earlier, in the context of global value chains, certain buyers specify the design and hence the firm supplies according to the design specified. Contrary to what is expected, the small and medium-sized firms are engaged in design and branding.²² This has to be seen in the context of the domestic value chain to which they cater. Branding and design are lowest

²⁰ Government of India, Ministry of Textile, 2010. *National Fibre Policy, 2010-11*.
<http://www.ijma.org/acts-rules-policies/policies/national-fibre-policy-2010-11.pdf>

²¹ Currently the global mix of garments is 41% natural and 59% manufactured. In India, 70% are cotton-based garments.

²² Many of the small firms are selling only in the domestic market in contrast to the large firms surveyed, which are either exporting or doing both. Since the domestic value chain is different from the global value chain, some difference in behavior is observed among these groups of firms.

in firms selling to the global value chain through direct contact. Most firms in the Delhi (which are also exporting) reported that buyers specified the design.

The discussion on the organization of the domestic value chain and the global value chain (catering to the EU/US and Middle East) needs to be highlighted here. As Humphrey and Schmitz (2000) point out, insertion in a quasi-hierarchical chain offers favorable conditions for product and process upgrading but hinders functional upgrading. From our survey, we find that designs are specified by the buyers mostly in firms supplying to the EU or US (and hence functional upgrading is limited in these cases). While functional upgrading could be prevented by buyers in quasi-hierarchical chains, it can occur more easily in market-based value chains (Giuliani et al. 2005). In the Sinos Valley case, functional upgrading in design, branding, and marketing have been achieved by firms selling to buyers in the domestic and regional markets of Latin America (Bazan and Navas-Aleman 2004). Functional upgrading has also been reported by Mexican footwear producers selling in the domestic market (Rabellotti 1999). In the Brazilian textile cluster of Vale do Tajá, functional upgrading has been experienced (Giuliani et al. 2005).

Hence, the governance of the value chain has implications for functional upgrading, and as suggested by Navas-Aleman (2011), firms functionally upgrade first in domestic value chains and then apply this knowledge when they start to export. The importance of domestic value chains also needs to be recognized in this context.

C. Discussion on Differences and Similarities between Firms in Upgrading

Small Firms vs. Medium-Sized Firms in Upgrading

There are 52 medium-sized, 39 small, and 6 large firms in the sample. The small firms surveyed cater to the domestic market as well as export. In addition to supplying to the EU and the US, small firms are catering to the Gulf countries and South America. The small firms in our sample are more actively engaged in process upgrading than product and functional upgrading. Within functional upgrading, these firms reported a higher score for design than for marketing and branding. The majority of the small firms surveyed were located in Mumbai. The average scores for the small firms are higher than for the large firms but lower than for the medium-sized firms. Interestingly, small firms score lower than large firms in introduction of new organizational or management techniques, reduction in reworking rates, and marketing while recording a higher score than the large firms in all other categories of upgrading (Appendix A). The medium-sized firms score lower than the large firms only in introduction of new organizational or management techniques, while scoring lower than small firms in reduction in delivery times, introduction or improvement of total quality programs, and steps to improve product quality. Over half of the medium-sized firms were exporting while these firms were mostly located in Tirupur in our sample.

Differences within the Clusters in Upgrading

There are 34 firms in the sample from Tirupur, 37 from Mumbai, 1 from Surat, and the balance 25 from the Delhi NCR. The highest average score was recorded by firms in the Mumbai cluster, followed by Delhi and Tirupur. The highest score for the Mumbai cluster was in improvements in the production process, while the lowest was in marketing and branding. The highest score for the Delhi cluster was in reduction in delivery time, which is not surprising given that all the firms in the Delhi cluster were exporters. The lowest score was in steps taken to increase product quality. In Tirupur, the highest score was in increased use of computer for business purposes, while the lowest was in reduction in reworking rates and branding.

Policy Implications from the Above Discussion

Firms were also asked about the problems they faced in upgrading. The majority of the firms reported lack of skilled labor, access to technology, and finance as the major obstacles to upgrading. Some firms observed that the duty drawback system needs to be more streamlined to reduce delays in receiving payments. Lack of logistics systems and inadequate infrastructure were cited as major reasons for delays in exporting.

VI. SUMMARY AND CONCLUSION

This paper examines, first, the engagement of firms in global, regional, and domestic supply chains in the apparel industry in India. The survey of the firms was conducted in Delhi NCR, Mumbai, and Tirupur using a structured questionnaire. There are firms catering to global value chains as well as selling to the domestic market. The global value chain is of two types: supplying to the EU and US markets and supplying to the Middle East market. There are some differences in the two value chains: while the products for the US market are low value added garments that are sold in bulk, the products sold in the EU market are higher value added and in lower quantities.

Second, we try to understand the strategies adopted by firms relating to process, product upgrading, and capacity to augment their functional position in the chain. While most of the firms reported process and product upgrading, fewer undertook functional upgrading. For process upgrading, the lowest score was for increased use of computer programs for business purposes while the highest score was for reduction in delivery time. For product upgrading, introduction to new fabrics and raw materials scored the lowest, while the highest rate was for steps taken to improve product quality. Almost all the firms surveyed are involved in functional upgrading. The lowest score, as expected, was for branding while the highest was for design. The impact of governance structure on functional upgrading was also discussed based on observations from our survey.

From a developing country's point of view, technology upgrading depends on the extent of assimilation of foreign technologies, the availability of skilled labor, and government policies that encourage investments in skills and technology. The policy implications from the survey were based on the factors that firms felt impacted upgrading the most; these factors are also commonly cited in the literature. The process of upgrading is likely to be different depending on whether the product is being supplied to the EU/US or the Middle East or South Asia.

The most important conclusion is that the nature of the value chain matters—whether domestic or global. In the global value chain, the export destination determines the governance structure within the chain. Export promotion strategies of the government tend to overlook this aspect, and a more nuanced approach to global value chain activity may help the industry more.

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APPENDIX A: UPGRADING SCORES REPORTED BY FIRMS

Sl. No.	Firm Characteristics			Process Upgrading							Product Upgrading			Functional Upgrading			Average score
	Cluster *	Size **	Exporter/ domestic ***	New production machinery purchased in the recent past	Workers training	Reduction in delivery times	Introduction or improvements in total quality programs	Introduction of new organizational/management techniques	Improvements in the production process	Increased usage of computer programs and internet for business purposes	Steps taken to increase product quality	Introduction of new materials and fabric to enhance the product range	Reduction in reworking rates	Design	Marketing	Branding	
1	M	S	D	5	5	5	5	5	5	4	5	5	5	5	5	5	4.9
2	T	S	B	5	4	3	4	3	4	2	3	0	2	4	4	2	2.8
3	T	M	B	4	3	4	3	4	4	4	4	3	4	2	3	4	3.5
4	D	M	E	5	4	3	4	4	5	4	3	4	3	5	4	5	4.0
5	T	M	E	4	3	4	3	3	4	4	3	4	3	3	4	3	3.5
6	T	S	E	4	3	4	3	4	4	5	3	4	3	3	3	4	3.6
7	T	M	B	3	4	3	4	5	3	3	3	3	4	3	4	4	3.5
8	T	M	E	4	5	4	3	4	4	4	4	0	2	3	3	3	3.1
9	M	L	B	3	4	3	4	4	4	3	3	4	4	3	3	3	3.5
10	M	S	D	5	3	3	3	3	4	3	5	4	5	0	0	0	2.7
11	M	L	B	3	4	4	5	5	5	3	4	4	3	4	4	4	4.1
12	M	S	D	5	5	5	5	5	5	5	5	5	5	5	5	5	5.0
13	D	S	E	3	4	5	0	0	3	0	4	0	3	0	0	0	1.4
14	T	M	E	4	5	4	3	3	4	5	4	0	5	3	4	2	3.4
15	M	S	B	4	2	4	5	1	4	5	5	5	3	4	2	2	3.6

16	D	M	E	4	3	4	3	5	4	3	4	3	5	4	5	3	3.9
17	D	S	E	1	4	5	3	5	5	5	4	4	5	4	5	5	4.5
18	M	S	D	3	4	4	5	4	4	2	4	0	5	5	3	3	3.5
19	M	M	B	4	4	5	4	4	5	0	3	3	3	4	0	0	2.8
20	T	S	B	4	3	3	4	3	3	4	4	3	3	4	4	4	3.5
21	D	S	E	4	3	4	5	4	4	3	4	4	5	4	5	5	4.3
22	T	S	E	4	2	2	3	3	3	3	4	4	2	3	4	1	2.9
23	M	S	E	4	4	5	4	4	5	5	5	4	4	0	0	0	3.3
24	T	S	B	4	2	3	4	4	3	4	3	3	2	3	2	2	3.0
25	T	M	E	4	2	4	4	3	2	4	4	4	2	3	4	3	3.4
26	T	S	B	3	4	4	3	4	3	4	3	4	3	3	3	3	3.4
27	T	S	D	3	4	3	4	4	4	4	3	4	3	4	2	1	3.3
28	D	L	B	4	0	4	5	5	0	0	3	0	0	3	0	0	1.8
29	T	M	D	4	3	4	4	4	4	4	4	3	2	4	3	2	3.5
30	T	S	E	0	0	2	0	0	0	2	3	0	0	2	0	0	0.8
31	D	M	E	5	3	5	5	4	4	4	3	4	4	5	4	5	4.3
32	M	M	B	4	3.5	4	3	4	3	4	4	3	3	3	4	4	3.5
33	T	L	E	4	5	4	3	3	4	4	4	3	4	3	4	4	3.6
34	T	S	E	4	3	3	4	4	3	4	3	4	4	2	3	4	3.5
35	T	M	E	4	4	4	3	4	3	4	4	4	3	4	3	2	3.5
36	M	M	B	4	0	4	5	5	5	3	0	4	4	4	2	2	3.5
37	M	M	B	5	4	4	3	4	5	2	4	3	2	1	2	2	2.9
38	M	M	D	4	3	3	3	2	3	0	3	2	0	2	2	2	2.0
39	M	M	B	4	5	1	4	4	4	0	1	5	5	5	5	5	3.5

40	D	M	E	1	5	4	5	3	5	4	4	4	5	5	5	5	4.5
41	T	M	E	4	4	4	3	3	4	3	3	4	4	4	3	3	3.5
42	M	M	B	4	3	3	3	3	4	3	4	3	3	4	3	2	3.2
43	D	M	E	1	4	5	5	0	4	0	4	5	4	5	5	5	3.8
44	T	M	E	5	3	3	3	2	4	4	4	3	3	5	4	4	3.5
45	D	M	E	3	4	3	3	4	3	4	4	3	5	5	5	5	4.0
46	M	S	D	3	3	4	5	3	5	3	4	4	3	4	3	5	3.9
47	T	M	B	4	5	4	3	4	3	5	3	4	2	3	4	3	3.5
48	T	M	B	3	4	4	3	4	4	3	4	3	4	3	4	3	3.5
49	M	M	B	5	4	4	4	3	3	3	4	0	0	4	3	2	2.7
50	D	S	E	3	4	5	3	0	3	0	5	0	0	3	0	0	1.7
51	M	S	B	4	5	5	5	5	5	0	5	0	4	4	5	4	3.8
52	M	L	E	3	3	3	4	4	3	3	4	4	4	3	5	5	3.8
53	D	M	B	1	4	5	3	5	5	5	4	4	5	4	5	5	4.5
54	T	M	E	4	3	4	3	3	4	3	4	4	2	4	2	2	3.2
55	D	M	E	4	3	3	4	3	3	4	3	3	5	5	5	5	3.9
56	M	S	B	5	4	4	4	4	5	4	4	0	4	4	5	4	3.8
57	D	M	E	1	5	4	0	3	0	5	3	3	4	5	0	0	2.5
58	D	M	E	1	4	5	3	5	5	5	4	4	5	4	5	5	4.5
59	M	M	D	3	3	4	2	3	4	4	4	0	3	2	2	3	2.8
60	M	M	B	4	5	5	4	4	5	4	5	5	4	5	4	4	4.5
61	D	M	E	0	3	5	3	5	5	5	5	4	5	4	5	5	4.6
62	T	M	E	4	5	3	4	4	4	5	3	4	2	4	4	2	3.5
63	M	S	B	4	3	3	3	2	3	0	3	2	0	2	2	2	2.0

64	T	M	E	4	4	3	4	3	4	4	4	3	3	3	4	3	3.5
65	D	M	E	3	4	4	0	3	5	0	4	0	0	3	4	0	2.1
66	T	M	E	0	3	5	3	5	5	5	5	0	5	4	5	5	4.3
67	T	S	B	4	3	4	3	4	4	4	4	3	2	4	3	4	3.5
68	M	S	D	3	3	5	4	4	5	5	3	4	5	3	2	2	3.8
69	D	S	E	1	4	5	4	3	4	4	5	5	5	4	5	4	4.4
70	M	M	D	4	5	5	4	4	5	5	4	0	5	5	4	4	4.1
71	D	M	E	4	3	4	3	4	5	4	3	3	5	5	5	5	4.2
72	M	S	D	3	4	3	3	4	3	4	4	5	3	3	4	4	3.6
73	D	S	E	3	3	4	0	0	5	0	3	0	4	3	0	0	1.7
74	T	S	E	4	3	4	3	4	3	4	4	4	2	4	3	3	3.5
75	M	S	B	4	4	5	4	4	5	5	5	3	3	4	2	2	3.8
76	M	S	D	0	0	4	0	0	0	0	0	0	0	5	5	5	1.7
77	D	L	E	4	3	3	0	4	0	3	4	0	5	0	5	0	2.2
78	M	M	B	4	4	4	4	4	4	3	4	0	4	4	5	4	3.6
79	M	S	D	5	4	3	4	4	4	4	4	3	5	5	5	5	4.2
80	M	S	D	4	4	4	3	4	3	0	4	4	3	3	3	3	3.1
81	T	M	E	4	3	4	4	3	4	4	4	3	2	4	3	3	3.5
82	T	M	D	3	3	3	4	3	4	3	4	3	2	3	2	2	3.0
83	M	M	D	3	3	4	4.5	4	3.5	0	3.5	4	4	4	4	4	3.6
84	M	S	D	5	0	4	5	5	4	0	4	5	0	4	0	0	2.8
85	D	M	E	4	3	4	3	0	1	0	0	0	5	0	0	0	1.2
86	D	M	E	1	4	4	5	5	4	5	5	4	4	5	3	4	4.4
87	M	M	D	5	4	3	4	4	5	4	5	5	4	3	3	3	3.9

88	T	M	E	4	4	3	3	4	4	5	3	3	4	3	4	4	3.6
89	M	M	B	4	4	1	3	4	4	3	3	2	3	3	1	3	2.7
90	S	M	D	4	3	3	3	3	4	3	4	5	3	3	3	4	3.5
91	D	S	E	4	4	5	4	4	4	4	3	4	3	4	4	4	3.9
92	M	S	D	3	4	4	4	3	2	3	2	0	3	4	5	5	3.2
93	T	M	B	5	3	3	4	4	3	5	3	3	4	4	5	4	3.8
94	T	S	B	4	5	5	4	4	3	4	3	4	3	4	4	4	3.8
95	T	M	D	4	3	5	4	4	3	4	3	4	2	2	3	2	3.3
96	M	S	D	5	4	4	5	5	5	4	5	0	4	5	5	5	4.3
97	D	S	E	1	4	5	3	5	5	5	4	5	4	5	5	5	4.6
Average score				3.5	3.5	3.9	3.5	3.5	3.8	3.2	3.7	2.9	3.3	3.5	3.3	3.1	

^a Cluster: M = Mumbai, D = Delhi, T = Tirupur.

^b Size: L = large, M = medium, and S = small (firm size is defined by the firms).

^c Exporter/Domestic: E = exporter, D = domestic, B = both.

APPENDIX B: SURVEY QUESTIONS ASKED

Background

1. Name of organization, address and location
2. Ownership type: multinational corporation, public, private, sole proprietor, partnership
3. Organization structure: small, medium, large
4. (a) Sales turnover in rupees 2005 and 2011, (b) proportion of exports in sales turnover in 2005 and 2011, (c) number of pieces produced (in millions) in 2005 and 2011, (d) number of factories in 2005 and 2011, (e) total number of employees in 2005 and 2011 of which contractual, and permanent, and (f) number of managers in 2005 and 2011
5. Location of factory, number of machines, investment in plant and machinery (in Rs million) (for each factory)
6. Source of finance capital: own funds, banks, money lender, others in 2005 and 2011, difficulty of getting loans in 2011 relative to 2005, rate of interest in 2005 and 2011.
7. If product sold in South Asia, and in particular Bangladesh, Nepal, Pakistan, or Sri Lanka markets where product sold

Products

8. Major products manufactured for the export market and the domestic market
9. Type of product: woven or knitted, market segment (men, women, or children) and kind of product (upper, lower, and innerwear)
10. Major markets in which products are sold: export markets and domestic market
11. For each market in which product is sold, list products sold, number of buyers, and share of market in total output
12. If products are sold in export market: (i) Proportion of output sold at Cost, Insurance and Freight (CIF), Free On Board (FOB), or Ex works in 2005 and 2011; (ii) proportion of orders from products sold through wholesale buyers, retailers, and commission agents in 2005 and 2011
13. If output is also sold in the domestic market, the proportion of orders from wholesale buyers, retailers, and commission agents in 2005 and 2011
14. If products have been diversified in the 5 years, reasons for diversification or consolidation of product range, and constraints faced in diversification of product range. If markets were diversified in the last 5 years, list the new markets, reasons for diversification, and constraints faced in diversification of markets.

Inputs

15. Number of input suppliers
16. (a) Value of inputs sourced from the domestic market and imported, (b) proportion of inputs sourced from domestic market and imported, (c) types of inputs sourced from the domestic market and imported, (d) fabric (proportion and value) sourced from domestic market and imported, (e) accessories (proportion and value) sourced from domestic market and imported
17. If inputs are imported, countries from which they are sourced
18. Reasons for sourcing of imported inputs: (i) quality, (ii) price, (iii) availability, (iv) buyer specification (proportion specified by buyer)
19. For imported inputs, proportion of inputs procured at Cost, Insurance and Freight (CIF), and Free On Board (FOB) or Ex-works
20. Whether firm wants to increase proportion of imported inputs and constraints faced in importing inputs
21. Whether imported fabrics or accessories are available in the local market

Value Chain Governance

22. Is the production process outsourced or done in house? If outsourced, which process: (i) printing, (ii) dyeing, (iii) embroidery, (iv) cutting, (v) labeling, (vi) stitching, or (vii) others is outsourced. Is the total process outsourced or partially done in-house
23. (a) Is there is production linkage with South Asia? If yes, then which country: Bangladesh, Nepal, Pakistan, Sri Lanka.(b) What is the organization of production if this alliance exists: own factory, outsourced, captive unit, any other firm? (c) If outsourced, what is the nature of the arrangement with this firm?(d) Are inputs provided by the firm for the outsourced operation?(e) Are finished products directly exported to the destination country or exported to India and then re-exported to the destination country?(f) What is the cost and quality advantages of production or outsourcing to South Asia?
24. Did the buyer specify any of the following in 2005 and 2011:(i) fabrics—source, quality, specification;(ii) machinery—source, quality, type; (iii) worker compliance—minimum wage, child labor, health;(iv) accessories—source, type, company; (v) shipment—delivery, risk, percent Free On Board (FOB)/ Cost and Freight (CNF); (vi) design—own, buyer specified, collaborative (f) What are the cost and quality advantages of production or outsourcing to South Asia?

Process Upgrading

25. (a) Range of order size (number of pieces) in 2005 and 2011,(b) average order size (number of pieces) in 2005 and 2011,(c) number of days for order cycle in 2005 and 2011,(d) number of days to source raw material in 2005 and 2011,(e) number of days for manufacture of any specific product (cut, trim, and finish) in 2005 and 2011,(f) percent of manufacturing outsourced in 2005 and 2011
26. (a) Reduction in order cycle (number of days) over the last 5 years (2005–2011),(b) reduction in manufacturing time (number of days) over 2005–2011
27. How has manufacturing time been reduced in the last 5 years?
28. Has the proportion of outsourcing increased or decreased in the last 5 years?
29. Reasons for the increase or decrease in outsourcing
30. (a) For each major product, information on the cost breakdown (in percent) of (i) raw materials, (ii) Cut Make Trim, (iii) overhead, (iv) margins in 2005 and 2011; (b) for each major product, information on the cost per piece (in terms of the retail price for the main product in US dollars) in terms of Ex works, Free On Board (FOB), retail price; (c) profit per piece(in terms of US dollars)

Upgrading

31. Has upgrading been undertaken in any of the following? If yes, rank on scale of 1 to 5 (where 1 is lowest): (i) New production machinery (process upgrading), (ii) worker training and attainment of qualifications (process upgrading), (iii) reduction in delivery time (process upgrading), (iv) introduction or improvements in total quality programs (process upgrading), (v) introduction of new organizational or management techniques (process upgrading), (vi) improvements in the production process (process upgrading), (vii) increased use of computer programs and the internet for business purposes (process upgrading), (viii) steps taken to increase product quality (product upgrading), (ix) introduction of new materials and fabric to enhance product range (product upgrading), (x) reduction in reworking rates (product upgrading), (xi) design (functional upgrading), (xii) marketing (functional upgrading),(xiii) branding (functional upgrading), and (xiv) any other
32. Main constraints faced in upgrading

Logistics

33. Proportion of domestic inputs sourced by road, rail, and air
34. (a) Proportion of imported inputs sourced by air, sea, and land; and (b) proportion of outbound traffic going by air, sea, and land
35. Major constraints faced in transportation
36. Whether the buyer nominates a freight forwarder
37. Logistic arrangement with domestic buyers

Policy

38. What are the major constraints and challenges faced? Rank them in scale of importance from 1 to 5 (1 being lowest).
39. Has the firm benefited from any government policy? If yes, name of policy.
40. What steps could the government take to help industry?

Upgrading in the Indian Garment Industry *A Study of Three Clusters*

This paper examines the process of upgrading the Indian garment industry through a survey of 100 firms in three clusters in the Delhi National Capital Region, Mumbai, and Tirupur in 2012. The role played by the lead firm in upgrading (particularly functional upgrading) is explored. It can be concluded from the survey that functional upgrading is lowest in firms supplying to the European Union and the United States. Moreover, governance structure and export destination matter in functional upgrading.

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ADB's vision is an Asia and Pacific region free of poverty. Its mission is to help its developing member countries reduce poverty and improve the quality of life of their people. Despite the region's many successes, it remains home to the majority of the world's poor. ADB is committed to reducing poverty through inclusive economic growth, environmentally sustainable growth, and regional integration.

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