

Pakistan in the Apparel Global Value Chain

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Prepared by
Stacey Frederick and Jack Daly

Duke Global Value Chains Center,
Duke University

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Acronyms

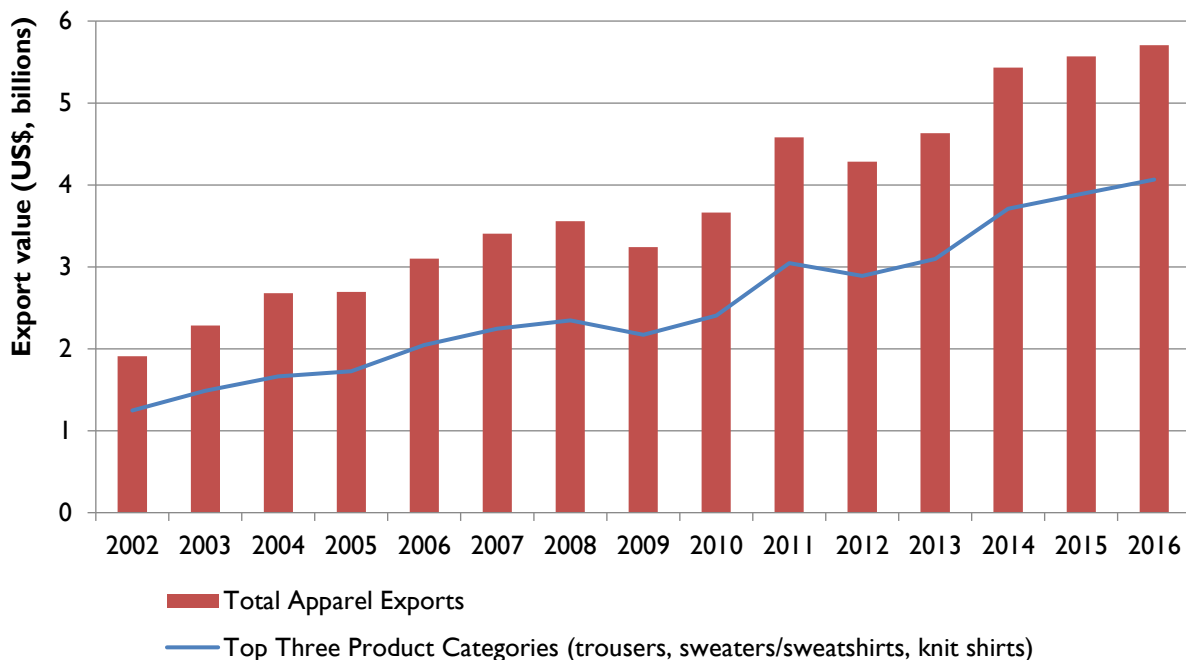
APTMA	the All Pakistan Textile Mill Association
CAD	Computer Aided Design
CAGR	Compounded Annual Growth Rates
CCC	Clean Clothes Campaign
CMT	Cut, Make & Trim providers
DTRE	Duty and Tax Remission
DLTL	Drawback of Local Taxes and Levies
EDB	Engineering Development Board
EPZ	Export Processing Zone
FDI	Foreign Direct Investment
FOB	Free on board
GE4DE	Gender Equality for Decent Employment
GENPROM	United Nations Development Programme's Gender Promotion in the Garment sector through Skills Development
GSP	General System of Preferences
GVC	Global Value Chains
GVCC	Global Value Chains Center
ILO	International Labour Organization
MFA	Multi-Fibre Agreement
MMF	Man Made Fibres
NTC	National Tariff Commission
OBM	Original Brand Manufacturers
ODM	Original Design Manufacturers
OEM	Original Equipment Manufacturers
PBOI	Pakistan Board of Investments
PRGMEA	Pakistan Readymade Garment Manufacturer & Exporter Association
PTEA	Pakistan Textile Exporters Association
RSP	Retail Selling Price
SEZ	Special Economic Zone
SMEDA	Small and Medium Enterprise Development Authority
TVET	Technical and Vocational Education and Training
T&A	Textiles & Apparel
WRAP	Worldwide Responsible Accredited Production

I. Introduction

Pakistan's apparel industry is inexorably linked with its history in textiles. Long one of the world's leading cotton producers, Pakistan has used local access to the natural fiber as well as the related yarn and fabric materials to integrate into the apparel Global Value Chain (GVC) in certain product categories. Overall, Pakistan's apparel exports stood at US\$5.7 billion in 2016, an increase of nearly 200% compared to 2002, when they were US\$1.9 billion (see Figure 1). From 2010 to 2016, the country's annual growth rate of exports was 7.5%, which helped it gain market share to become the world's eighth largest apparel exporter, ninth if one aggregates all 15 countries in the European Union.

Although those data points suggest a broad-based increase, it is important to note that growth has been narrowly concentrated. Three product categories—trousers, knit shirts and sweaters/sweatshirts—accounted for 66-71% of apparel's export values from 2006 to 2016. Of those, only one had dramatic expansion: trousers. With its cluster of denim manufacturers, Pakistan's exports in the product category grew by an average of 11.6% in the period from 2006 to 2016, lifting the country to the position of the world's sixth-largest exporter with 4% market share.

Figure 1: Pakistan's Apparel Exports, 2002-16



Source: UN Comtrade, 2002-2016b, 2002-2016c.

The sector has had difficulty making much headway in other products. At a time when China's position as the unquestioned apparel heavyweight is receding to a degree, there has been some worldwide reshuffling in recent years. However, it has been countries such as Vietnam, Cambodia and Bangladesh—and not Pakistan—that have had the most success growing their exports across product and material categories. Critical attributes that have allowed businesses in those markets to integrate into the supply chains of leading firms include quality, lead time and compliance to social and environmental standards in addition to the baseline metric of price.

Pakistan's potential upgrading in the GVC has been constrained by multiple factors. Upstream, there are supply chain gaps in critical inputs. Synthetic fibers and important components that are not available in the local market are subject to tariffs and taxes that increase costs. This even includes cotton, where production has stagnated in recent years and the fibers that are generated are of low quality. Downstream, underdeveloped energy infrastructure and challenging security considerations have hampered apparel producers. Lead times are not necessarily a major limitation with the existing product mix, but they limit the potential for industry expansion because of the potential for delays associated with imported inputs. Meanwhile, industry institutions are fragmented and fail to take a holistic look at the sector. Cognizant of these and other macro issues, global buyers have largely shunned investing in Pakistan, with incoming FDI into the apparel industry below levels seen in regional competitors.

Vietnam and Sri Lanka can both serve as potential models as Pakistani stakeholders consider how best to propel the industry forward. Vietnam, as highlighted, has been notable for its expansive gains, allowing it to become the world's fourth largest apparel exporter. Sri Lanka's export profile is more concentrated, but the country punches above its weight class by concentrating on a narrow range of export products. Both countries have attracted foreign investment, using industrial parks and all-inclusive investment measures to attract global buyers.

Pakistan's strengths in the apparel sector revolve around its integrated industry with high domestic ownership located in a country with a long history of producing cotton and relatively competitive labor prices. This affords multiple plausible paths for generating increasing returns in the form of higher exports and employment prospects. The burgeoning retail market in Asia might pose additional opportunity. In terms of greatest likelihood of success, solidifying its position in existing niches is likely to gain the most immediate traction. However, it will be critical for all Pakistani stakeholders across the value chain to convene and agree on a shared strategic vision.

Pakistan's apparel industry has been examined by many organizations in recent years, with its workforce and labor regulation being regular subjects of research interest. This report centers its analysis on the country's firms, using the GVC framework to evaluate their interaction with global industry forces. After assessing the current industry, the goal was to identify future upgrading trajectories. Research was supported by both qualitative and quantitative efforts. Field research was conducted in September 2018, with Duke GVCC researchers interviewing 25 in Lahore, Faisalabad and Karachi. Interviews were supported by firm-level data based on Pakistan Custom's Authority data provided by the World Bank as well as the UN Comtrade database.

The report is structured as follows: It first provides an overview of the apparel GVC to present a clear understanding of the scope of the industry, how markets are structured and how changing distribution of demand and supply destinations and lead firm organization alter structural dynamics in the chain. It then analyzes the domestic industry within Pakistan, first detailing the country's position in the chain by looking at its firm profile, backward linkages, product profile and end markets. The internal organization of the industry is then outlined as well as recent examples of upgrading and the factors that influence the labor environment. After assessing the country's advantages and constraints, it pivots to Vietnam and Sri Lanka's experiences. The report then concludes by outlining potential upgrading strategies to enhance the country's competitiveness.

2. The Global Apparel Industry

Key Points

- China is world's leading source of apparel products, accounting for 34% of the value of global exports in 2016. Its market share has declined some in recent years as the country has focused on higher-value activities.
- Countries such as Vietnam, Cambodia and Bangladesh have increased overall market share by integrating into supply chains of lead firms in significant volume. New sourcing locations are evaluated by range of variables, including price, quality, lead time and compliance to social and environmental standards.
- Lead firms in the value chain are Original Brand Manufacturers (OBMs) that control marketing & sales activities. Other categories of businesses include Cut, Make & Trim providers (CMTs) that are responsible for cutting, sewing and adding trim to produce garments; Original Equipment Manufacturers (OEMs) that perform CMT activities but also source raw materials; and Original Design Manufacturers (ODMs) that design and develop while overseeing the production process.

The apparel industry has often played a catalytic role in economic development. With low barriers to entry in terms of capital, technology and labor skills, many countries have targeted the sector as a means for providing significant employment opportunities and export revenue. The benefits associated with the industry ensure the competitive environment is fierce. For markets to upgrade within the chain, domestic apparel manufacturers must find a way to embed themselves within well-established international networks of production and distribution, notably organized by South Korean, Taiwanese, and Chinese or Hong Kong first-tier suppliers and US and European buyers.

The depth and breadth of these networks is highlighted by the size of international trade in the industry. In 2016, the world value of apparel trade was approximately US\$377 billion.¹ Although there has been some fluctuation in the value of global exports in recent years, the industry's growth rate for the six years between 2010 and 2016 was 2.3%. Since the economic crisis, apparel exporters have become even more focused on Asia, but with less emphasis on China. China's share of apparel trade peaked in 2010 at 43% before falling in more recent years. Instead, growth between 2008 and 2016 has been driven by Southeast and South Asian suppliers.

These characteristics provide a broad snapshot of the industry. Building on these, the considerations that have helped shaped the global industry in recent years include the following:

1. **China remains the world's largest apparel producer and exporter.** China's share of global apparel exports increased from 26% to 43% in the period from 2002 to 2010 before falling to 34% in 2016. Even with that decline, the value of its total apparel exports was 126% higher than the second leading exporter, the EU-15². The country has wide-ranging capabilities across diverse categories of products and materials. In recent years, the country's exports

¹ For this report, apparel products are those covered by the 61 and 62 HS codes.

² The European Union-15 (EU-15) includes Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden and the United Kingdom.

have shifted toward product categories with higher unit values, including coats, dresses and skirts and within product categories (knit shirts). China's top exports in 2015 by product category were sweaters/sweatshirts (16%), trousers (15%) and coats (12%). In terms of world market share, China accounts for the highest percentage of bras (51%), coats (49%), accessories (46%), miscellaneous apparel (45%), and baby apparel (44%).

- 2. New sourcing destinations are increasingly evaluated based on factors beyond price, with quality, lead time and compliance to social standards the most important considerations.** While China is likely to remain the dominant sourcing destination for the foreseeable future, there are indications the Chinese industry might be entering a period of transition. Industry surveys suggest large-scale buyers are looking to diversify their supply chain as a hedge against China's increasing labor costs, currency appreciation and policy focus on higher value-added industries. Although this isn't reflected in trade data to a significant degree, it nonetheless provides opportunities for other countries in the sector. Nations like Cambodia, Vietnam, Bangladesh and Pakistan have taken advantage to varying extents.³

As new markets enter the chain, local businesses must understand the governance landscape. Lead firms in the apparel GVC concentrate on the highest value-adding activities (branding and retail) while setting minimum standards and sourcing criteria for suppliers. Whereas price is important, buyers do not necessarily buy from the supplier that offers the *lowest* price. Instead, other key factors include quality, lead time and reliability in delivery, access to inputs, full package services as well as compliance to social and, to a lesser extent, environmental standards. Box 1 below introduces social standards while the Standards subsection offers more detail. The Lead Firms and Governance subsection also examines these features of the chain in further detail.

Box 1: Social Compliance in Apparel GVC

Social compliance has increased in importance in buyers' sourcing decisions as a response to a variety of factors. Corporate social responsibility (CSR) campaigns by NGOs and compliance-conscious consumers have played a role, often spurred through concern about working conditions or well-publicized disasters in apparel factories. Labor and environmental compliance are important due to the labor intensity of the apparel industry and the environmental impact of the textile industry (energy use and wastewater are two examples).

Lead firms have introduced initiatives to align with these efforts or increasing requirements for sustainability reporting. For example, Levi's, the jeans manufacturer, has prioritized reducing greenhouse gas emissions in its supply chain. Other buyers have developed codes of conduct and monitoring and auditing systems to ensure "brand security." Compliance with buyers' labor and environmental standards generally does not provide suppliers or countries with a competitive advantage since it has become a minimum criterion for entering and remaining in supply chains. Poor compliance and bad occurrences do not only affect individual firms but can affect the image of the whole country.

Source: Frederick, 2016.

³ The China-Pakistan Economic Corridor is one such example; the partnership between the two countries could yield initial investments of US\$2.7 billion in Pakistan's textile & apparel (T&A) industries (Pakistan Today, 2018). For more information, please see the section on Pakistan.

3. **The retail sector in Asia offers growth opportunities.** The largest and the fastest-growing consumer market for apparel is in Asian countries, including Australia, China, Japan, Korea, and Russia. In 2015, Asia-Pacific accounted for roughly a third of global apparel retail sales, up from 23% a decade before. The region also had the highest compound annual growth rate (7.6%), compared to the world average of 2.9%. The retail sector in Asia presents opportunities for growth in the higher value-added service and knowledge-intensive activities. As of yet, these markets do not have powerful domestic brands and global brands have yet to fully tap these markets. Asian firms may be particularly suited for entering the market due to advantages in cultural affinity, sizing, advertising channels, language and preferred retail formats.
4. **The global apparel industry is still influenced by tariffs, especially in regions such as South Asia.** Although the Multi-Fibre Agreement (MFA) quota regime that characterized the apparel industry for decades no longer exists, there are still prominent barriers to trade. Tariffs are the most significant, with developed nations regularly applying charges of 10-13% depending on the product. While broader trade agreements sometimes eliminate or reduce these levies, textile and apparel products are often subject to restrictions.⁴

There are also important regional variances. South Asia continues to be one of the least integrated regions in terms of intraregional trade as a share of total trade, with intraregional trade accounting for close 5% compared with 50% in East Asia and 22% in the Sub-Saharan Africa (Kathuria, 2018). Its most important trade agreement is the South Asian Free Trade Agreement (SAFTA), but there is little progress in its implementation given political tensions, particularly between India and Pakistan. Despite some growth in textile trade from India to Bangladesh and, to a lesser extent, Sri Lanka, one cannot speak of a regional value chain.

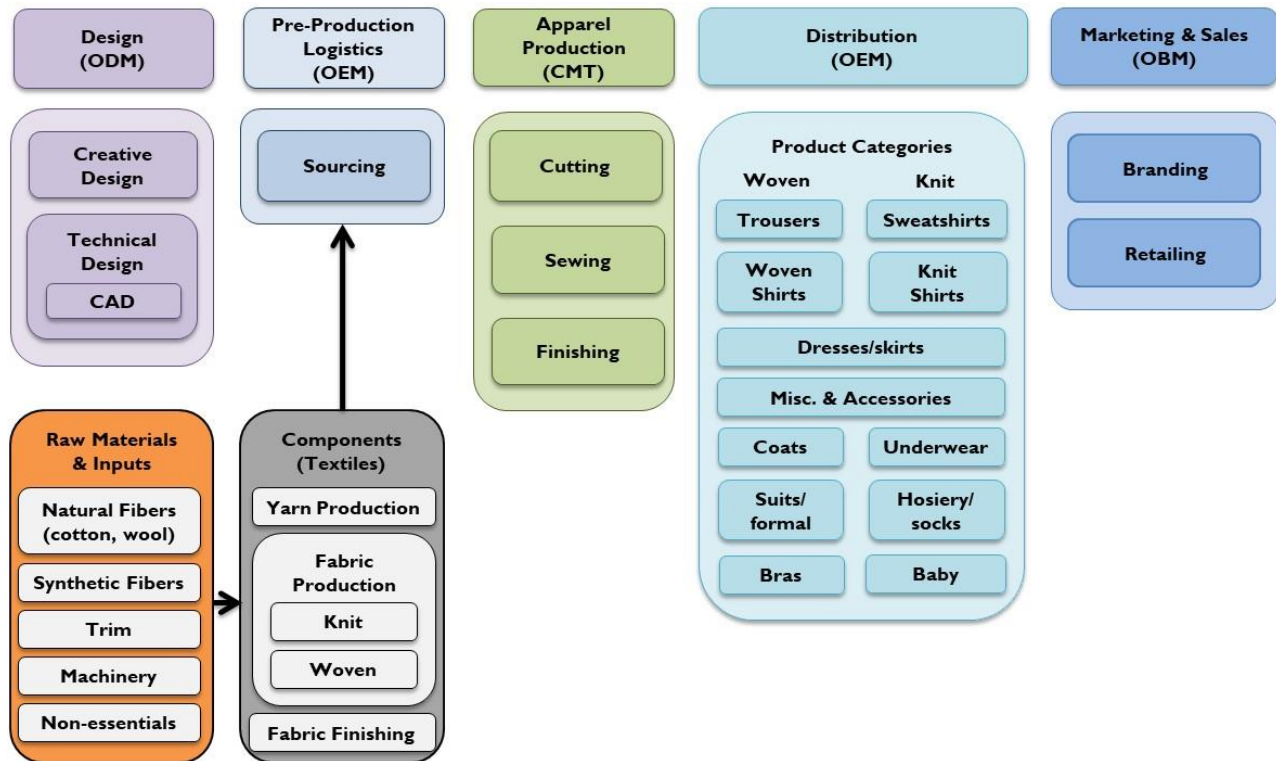
2.1. The Apparel Global Value Chain

As in many other sectors, the apparel industry is organized in GVCs where production of components and assembly into final products is carried out via intra-firm networks on a global scale. The apparel supply (or value) chain can be broken up into five stages: 1) design; 2) pre-production logistics; 3) apparel production; 4) distribution; and 5) marketing & sales. While apparel is intertwined with the textile industry, this report focuses primarily on apparel, devoting only limited space to textile production and raw materials.⁵ Figure 2 below depicts the main stages and actors. The subsections that follow provide additional detail on each segment. The Governance and Industry Organization section then outlines the main categories of firms.

⁴ To cite one example: 27 developed countries have provided tariff preferences to over 100 beneficiary countries through the General System of Preferences (GSP). However, tariffs for apparel products are only marginally reduced in the standard EU and USA GSP schemes. Within the GSP, some countries have negotiated preferential access for lower-income countries such as the Everything but Arms and the GSP+ initiatives by the EU, and the Africa Growth and Opportunity Act AGOA by the USA. Preferential market access in these agreements is governed by relatively restrictive rules of origins that typically require the use of yarn and fabric produced in a granting or signatory country, which has had a crucial impact on outcomes.

⁵ Textile components are also used in products such as home textiles (linens, curtains and rugs/carpets are examples) and industrial-use products such as filters, seat belts or building materials. Non-apparel end uses are considered a separate GVC and are thus not included in this report.

Figure 2: The Apparel Global Value Chain



Source: Authors. **Note:** Raw materials & inputs feed into textile components that are then used to generate apparel products. Since this report focuses on the apparel GVC, the raw materials & inputs as well as components segments are considered separate supporting activities.

Design: This stage includes actors that offer aesthetic design services and product development for outputs and components throughout the value chain. Design and style activities are used to attract attention, improve product performance, cut production costs and give the product a strong competitive advantage in the target market (Fernandez-Stark et al., 2011). Designers can be divided into two categories: 1) *creative design*, which has traditionally involved human designers sketching and generating fashion ideas that are featured in shows; and 2) *technical design*, which involved translating those ideas into garments.⁶ As this is their core competency, firms operating in the high-end segment of the market retain design functions in-house, while consumer brands and retailers, which follow the design tendencies set by the high-end market segment, are more open to outsourcing design to other companies.

Pre-Production Logistics: Critical pre-production activities in the apparel GVC include the sourcing of materials such as fabrics, yarn, trim and accessories. The inputs must align with the design needs and product characteristics associated with the final product. Factors that are prioritized include price, quality, reliability and lead times.

Fabrics are the most expensive input into apparel production. It can be divided into two key categories: knit and woven. Trade is evenly split between knitted and woven apparel (50% and 50%

⁶ Computer-Aided Design (CAD) is a growing component of the design segment of the chain, with software programs generating ideas for customers based on previous tastes. Box 7 on Red Collar Group in China provides some detail on the development of these companies.

in 2016). Knitted, however, is growing at a faster rate than woven—in 1992, knits were only 40% of the world export market while woven apparel was 60%. Woven garments have higher unit values than knitted (US\$9.8 per unit compared to US\$4.3 in 2015).

Each differ considerably in terms of yarn and machinery requirements as well as labor skill and capital investment. Woven fabrics require considerably higher investment than knit production. Knit-textile producers are more often vertically integrated with apparel production, while woven fabric producers are independent. Knit fabrics are used for t-shirts, dresses, sweaters, underwear and swimwear amongst others, while woven fabrics are used for dress shirts, pants, jeans, and home furnishing such as bed linens and curtains.

The quality of textiles is directly related to the final product's quality. However, in contrast to apparel production, textile production is more capital-, skill-, and scale-intensive, which is a challenge for the establishment of backward linkages. A certain minimum size of the apparel industry, locally or regionally, is a requirement for local or foreign investment into backward linkages, particularly in the woven segment (Staritz & Frederick, 2014).

Box 2: Raw Materials in the Apparel GVC

The four largest categories of inputs in the apparel GVC include natural fibers, synthetic fibers, apparel trim and accessories (buttons, zippers, hangers, tags and other small accessories), and capital equipment and machinery parts. Natural and synthetic fibers are produced from raw materials such as cotton, wool, silk, flax and chemicals. There are also categories of non-essential inputs such as packaging and broad services applicable to a range of industries, such as transportation, logistics, catering, information technology (IT), construction, cleaning, security, human resources, and training.

Cotton is the most significant natural fiber. In developed countries, the production model is typically medium- to large-scale commercial operations with mechanized harvesting, while in developing countries, production tends to be dominated by small-scale producers who harvest the cotton by hand (Cotton Council International, 2014). With its potential to employ large numbers of lower-skilled workers, governments often provide subsidies to support production in many locations. Worldwide, the leading producers are India, China, the United States, Pakistan, Brazil, Turkey and Australia (USDA FAS, 2018). Major exporters include the US, Australia, Brazil and India, while Bangladesh, Vietnam, China and Turkey top the leading importers. The US, Egypt, India and China are the leading sources of higher-quality cotton (Fernandez-Stark et al., 2016). Table A-1 presents the countries that figure most prominent in global production and export.

Source: Frederick, 2016.

Apparel Production: Apparel production includes cutting, sewing and finishing activities. Manufacturers cut and sew woven or knitted fabric or knit apparel directly from high quality yarn.⁷ A large portion of the work is labor-intensive, has low fixed costs and requires simple technology. These characteristics have encouraged the move to low-cost locations, mainly in developing countries. In contrast, textile (yarn and fabric) production is more capital and scale intensive, demanding higher worker skills; as a result, it has partly remained in developed countries or shifted towards middle-income nations.

⁷ A common description of businesses engaged in basic cutting, sewing and finishing activities is Cut, Make & Trim (CMT). Full package refers to firms that perform CMT services and also perform sourcing, logistics and other services. See Governance section for additional details.

Box 3: Automation in Apparel GVC

Although recent advances in automation in the apparel industry have prompted speculation the sector could be vulnerable to disruptive change, the nuances of the apparel industry highlight the complexity of the issue.⁸ Automating a production process typically occurs because: (1) it is expensive to hire people to do the job; (2) the product has the potential to be contaminated if handled; or (3) the task is repetitive with minimal changes. Apparel, particularly the sewing segment, does not meet these requirements. There has historically been a pool of low-cost labor from a global perspective, contamination is not an issue, and whereas the task is repetitive, it changes often. Apparel fabrics are also soft and flexible, making it difficult for a robot to handle. For these reasons, Crystal Group—one of the largest clothing manufacturers in the world—has expanded production in Bangladesh and Vietnam, with its CEO specifically stating that robots could not compete with humans.

Source: Frederick, 2015; Bain, 2018.

Distribution: The next stage of the value chain captures the business-to-business relationships that move garments to customers. The distribution segment of the value chain can also be considered post-production logistics or apparel sourcing. The key factors apparel buyers consider when selecting a supplier are similar to the factors that apparel producers themselves evaluate with textile inputs: cost, quality, lead time and reliability as well as social and environmental compliance.

The distribution segment of the chain is best evaluated based on product categories. Products can be divided into three primary ways: gender, product or materials. The main features of each are as follows:

- **Gender:** Womenswear makes up the largest share of the global apparel market as measured by Retail Selling Price (RSP). It is followed by menswear (roughly 30% share), childrenswear (11%), apparel accessories (5%) and hosiery (4%). Men's apparel is generally considered to be more "commodity-like" and basic in terms of construction and sizing, with styles changing less dramatically. Women's apparel is more fashion-oriented, with frequent style changes. Products often have more detail and design features than menswear. As such, finding womenswear suppliers can be more difficult because manufacturers need to have the logistics capabilities to produce and supply products with shorter lead times and production and design-related skills and machinery required to make the more detailed styles.
- **Product:** The global apparel industry can be divided into 14 product subsectors: trousers; sweaters and sweatshirts; knit shirts; coats, woven shirts; dresses and shirts; underwear and

⁸ The first robotic, automated production line could be operational by the end of 2018 with larger-scale implementation further ahead (Stacey & Nicolaou, 2017). Softwear Automation produces a clothes-making robot called "Sewbot." The system was being installed in a facility in the United States with the expectation of producing 1.2 million T-shirts per year at a price that is competitive with manufacturing and shipping the same material in low-wage locations (Peters, 2017). Such developments led one report concluded that the broader textiles, clothing and footwear industry faced higher automation risks than workers in automotive and auto parts; electronics and electrical parts; textile, clothing and footwear; business process outsourcing and retail value chain (Chang et al., 2016). ASEAN nations could be in particularly precarious situation, according to the analysis, with as many 88 percent of Cambodian, 86% of Vietnamese and 64% of Indonesian wage workers facing possible replacement.

pajamas; suits and formal wear; miscellaneous apparel; accessories; athletic apparel; hosiery & socks; bras; and baby apparel. Trousers have historically been the largest export category, with a 20% share of the world market in 2016. Sweaters and sweatshirts were the second largest at 13%. Dresses/skirts, coats and miscellaneous apparel are all important growth areas for global markets, with growth rates of more than 5% in the period from 2006 to 2016. Table I below provides a list of the export values of each product category.

Table I: World Apparel Exports by Product Categories, 2006-16

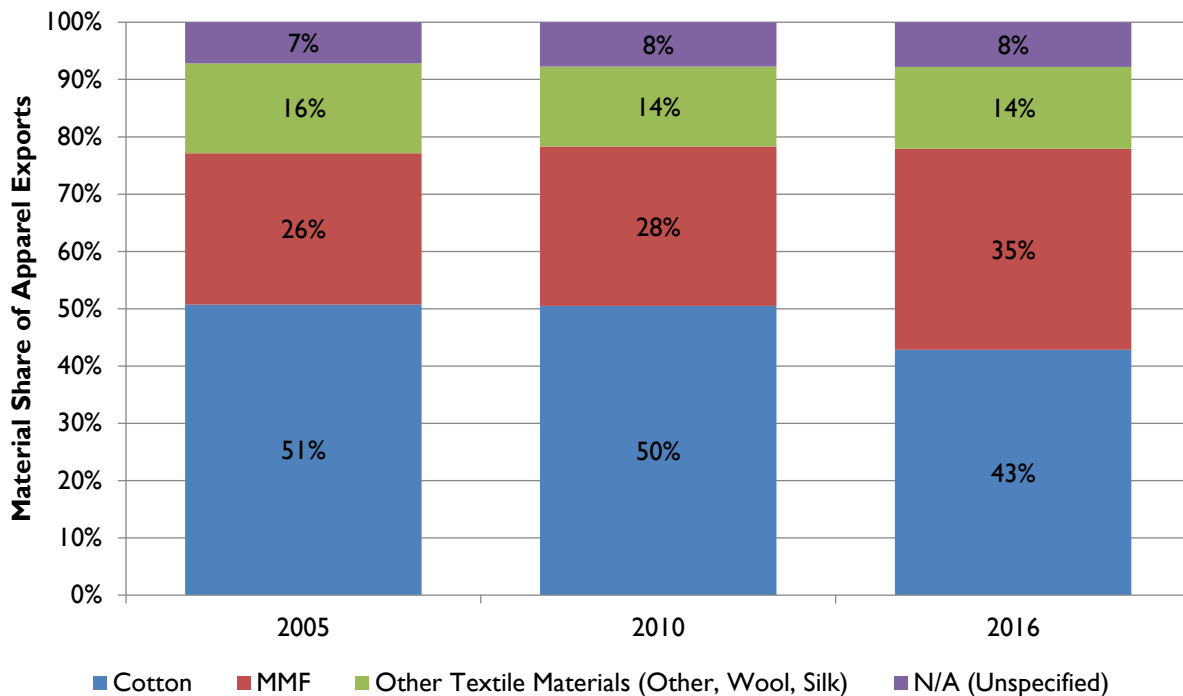
Product Category	Value (\$, Billions)				World Share (%) 2016	CAGR (%) 2006-16
	2006	2010	2014	2016		
Total	292	327	402	377		2.6
Trousers	60	62	78	76	20%	2.5
Sweaters/Sweatshirts	44	47	55	50	13%	1.2
Knit Shirts	39	44	52	49	13%	2.3
Coats	21	26	37	35	9%	5.1
Woven Shirts	22	24	31	29	8%	2.7
Dresses/Skirts	16	23	29	27	7%	5.2
Underwear/Pajamas	17	18	21	20	5%	1.5
Suits/Formalwear	20	17	20	17	5%	-1.3
Misc. Apparel	9	12	16	15	4%	5.4
Athletic	10	11	14	14	4%	3.2
Accessories	10	13	15	13	4%	3.2
Bras	8	9	11	11	3%	2.9
Hosiery/Socks	7	10	12	11	3%	4.1
Baby	8	9	10	10	3%	2.1
Trousers, Sweaters, Knit Shirts	142	153	185	174	46%	2.1
Coats and Dresses/Skirts	38	50	66	62	16%	5.1

Source: (UN Comtrade, 2002-2016b, 2002-2016c). **Note:** The product categories are ordered by value of international trade. Blue shades equal CAGRs > 3%. Red shades equal CAGRs < 1%.

- Materials:** The two main materials are cotton and man-made fibers (MMF), with the two categories representing 43% and 35% of world apparel exports in 2016. Wool and silk comprise relatively small market shares (5% and 1%, respectively), while the remaining 17% are from other textile materials or the material is not disclosed (UN Comtrade, 2002-2016c). It is worth noting that MMF has increased its share dramatically in recent years at the expense of cotton—in 2005, cotton materials accounted for 51% of worldwide apparel exports compared with 26% for MMF. Figure 3 below depicts the share of global apparel exports by material in selected years from 2005 to 2016 and provides a sense of MMF’s growing market share.

Cotton’s shrinking share of material exports is partially attributable to the unit value associated with each of the main categories. Apparel made from silk and wool have the highest average unit values (US\$25 and US\$15 per item in 2015). However, of the main materials, apparel made from MMF has higher unit values compared to cotton: US\$7.3 per unit compared with US\$5.2 in 2015.

Figure 3: Share of Apparel Exports by Material, 2005-2016



Source: UN Comtrade, 2002-2016b.

Marketing & Sales: This segment of the chain includes all activities associated with pricing, distributing and selling the physical apparel product, including marketing and branding. The companies that participate in these activities are often the lead firms in the chain. Once these companies receive the apparel product, they do not frequently make physical alternations. Apparel is marketed and sold to consumers (via retail channels), institutions or the government. This stage of the chain accounts for the highest value addition in the chain.

2.2. Global Trade in the Apparel GVC

Global trade in the apparel industry has been characterized by Chinese supply and European and American demand for some time. In recent years, there has been some indication the overall dynamics are evolving; with labor costs in China increasing and the country focused on higher value industries such as electronics, locations such as Cambodia, Vietnam and Bangladesh have increased their export presence. The following section analyzes global supply and demand. Unless otherwise stated, the source for all trade data is the UN Comtrade database.

2.2.1. Global Supply

China is a behemoth in the apparel GVC. The country has accounted for at least 30% of global exports since 2006 and has regularly outpaced the world's second leading apparel exporter (the EU-15) by at least 100% during that span. Its export portfolio is diverse with capabilities spread throughout product categories, material, construction type and gender. In terms of world market share, China accounts for the highest percentage of bras (51%), coats (49%), accessories (46%), miscellaneous apparel (45%),

and baby apparel (44%). Its top two exports by product category are sweaters/sweatshirts and trousers, although that has shifted in more recent years to categories with overall higher unit values such as coats and dresses or skirts. Table 2 lists the world's top apparel exporters by year and value.⁹

Table 2: Top 10 Apparel Exporters by Year and Value, 2008-16

Partner	Value (US\$, billions)					World Share				
	2008	2010	2012	2014	2016	2008	2010	2012	2014	2016
TOTAL	343	330	365	402	377					
China	134	142	149	141	130	39%	43%	41%	38%	34%
EU-15	60	52	54	63	58	18%	16%	15%	16%	15%
Bangladesh	14	17	23	29	33	4%	5%	6%	7%	9%
Vietnam	10	11	16	22	25	3%	3%	4%	5%	7%
Turkey	16	15	17	19	17	5%	5%	5%	5%	5%
India	11	13	13	16	15	4%	4%	4%	4%	4%
Cambodia	—	4	6	9	10	—	1%	2%	2%	3%
Indonesia	8	8	10	10	10	2%	2%	3%	3%	3%
Pakistan	—	4	—	5	5	—	1%	—	1%	2%
Sri Lanka	—	4	5	5	5	—	1%	1%	1%	1%
Morocco	5	—	—	—	—	1%	—	—	—	—
Mexico	5	4	5	—	—	1%	1%	1%	—	—
Hong Kong	6	—	—	—	—	2%	—	—	—	—
Top 5	269	269	296	330	309	78%	82%	81%	82%	82%
Top 10	236	239	258	284	263	69%	72%	71%	71%	70%

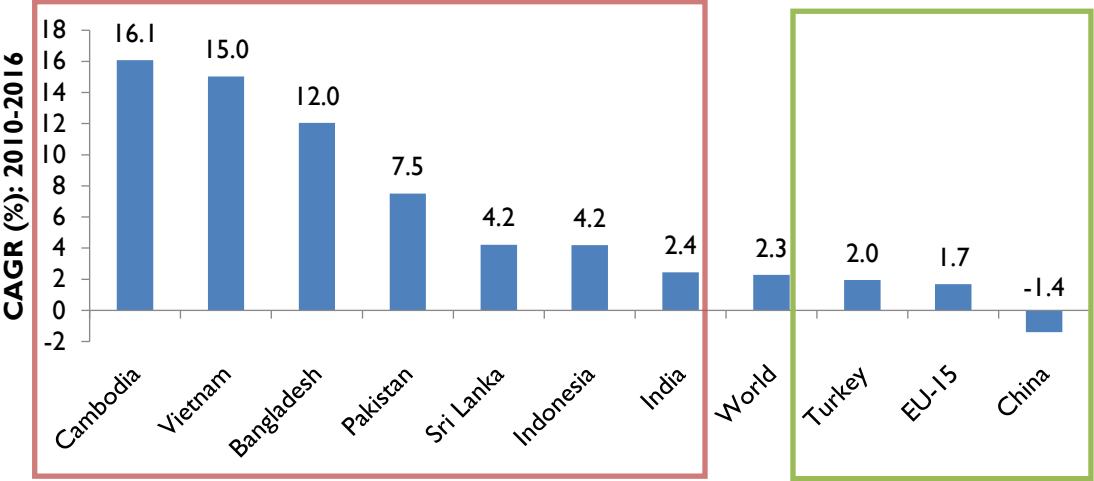
Source: UN Comtrade (2002-2016b). **Note:** HS02, 61+62 codes. Exports are based on import data. (—) indicates a country was not in Top 10 in given year. Pakistan, as an example, was not in top 10 in 2008 and 2012.

There are indications China's apparel industry might be facing headwinds. Growth has largely stagnated in the value of the country's apparel exports—it exported US\$142 billion worth in 2008 for a 43% share of the global market; in 2016, the total was US\$130 billion for a 34% share. Moreover, the country's increasing labor costs and policy focus on higher value-added industries has led lead firms to evaluate other countries. Since the global economic crisis, apparel buyers stated their intent to decrease the share of apparel sourced from China as a response to increasing costs, (Frederick, 2016; McKinsey & Company, 2013).

Countries in South and Southeast Asia have proven the largest growth markets as China enters a period of transition. Cambodia (16%), Vietnam (15%), Bangladesh (12%) and Pakistan (7.5%) posted the highest Compounded Annual Growth Rates (CAGRs) for the value of their exports in the six-year period from 2010 to 2016 (see Figure 4 below). As a result of this and more recent expansion, Cambodia was the world's seventh largest exporter by value in 2016, Vietnam was the fourth, Bangladesh the third and Pakistan the ninth.

⁹ The highest unit value cannot necessarily be interpreted as having the highest value addition or the highest margins. Calculations on individual margins vary significantly by company and are complicated by individual firm strategies—some companies will take a loss on certain products in order to maintain relationships with buyers. Multi-country, firm-level datasets would be required to draw conclusions about most profitable products.

Figure 4: Top Global Apparel Exporters by CAGR, 2010-2016



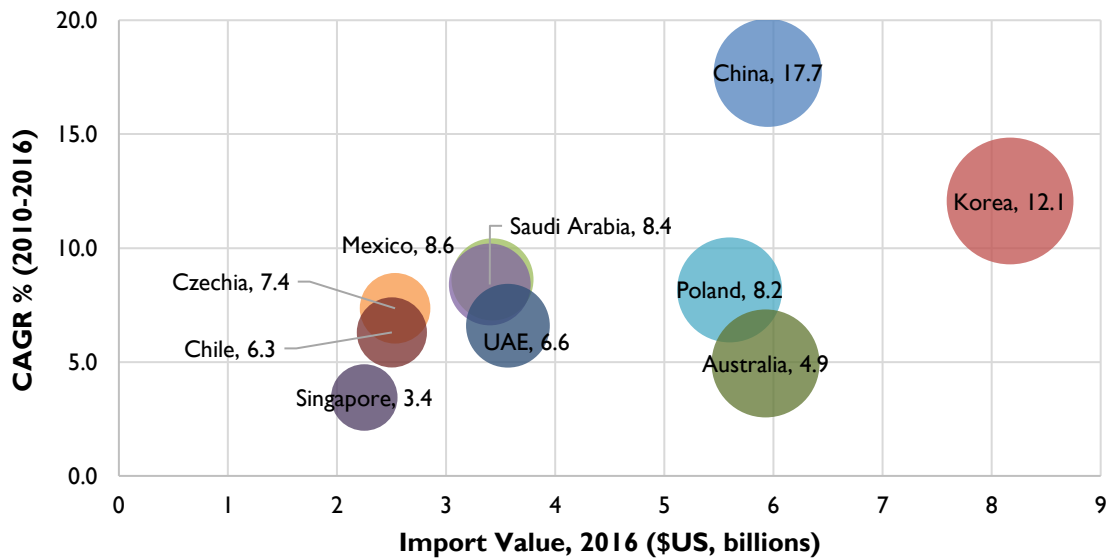
Source: UN Comtrade (2002-2016b).

2.2.2. Global Demand

Geographic end markets for apparel can be analyzed using both retail and trade data. The retail data supplements trade data because several growing apparel markets are omitted in trade data because this excludes non-traded apparel—apparel produced domestically for the domestic market—and countries with limited trade data availability. In 2014, the value of the global apparel retail market was approximately US\$1.38 trillion and the total value of apparel imports was US\$402 billion (Frederick, 2018a). Highlighting some of the discrepancies between trade and retail data, Asia-Pacific was the largest retail market in 2014, accounting for 34% of sales for a value of US\$474 billion. By contrast, it generated less than 20% of the global import market.

With respect to import data, the largest and the fastest growing import markets include South Korea, UAE, Australia, China, Poland, Saudi Arabia and Mexico (UN Comtrade, 2002-2016b). Figure 5 below presents the fastest growing apparel import markets, while Table A-2 in the Appendix lists the largest global importers in the period from 2008 to 2016. There is a high degree of consistency each year, with the EU-15, US and Japan consistently ranking as the top three markets followed by Hong Kong and Canada. Although the US and the EU-15 remain the largest importers, emerging and regional markets are gaining in importance and represent equally important opportunities for apparel manufacturers. Diversifying end markets not only increases growth prospects—especially since mature markets such as (the United States and the EU-15) are experiencing a slowdown in demand—but it also reduces risks and dependency on certain markets and buyers (Frederick, 2016).

Figure 5: Fastest Growing Apparel Import Markets, 2010-2016



Source: UN Comtrade (2002-2016b). Apparel is represented by HS02 (61+62); countries shown are non-top five importers with had imports greater than US\$2 billion in 2016 and a change in export value greater than the world average between 2010 and 2016.

2.3. Lead Firms and Governance

The categories of firms that participate in the apparel GVC can be roughly distinguished based on the activities they perform. The four primary distinctions were first introduced in the apparel GVC diagram (Figure 1). They are as follows:

1. **Cut, Make & Trim (CMT):** A marginal supplier that typically generates low-cost outputs in high volume. The manufacturer only cuts the fabric, sews it together and adds final trim (zippers, buttons) and is not responsible for sourcing fabrics.
2. **Original Equipment Manufacturer (OEM):**¹⁰ The apparel manufacturer is responsible for all production activities, including the CMT activities as well as finishing. The firm must have upstream logistics capabilities, including procuring (sourcing and financing) the raw materials, piece goods, and trim needed for production.
3. **Original Design Manufacturer (ODM):** The apparel supplier is involved in the design and/or product development process, including the approval of samples and the selection, purchase and production of required materials. The apparel supplier is also responsible for coordinating the production and logistics activities.
4. **Original Brand Manufacturer (OBM):** The apparel supplier is responsible for branding and marketing of the final products.

¹⁰ Full package or Free on board (FOB), which is an international trade term, are also used to describe this category in which the manufacturer is responsible for financing and coordinating shipment of the product to the buyer.

Lead firms are set apart because of their purchasing power and control over the activities that generate the most profitable returns. The share of the retail selling price attributable to manufacturing an apparel item is typically less than 30%, of which raw material costs make up the largest share. Costs associated with intangible activities including product development, design, marketing, branding and management contribute the other 60-75% (Hester, 2013; Newbury, 2013). The lead firm sets the price to develop a final product and thus determines the final product margin, the difference between the cost of manufacturing, and the price it will pay to purchase or manufacture the product. These activities primarily take place at the headquarters of global retailers and brands in the United States and Western Europe.¹¹

There are two key sets of business-to-business relationships in the apparel value chain. The first is the division between lead firms and the first-tier supplier (often OEMs). The second is between the first-tier supplier and branch locations or subcontractors and input suppliers (CMTs in the above categories). These relationships are important for production-related decisions. First-tier suppliers are responsible for coordinating the supply chain and thus make decisions on which factories are included in the chain. Lead firms may or may not have a relationship with these factories or suppliers farther upstream.

There are recent trends associated with governance and power in the apparel GVC that are worth accentuating. These include the following:

- 1. There has been some consolidation as buyers are increasingly purchasing from larger, more capable first-tier suppliers (OEMs and ODMs).** Lead firms prefer fewer suppliers because identifying and maintaining relationships with many vendors adds unnecessary time and transaction costs for buyers whose core competencies are in the higher-value activities related to marketing and branding. With these companies increasingly focused on sourcing from larger and more capable vendors, the smaller firms focused on assembly face challenges in forming direct relationships with global buyers. It should be noted that this does not necessarily mean there are fewer apparel manufacturers overall—smaller firms still play a role as subcontractors to first-tier suppliers and as producers for domestic markets. However, there are clear indications of supply chain consolidation, which forces companies in emerging markets that are attempting to enter and upgrade within the chain to consider variables that are outlined below.
- 2. Firm-specific factors beyond price are critical in the supplier selection process, with two characteristics gaining in importance.** Traditional metrics such as price and quality are baseline considerations that all suppliers must demonstrate to be competitive. There are also a range of secondary characteristics that buyers use to evaluate potential suppliers. Two specific factors have increased in importance in recent years: **full-package capabilities** and **lead time**.

Full-package capability describes non-manufacturing capabilities or value-adding services. With lead firms concentrating on core competencies and reducing the complexities of their supply chains, the expectation is that suppliers can handle more responsibilities. Buyer surveys show

¹¹ While lead firms are most often the OBM, there are four different types: 1) mixed retailers/mass merchants; 2) specialty retailers; 3) brand marketers; and 4) brand manufacturers. These lead firms are responsible for selling different types of brands, including national brands, private labels, exclusive labels, and licensed brands (Frederick, 2015). Table A-3 in the Appendix provides further descriptions and examples of each category of lead firm.

the most important services include input or material sourcing and financing and product development (Frederick, 2016). These require more diverse skill sets, including customer service, technology training and supply chain management (Frederick, 2015).

The emphasis on lead time is related to the shift to lean retailing and just-in-time delivery, where buyers reduce the inventory risks associated with supplying apparel to fast-changing, volatile markets by replenishing items on their shelves in very short cycles and minimizing inventories (Frederick, 2015). Buyers are reconfiguring their sourcing strategies by working with fewer vendors and forming more strategic relationships, sourcing products closer to home and adapting new software and planning technology to streamline the process.

- 3. Although firm-specific considerations are critical, country and industry characteristics also play significant role in chain relationships.** Industry and country-level variables are generally of less importance compared to firm-specific factors in the supplier selection process. There are, however, areas where the local environment is a prominent consideration. At an industry level, while lead time and full-package capability have become important criteria for suppliers, linkages with local or regional textile suppliers is critical. Fabric production needs to be competitive in terms of price, quality, delivery time and variety. In this context, the possibility to import inputs duty-free is crucial given the large variety of fabrics (Frederick, 2016).

There are also country-level considerations that can impinge growth in the apparel GVC. The most important supporting features are transportation and power infrastructure, political stability, security environment and overall costs associated with trade. Historical relationships and established well-known capabilities within a country or region are important factors for chain entry or upgrading; concerns over any of the supporting features can be disqualifying, especially for markets that have very limited functional capabilities (Staritz & Frederick, 2014). Pakistan is an example of a country where political turbulence has damaged the apparel industry. Because of concerns over security and political stability, executives from foreign companies rarely visit the country, making it difficult for exporters to access new markets (Shaikh, 2015).

2.4. Human Capital

The fact apparel production is labor intensive ensures the industry supports a high number of workers. Worldwide, estimates suggest that close to 14 million people work in the sector, placing the industry among the global leaders in terms of overall employment (UNIDO, 1963-2014). If textiles and apparel are combined, the industry is easily one of the top employment generators, accounting for 11-13% of global manufacturing employment, with combined employment of at least 26.7 million in the formal sector.¹²
















Most workers are concentrated in production-related segments; they are often female and earn minimum wages. There is also a strong youth component to the industry, especially at the assembly stage. In 2012, the average age of the textile workers was about 26 years in Cambodia and 30 years






¹² It should be stressed there are inconsistencies in estimates on the workforce of the global industry owing to what activities and products are included. Additionally, including informal workers in developing countries would dramatically increase the size of the global workforce. Some have gone as high as 75 million (Stotz & Kane, 2015).

in Vietnam, while that of non-textile and apparel workers was 35 years and 38.5 years, respectively (Kotikula et al., 2015). While the required formal education and skill level is low at the assembly stage, it rises rapidly as countries upgrade into higher-value stages; workers with more advanced skills are needed to support new service functions, such as logistics, finance, design and marketing.

Table 3 below provides an overview of the most important job profiles in the apparel GVC. It is organized by value chain segment.

Table 3: Job Profiles in the Apparel GVC

Position	Job Description	Typical Education	Skills/ Experience	Skill Level
Design				
Assistant Fashion Designer	Training in aesthetics of product development, some market and consumer knowledge, and technical skills required to translate ideas into samples	BA/BS, Design Apparel	Experience; Computer Skills	
Senior Designer	Creative talent within the industry that can develop new design lines for production.	BS/MS, Design Apparel	Experience; Computer Skills	
Product Development	Product life cycle management (PLM)	BS/MS, Business or Apparel		
Apparel Production				
Fabric Spreading/ Cutting	Layering/laying fabric on cutting table: Ensure materials are straight, smooth and tension free. Inspect for faults	None	—	
	Cut fabric by hand.	High school	Technical training	
	Pieces are cut via a computer-controlled machine.	Technical education		
Sewing Machine Operators	Operate sewing machines to join, reinforce, decorate, or perform related sewing operations	No formal education required	Speed and accuracy skills; OTJ experience	
Hand Sewers/ Embroidery	Sew, join, reinforce, or finish, usually with needle and thread	No formal education required	Required experience	
Finishing	Activities may involve final sewing/attaching buttons/zippers/fusing, dyeing, ironing/pressing, etc.	None		
Line Leaders	Supervisory roles; assure work flows along the line; workers often start as operators and progress	HS diploma/ technical education	Management skills	
Supervisors	Oversee pace of the work and ensure stoppages are minimized, monitor production levels, train, etc.	Technical education/ BS	Communication/ Planning	
Export Manager	Plans and coordinates all activities related to international shipment of goods	BS, Business	Communication Logistics	
Marketing & Sales				
Marketing Analyst	Responsible for market research, marketing/advertising, networking and positioning brands in the market.	BS/MS, Business	Marketing skills and experience	
Industrial Engineers	Arrange shop floor; lean production, Six Sigma	BS, Engineering		
Office and Administrative	Book keeping, human resources, payroll, accounting, customer service; ERP.	BS	Computer skills	
Corporate Management	Responsible for financial management, supply chain optimization, quality control, strategy and business development.	BS/MS, Business	Experience; General business	

Skill Level	Low	Low-Medium	Medium	Medium – High	High
					
	No formal education; experience	Literacy and numeracy skills	Technical education/certification	Technical education /undergraduate degree	University degree and higher

Source: Adapted from Fernandez-Stark et al., 2011.

2.5. Standards

At the same time that lead firms influence much of the contours and shape of the apparel GVC, private standards administered by outside parties play an important governance role in monitoring workplace conditions of apparel factories. These multi-stakeholder initiatives are composed of lead firms, NGOs, unions, government agencies and in some cases large MNC suppliers. Table A-4 in the Appendix below lists major private labor standards associated with the global industry; the largest and most prominent include the Fair Labor Association Workplace, the Fair Wear Foundation, ILO/IFC Better Work Programs, the Clean Clothes Campaign (CCC) and the Worldwide Responsible Accredited Production (WRAP).

These initiatives have both their strengths and weaknesses. A significant one is that they primarily target the supply chains of the largest global lead firms, which only account for a relatively small share of the global apparel manufacturing. An additional problem is the sheer number of initiatives—Table A-4 in the Appendix only includes a sample of the most prominent. Having multiple programs with similar requirements creates confusion and complexity and results in higher compliance costs, which ultimately increases fragmentation rather than promoting harmonization.

While the standards often succeed at identifying compliance issues in factories, they do not necessarily represent a means to address power asymmetry in the chain. The actual requirements to comply with the codes and standards are often low; in many cases, they do not address one of the primary concerns of workers regarding “living” wages. Furthermore, the definition of “living wages” is not universal nor is it legally binding. Estimates have been created as part of the Asian Floor Wage, but they are not part of an internationally agreed upon convention or standard. Some mention living wages, but due to inability to clearly define a living wage, they provide no means of enforcement.

There are also enforcement issues with respect to other issues such as minimum wages and child labor. Buyers all mandate that national minimum wages are paid in suppliers’ factories, but labor unions contest that these wages fall far below acceptable levels. Factory owners can also circumvent minimum wages by hiring employees under different titles (such as an apprentice) or as temporary employees that are not mandated under national minimum wage policies.

As far as child labor, most third-party standards have adopted ILO conventions prohibiting children younger than 15 from working as part of their programs. While it is not a prominent issue at first-tier factories and suppliers, it is observed in the informal sector in developing countries. Textiles in countries such as India has been highlighted as a sector and location where the issue is rampant (Theuws & Overeem, 2014).

3. Pakistan and the Apparel Global Value Chain

Key Points

- Pakistan's strong recent growth rate in apparel exports (6.3% from 2006-16) is somewhat deceptive. Its position in the GVC is concentrated in a small handful of products. Trousers is the largest export category, accounting for 50% of the value of the country's exports in 2016. The product's recent growth has been robust (11.6%). But expansion in other categories has been subdued.
- Pakistan's cotton base and integrated supply chain offer both strengths and weaknesses. It provides benefits with doubling down on existing products, such as trousers and denim. But it is a liability for product diversification, which is an important consideration as global buyers move toward sourcing from vendors and countries with broader product availability to reduce complexity and costs.
- In order to move forward, the industry should prioritize securing cost-competitive access to critical inputs (either by supporting cotton production and/or by simplifying tariff regime), attracting higher levels of FDI and enhancing the institutional environment.

Pakistan's foothold in the apparel GVC can trace its roots to the country's history of cotton production. Long one of the world's top-five sources for the raw material, a small group of local companies have taken advantage of the access to selected inputs to move from textiles to apparel and integrate into the supply chains of leading firms. With production clusters in Karachi, Lahore and Faisalabad, Pakistan was the eighth largest apparel exporter in 2016, accounting for close to 2% of worldwide share with heavy representation in certain product categories.

The sector's importance to Pakistan's overall economy can be detected through multiple metrics. The combined Textiles & Apparel (T&A) industries generated a minimum of US\$10.3 billion in exports each year between 2009 and 2016 (see Table 4).¹³ Throughout that period, the industry accounted for between 53-61% of the value of the country's total exports, with the 2016-17 financial year representing a recent historical apex (61%) (GoP MoF, 2018). If one focuses more narrowly on apparel, Pakistan had US\$5.7 billion in exports in 2016. Annualized growth was 6.3% in the period from 2006 to 2016 and 2.3% in the period from 2011 to 2016. With US\$2.9 billion in value, the country's largest export product category is in trousers, where it ranks as the world's sixth-leading supplier. All told, the T&A sectors directly employed roughly 2.5 million people.

¹³ While this report concentrates on the apparel GVC, there are times when segregating the apparel from textiles is not possible. In instances where data or other sources aggregate, this report uses the term "T&A industry."

Table 4: Pakistan’s Textile and Apparel Exports, 2009-16

	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17
T&A exports	10,338	13,887	12,470	13,156	13,856	13,589	12,553	12,531
Cotton & cotton textiles	9,755	13,147	11,803	12,628	13,348	13,139	12,168	12,248
Synthetic	446	608	546	406	383	331	288	204
Wool & woolen	137	132	121	122	125	119	98	79
T&A share of total exports (%)	54	56	53	54	55	57	60	61

Source: (GoP MoF, 2018). Source’s source: Ministry of Textiles. **Note:** US\$ millions.

Despite the significant economic activity, the industry still trails competitors in upgrading metrics. It has been hobbled by many features, from limited product diversity to onerous tariff regimes to infrastructure constraints to regulatory shortcomings. Although the competitive undercurrents that have shaped the global industry since the expiration of the MFA have influenced Pakistan, they have not been felt in the same way as in countries such as the Vietnam, Sri Lanka and Cambodia, where the growth of the sector has often been driven by foreign investment. The characteristics associated with the industry that are worth accentuating include the following:

- **Recent growth has been concentrated narrowly in certain product categories.** The annualized growth rate of Pakistan’s apparel exports is somewhat deceptive, suggesting a broad-based increase that is, in fact, far more concentrated. Driven by CAGRs of 11.6% from 2016-16, trousers are Pakistan’s largest export product, accounting for 50% of the value of all apparel exports in 2016. That figure represents a 19% increase in share since 2006 (see Table 5). There are certainly other categories where exports are expanding, but they generally are in products where Pakistan has only a negligible share of global trade. The country’s second and third largest categories (sweaters/sweatshirts and knit shirts) have largely been stagnant. Trousers are far more promising—Pakistan is the world’s sixth leading exporter and has the third best unit value in the global top 10.

Table 5: Pakistan's Apparel Exports by Product Category, 2006-16

Product Category	Export Value (US\$, billions)				Share of Pakistan's Total Apparel Exports				CAGR (%) 2006-16
	2006	2010	2014	2016	2006	2010	2014	2016	
Total	3.1	3.7	5.4	5.7	—	—	—	—	6.3
Trousers	1.0	1.4	2.5	2.9	31%	39%	46%	50%	11.6
Sweaters/Sweatshirts	0.5	0.4	0.6	0.6	16%	11%	11%	11%	2.4
Knit Shirts	0.6	0.6	0.6	0.6	19%	17%	11%	10%	-0.3
Hosiery & Socks	0.2	0.3	0.4	0.4	7%	8%	7%	6%	5.4
Accessories	0.2	0.3	0.3	0.3	5%	7%	6%	5%	6.5
Coats	0.2	0.2	0.2	0.2	5%	5%	4%	4%	4.3
Underwear	0.2	0.2	0.2	0.2	6%	5%	4%	3%	-0.2
Athletic	0.1	0.1	0.2	0.2	3%	4%	4%	3%	5.0
Suits/Formalwear	0.1	0.1	0.1	0.1	3%	2%	2%	3%	6.3
Miscellaneous	0.0	0.0	0.1	0.1	1%	1%	1%	1%	10.5
Baby	0.0	0.0	0.1	0.1	1%	1%	1%	1%	9.8
Dresses/Skirts	0.0	0.1	0.0	0.0	1%	1%	1%	1%	0.0
Woven Shirts	0.0	0.0	0.1	0.0	2%	1%	1%	1%	-0.9
Bras	0.0	0.0	0.0	0.0	0%	0%	0%	0%	18.1
Top Three	2.0	2.4	3.7	4.1	66%	66%	68%	71%	7.1

Source: UN Comtrade (2002-2016c). Note: Blue shades equal CAGRs > 5%. Red shades equal CAGRs < 1%.

- **The EU-15 has ascended to the position as Pakistan's top export market.** As recently as 2008, the US was Pakistan's largest export market; in that year, 45% of total export value of Pakistan's apparel exports went there compared with 42% to the EU-15. The situation has shifted in recent years. In 2016, the EU-15 received 54% of the value of Pakistan's apparel exports while the US accounted for 24%. The importance of the European market is likely to continue with Europe granting Pakistan preferential access as a trading partner as part of the GSP+ program.
- **The apparel sector has undergone only limited economic upgrading, with 8-10 large companies generating close to one-third of the export revenue.** Most of the companies active in Pakistan's sector moved into apparel only recently after beginning as textile companies. The delayed nature of this integration has resulted in relatively modest product diversity and limited economic upgrading, with the increase in trouser exports and unit values being a prominent exception. By and large, Pakistan's outputs are predominantly men's wear (knit and woven) that is made from cotton fabrics. The value chain is as much as a local one as a global one, with companies active in one geographic area, possessing little in the way of international operations and largely serving the domestic market. There are few OBM's active in the market and only scattered examples of ODMs; most companies are OEMs or second-tier CMTs.

There are, of course, exceptions. Eight companies had more than US\$100 million in exports during the 2016/17 financial year, accounting for 31% of the value of Pakistan's total apparel exports. Nishat Mills, Sapphire Group and US Apparel & Denim are among the country's most prominent exporters; almost all these firms are integrated while some produce both apparel and home textiles. Most focus almost exclusively on the export market. At the other end of the spectrum, close to 90% of the roughly 5,000 businesses that export apparel products earn less than US\$1 million annually from international trade.

- **FDI into the T&A sectors has been minimal.** Like the larger economy, Foreign Direct Investment (FDI) has played a minimal role in Pakistan’s apparel sector. The textile sector has been more attractive, receiving moderate amounts of inflows in the early 2000s, although that interest has waned in more recent years. Overall, the total size of FDI in the apparel sector has been estimated to be less than 2% (Frederick, 2016). Table 6 below charts FDI inflow into the T&A industries from 2007-17. The apex came in 2011-12, when the sector received 3.6% of all the country’s investments.¹⁴

Table 6: FDI Inflows to Pakistani Textile and Apparel Industry, 2007-16

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Textile & Apparel (US\$, million)	30.1	36.9	27.8	25.3	29.8	10	-0.2	43.9	20	15.5
Total FDI (US\$, million)	5,409	3,719	2,150	1,634	820	1,456	1,698	987	2,305	2,746
T&A share of total	0.6%	1.0%	1.3%	1.5%	3.6%	0.7%	0%	4.4%	0.9%	0.6%

Source: Pakistan BOI (2018). **Note:** Each year represents financial years, beginning in July and ending in June of the following year.

- **Although female participation has increased, labor in the sector still suffers from male overrepresentation. There are also shortages of trained workers.** Both the T&A industries in Pakistan have traditionally been characterized by limited social upgrading. The textile sector employs as much as 40% of the industrial labor force, yet there is also a significant shortage of trained labor, forcing companies to invest resources on internal training (CNV Internationaal, 2017; GoP MoF, 2018).¹⁵ A central characteristic of the workforce is that it has traditionally been skewed heavily toward men, with cultural stereotypes against factory work, the lack of public transportation and insufficient child care all playing key roles in the low female participation rates (Huynh, 2017; Munir et al., 2018). Although male workers still hold approximately two-thirds of all T&A jobs (Huynh, 2017), there has been some evolution in recent years. Significantly, the average annual growth for women in the industry has been 10% over the last four years compared with 4.3% for men.

The following portion of the report analyzes Pakistan’s participation in the apparel GVC and examines how it is attempting to spur growth. Its goal is to provide a foundation for the potential upgrading trajectories and recommendations that follow in subsequent sections. Its organization is as follows: first, the country’s history and development in the apparel industry and its current participation in the GVC is examined before the organization of the industry is outlined as well as key firms and important institutions. After assessing upgrading steps that have been taken by stakeholders, there is then discussion of the country’s human capital before the section concludes with advantages and constraints that will shape future participation in the apparel GVC.

Qualitative and quantitative data presented in this section is based on field research conducted in Pakistan in September of 2018. Duke GVCC spoke with 25 stakeholders active in the apparel GVC

¹⁴ The government has made attempts to attract more investments to Pakistan’s broader economy. The China-Pakistan Economic Corridor (CPEC) is perhaps the most prominent example. Published details indicate the project is first focused on infrastructure, although the textile sector has also been linked to Chinese interest, with yarns and cloth being a target, although there could be some spillover into apparel (Husain, 2017).

¹⁵ The annual requirement for trained individuals in the textile sector is estimated to be 135,000 people; the annual supply is closer to 10,000 (CNV Internationaal, 2017).

during three separate week-long trips to Islamabad, Faisalabad, Lahore and Karachi. Individual citations are included when supplemental material was used to support the analysis.

3.1. The Development of the Apparel Industry in Pakistan

Pakistan's long history in textile production has provided a foundation for its apparel industry. With Punjab serving as the primary production region, cotton accounts for 14% of the country's total cropped area and is the leading agricultural output during the rainy season from May until December (Batool & Saeed, 2017). In addition to the local supply, the domestic industry received boosts from the government in the 1950s and 1960s through various government initiatives that attempted to increase exports in the sector. Programs such as the Export Bonus Scheme and the creation of the Pakistan Industrial Credit and Investment Corporation as well as the Investment Development Bank of Pakistan all prioritized moving agricultural workers from traditional industries to the textile sector (McCartney, 2014).¹⁶

As a result of the government-assisted efforts and the country's natural resources, Pakistan's exports were heavily dominated by cotton-based textiles. In 1979, textile exports accounted for US\$991 million and included predominately raw cotton, yarn and fabrics; apparel exports, meanwhile, amounted to only US\$79 million (Staritz & Frederick, 2012). Throughout the 1980s and 1990s, the growth of the country's textile capabilities provided some support for the expansion in apparel exports, especially those that were dependent on domestically sourced cotton yarns and fabrics. By comparison, apparel products based on MMFs have historically only accounted for a small share of production and export (Khan, 2003).

The reliance on cotton speaks to a central feature of the industry: it has been slow in moving into apparel production. Although there has been an overall increase in the exports for both textiles and apparel, the performance of the two sectors has been uneven, with textiles dominating for many stretches.¹⁷ By and large, Pakistan continues to produce low-value cotton yarn and cloth and intermediate products for the world market.

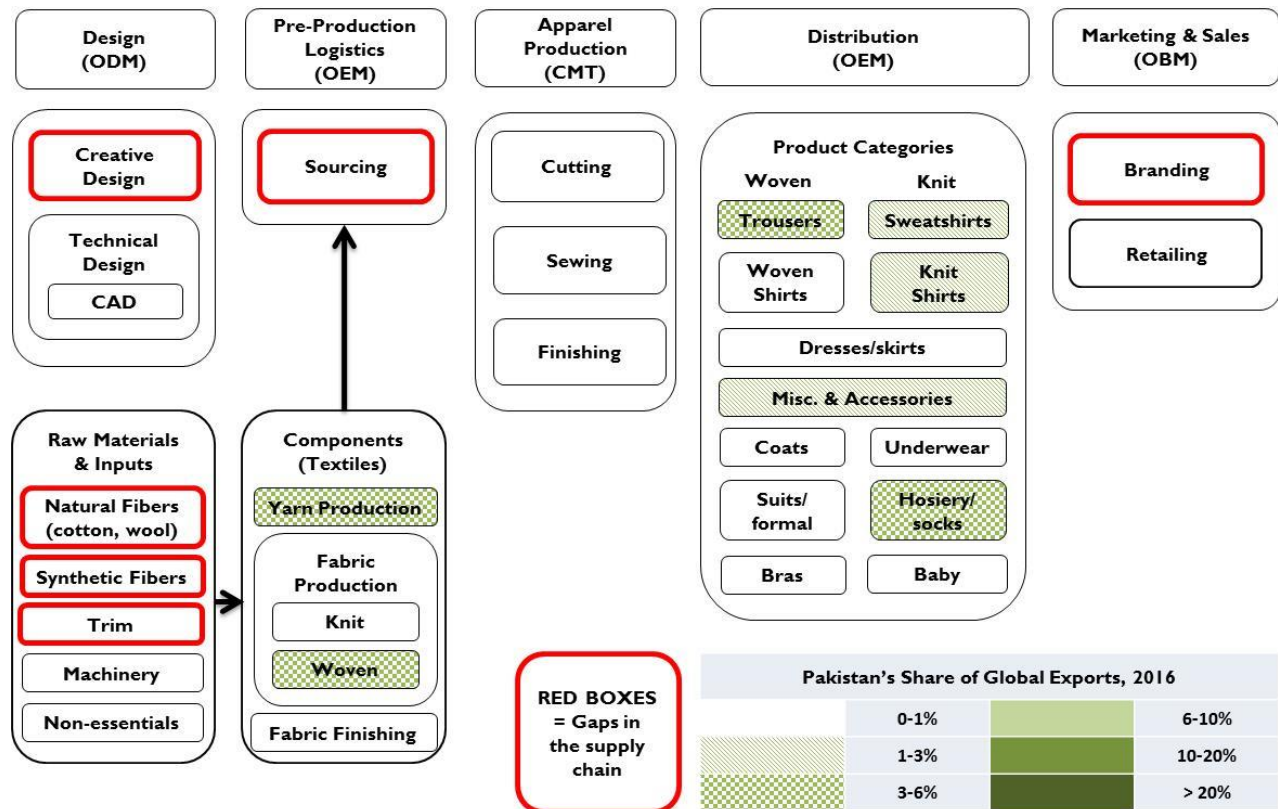
3.2. Pakistan's Current Participation in the Apparel GVC

Pakistan has an established foothold in the apparel GVC, solidifying its place in the last 15 years as an exporter of a handful of outputs. The country uses one of its larger advantages—its expansive base of cotton production—to provide global markets with both intermediate (yarn and fabric) and final products. Led mostly by domestic companies that have not accessed FDI to significant degrees, Pakistan's downstream apparel products are mostly concentrated in three categories: trousers, knit shirts and sweaters/sweatshirts. The US initially served as the country's largest market, although access to European market has increased since the implementation of the GSP+.

¹⁶ The Export Bonus Scheme offered incentives for increasing manufacturing exports; while the development banks offered capital for investments (McCartney, 2014).

¹⁷ Textile exports grew rapidly during the first half of the 1990s but stagnated in the second half and in the early 2000s before surging in 2003 and 2004 in light of increased exports to the EU and the US (Nordas, 2004). Pakistani textile exports increased their share in the world market from 2.8% in 1995 to 3.1% in 2004. Apparel exports grew more steadily from US\$530 million in 1991 to US\$2.6 billion in 2004, but the country's global share remained between 0.8-1.1% of total exports.

Figure 6: Pakistan in the Apparel GVC



Source: Authors. **Note:** The product categories in the Distribution segment of the value chain are ordered by approximate size of global market. Trousers, shirts (woven & knit) and sweaters/sweatshirts are the apparel products that have the largest worldwide trade.

Figure 6 above offers a visual representation of Pakistan's level of activity in the apparel GVC. Where possible, it has layered in export data available through UN Comtrade.¹⁸ Boxes depicted in green are where the country has the highest shares of the global market; trousers and hosiery/socks are the two final product categories where Pakistan exceeds 3% of exports, although the country does have 3-4% global market share in both yarn and fabric (woven fabric). Sweaters/sweatshirts, knit shirts and accessories are areas where Pakistan holds 1-3% global market share.¹⁹ White boxes signify areas where Pakistan has little to no export activity. Red circles then indicate gaps in the chain. The section that follows analyzes Pakistan's position in the apparel GVC from four perspectives: firms, backward linkages, products and end markets.

3.2.1. Firm Profile

Pakistan's apparel industry is characterized by a small handful of large companies that generate much of the country's exports and then thousands of smaller, local firms that access foreign markets in moderate to minimal volumes. Production is concentrated in or around the major cities of Karachi, Lahore, Faisalabad as well as Multan, Gujranwala, and Sialkot. The entire population of companies that

¹⁸ Shadings and comparisons involving the services performed in the apparel GVC (design, marketing, etc.) are not included because of the lack of available data.

¹⁹ It should be noted that Pakistan accounted for 1.2% market share in athletic apparel products in 2016; however, that category is not included in the GVC diagram because of its small market size.

exported apparel products during the 2016/17 fiscal year included 4,954 businesses (Pakistan Customs Authority, 2018). These firms generated US\$4.7 billion in export revenue under the 61 and 62 HS codes.²⁰

Table 7: Profile of Pakistani Businesses Exporting Apparel, 2016-17 Fiscal Year

Threshold	Number of Firms (Share)	Export Value (Share)	Top Product Categories (Share)	# of HS codes	Top Markets (Share)	Number of Markets
Over US\$100m	8 (0.2%)	US\$1.5B (31%)	1. 620322 (59%) 2. 611595 (12%) 3. 610910 (6%)	76	1. United States (31%) 2. Germany (11%) 3. UK (10%)	70
US\$10-100m	64 (1.3%)	US\$1.6B (34%)	1. 620322 (26%) 2. 620342 (13%) 3. 610590 (8%)	135	1. United States (28%) 2. UK (16%) 3. Spain (14%)	86
US\$1-10m	401 (8%)	US\$1.2B (25%)	1. 620322 (8%) 2. 610590 (8%) 3. 620342 (6%)	178	1. United States (33%) 2. UK (14%) 3. Germany (11%)	133
Less than US\$1m	4,481 (90%)	US\$0.5B (10%)	1. 611610 (7%) 2. 610590 (7%) 3. 620349 (5%)	203	1. United States (26%) 2. UK (18%) 3. Germany (9%)	164
TOTAL	4,954	US\$4.7B (—)	1. 620322 (30%) 2. 611590 (6%) 3. 620342 (6%)	207	1. United States (30%) 2. UK (14%) 3. Germany (10%)	175

Source: Authors based on Pakistan Customs Authority database. **HS codes:** 620322 = men's or boys' trousers or related products; 611595 = panty hose, tights, stockings, socks and other hosiery; 610910 = cotton T-shirts; 620342 & 620349 = recreational performance outerwear; 610590 = men's or boys' shirts, knitted or crocheted (other textile material); 611610 = gloves.

While the total number of businesses and the average exports suggest an industry that is heavily oriented toward SMEs, the sector is best described as bifurcated. At the top, roughly 10% of businesses account for 90% of exports. In the 2016/17 financial year, that point of delineation was US\$1 million in export sales—473 of Pakistan's apparel exporters eclipsed this threshold while 4,481 did not. Table 7 above provides a summary of the general profile of businesses exporting apparel products. It divides companies into four categories based on the value of exports.

Although it is not unusual that a handful of firms account for the majority of exports in a country, it is notable that Pakistan's upper echelon includes many of the country's largest companies across the entire economy. Eight topped US\$100 million in apparel exports during the 2016/17 financial year. These companies represented 0.2% of the entire population of apparel exporters but generated 31% of the exports, reinforcing the top-heavy nature of the industry.²¹ All are integrated from fabric to apparel, and many have at least some internal yarn spinning capacity. Only one company exports textiles in significant volume. All concentrate on export markets nearly exclusively.

The largest exporters often concentrate in a narrower range of products. The 620322 HS code (men's or boys' trousers or related products) was especially popular for companies that generated over US\$10 million in apparel exports in 2016/17—59% of the exports for the over US\$100 million firms

²⁰ The totals described in this subsection differ slightly from the figures outlined in the "Product Profile" subsection for two reasons: 1) They capture the 2016/17 fiscal year instead of the 2016 calendar year; and 2) the firm-level data is based on Pakistan's exports whereas the trade data reflects Pakistani imports reported by trading partners.

²¹ This likely understates the concentration at the top. Consolidated data was not available for parent companies that aggregate individual locations or subsidiaries. If it were, the share would be much higher.

fell into this category while 26% of the exports for the US\$10-100 million businesses did the same. In fact, six of the largest eight exporters appeared to specialize on individual products, with one HS code that accounted for at least 84% of exports during that financial year.

While the US was still the largest market for many firms that generated more than US\$100 million, there is geographic diversity, with few concentrating on any one market (see Table 8 below). The most common import for businesses in this grouping include labels, cotton and narrow woven fabrics; however, the overall import footprint for these firms is light (only US\$77 million across the 50-65 HS codes for the 2016/17 financial year) (Pakistan Customs Authority, 2018). Instead, most of these inputs are available on the local market or generated internally by the companies.

Table 8: Apparel Companies in Pakistan with >\$100m in Exports, 2016-17

Firm	Exports (US\$, millions)	Apparel Share of Exports [^]	Largest HS Code (Share)	Largest Market (Share)	Largest Import* (Share of Total)
Firm #1	217	100%	620322 (97%)	United States (28%)	Synthetic sewing thread (24%)
Firm #2	211	95%	611595 (84%)	United States (28%)	Labels (44%)
Firm #3	209	84%	620322 (99%)	Spain (22%)	Labels (28%)
Firm #4	195	97%	610510 (26%)	United States (67%)	Narrow woven fabrics (37%)
Firm #5	186	100%	611090 (23%)	United States (24%)	Narrow woven fabrics of other materials (35%)
Firm #6	180	83%	620322 (99%)	United States (43%)	Cotton (81%)
Firm #7	154	67%	620322 (99%)	United States (48%)	Labels (38%)
Firm #8	123	100%	620322 (99%)	Spain (36%)	Labels (38%)

Source: Authors based on Pakistan Customs Authority data. [^] = is compared only against the firm's textile exports and not economic activities that fall outside T&A GVC. * = The firm database only had imports for textile and apparel (HS codes 50-65). A three-year period (2014-17) is used to smooth potential supply chain fluctuations. **HS codes:** 620322 = men's or boys' cotton suits, ensembles, suit-type jackets, blazers, trousers, etc.; 611595 = panty hose, tights, stockings, socks and other hosiery; 610510 = men's or boys' shirts, knitted or crocheted (cotton).

Smaller businesses export similar products in significant volumes, although not to the same narrow degree as the larger firms. There were 401 companies that exported between US\$1-10 million worth of apparel during the 2016/17 fiscal year (8% of the total population). Their product distribution was more evenly distributed, with the largest five outputs all having between 5-8% shares of the total market.

In terms of sheer volume, the majority of businesses exporting apparel are SMEs generating less than US\$1 million in sales. In total, more than 90% of the firm population (4,481 of 4,954 total firms) falls into this category. These companies export products in at least 203 HS codes, with gloves, mittens and mitts, coated or covered with plastics or rubber (HS code 611610) being the most popular (7% share). While men's or boys' cotton suits, jackets and pants is the largest product HS code for Pakistan's largest exporters, it is only the fourth leading output for the country's smaller companies.

3.2.2. Backward Linkages

Cotton is the most significant import for companies active in Pakistan's apparel value chain, despite the fact the country is one of the world's largest five producers. Three of the largest 10 product categories for imports for firms that specialize in T&A exports from 2014-17 are different cotton varieties or classifications. Together, these three categories account for close to 20% of all imports,

with the 5201.0090 HS code (an “other” category that captures cotton products) being the largest. Other prominent categories include artificial fibers, chemical compounds and capital equipment. Table 9 below lists the top imports from the 2014/15 financial year through 2016/17. The largest 10 accounted for 43% of all imports from T&A firms located in Pakistan.

Table 9: Top 10 Inputs Imported by T&A Exporters, 2014/15-16/17

HS Code	Product	Share of Import Value (%)
5201.0090	Cotton, not carded or combed (other category)	14.5
3926.9099	Plastic materials (other category for elastic bands and others)	5.1
5504.1000	Artificial staple fibers (of viscose rayon)	5.1
3902.1000	Polypropylene	3.0
5503.2010	Synthetic staple fibers (of polyesters)	2.8
2905.3100	Ethylene glycol (Ethanediol)	2.8
8446.3000	Weaving machines (for fabrics with width larger than 30 cm)	2.7
5201.0060	Cotton (length exceeding 28.5 mm but not 31 mm)	2.7
5402.3300	Textured yarn of polyesters	2.6
5201.0050	Cotton (length exceeding 24.5 mm but not 28.5 mm)	2.1
—	Total	43.4

Source: Pakistan Customs Authority (2018).

The inflow of significant volumes of cotton could be considered something of a surprise considering Pakistan’s position as a leading cotton producer. The country’s total production volume has fluctuated between 7-10.6 million bales since 2008, placing the country in the top five in the world (USDA FAS (2018)). Yet output has plummeted in recent years, dropping nearly 34% in 2015/16 before a moderate increase in 2016/17. Quality is also low, which can be tied to a number of factors, including a pricing system that rewards weight, antiquated production and picking technologies as well as a familiarity with low-grade, small staple cotton (Batool & Saeed, 2017). The result is that local apparel producers pursue imports to access higher quality raw materials to blend for textile production that eventually results in apparel (Field Research, 2018).²²

With the local production at least serving as a backstop, cotton is not the most significant gap in the chain. Instead, the largest demand is for MMFs that are not widely produced in the domestic market (or synthetic fibers, as depicted in the apparel GVC diagrams). If one concentrates more narrowly on the fabric, yarn and fiber inputs that are used to create garments, roughly 64% of Pakistan’s aggregated material imports in 2016 were for MMF. In total, Pakistan imported roughly US\$1.55 billion in MMF materials in 2016.

Approximately 82% of the country’s US\$600 million worth of fabric imports was for MMFs compared with 7% silk and 6% cotton (see Table 10). Most came from China, a share that has increased rapidly in recent years, from 59% in 2006 to 86% in 2016. For yarn, 84% of Pakistan’s imports are for MMFs in 2016 as opposed to 13% for cotton. China is the largest source, accounting for 61% of the US\$750 million of Pakistan’s yarn imports in 2016. The only category where there is relative balance between cotton and MMF imports is in the unfinished fiber segment, which includes raw cotton and reinforces

²² The bottom line is that Pakistan is the third-largest cotton consuming nation in the world and the sixth biggest importer (Batool & Saeed, 2017). It is a net cotton importer.

the dynamics described above. Pakistan imported US\$1.06 billion worth of unfinished fiber in 2016; 55% was cotton material while 41% was MMF.

Table 10: Pakistan’s Fabric, Yarn and Fiber Imports, 2006-16

Material	Import Value (US\$, billions)				Share			
	2006	2009	2012	2016	2006	2009	2012	2016
Fabric (Knit, Woven)								
Total	0.15	0.07	0.22	0.60	—	—	—	—
MMF	0.11	0.05	0.10	0.49	75%	63%	45%	82%
Silk	0.00	0.00	0.02	0.04	2%	6%	8%	7%
Cotton	0.02	0.01	0.08	0.04	16%	15%	37%	6%
Other (wool, vegetable fiber, etc.)	0.01	0.01	0.01	0.02	7%	16%	6%	4%
Yarn (Filament, Staple, Unprocessed)								
Total	0.26	0.36	0.61	0.75	—	—	—	—
MMF	0.24	0.32	0.55	0.63	90%	89%	90%	84%
Cotton	0.01	0.01	0.04	0.10	4%	2%	7%	13%
Silk	0.01	0.02	0.01	0.01	4%	6%	2%	1%
Wool	0.00	0.01	0.01	0.01	1%	2%	1%	1%
Silk or Vegetable Fiber	0.00	0.00	0.00	0.01	1%	1%	0%	1%
Fiber (Unfinished; Unfinished or Waste; Waste)								
Total	0.71	0.87	1.04	1.06	—	—	—	—
Cotton*	0.40	0.48	0.57	0.58	56%	56%	54%	55%
MMF	0.25	0.32	0.42	0.43	35%	37%	40%	41%
Silk or Vegetable Fiber	0.05	0.06	0.05	0.04	7%	7%	5%	3%
Wool	0.01	0.01	0.00	0.01	2%	1%	0%	0%
Silk	0.01	0.01	0.00	0.00	1%	1%	0%	0%

Source: UN Comtrade (2002-2016a). Note * = category captures raw or slightly processed cotton.

3.2.3. Product Profile

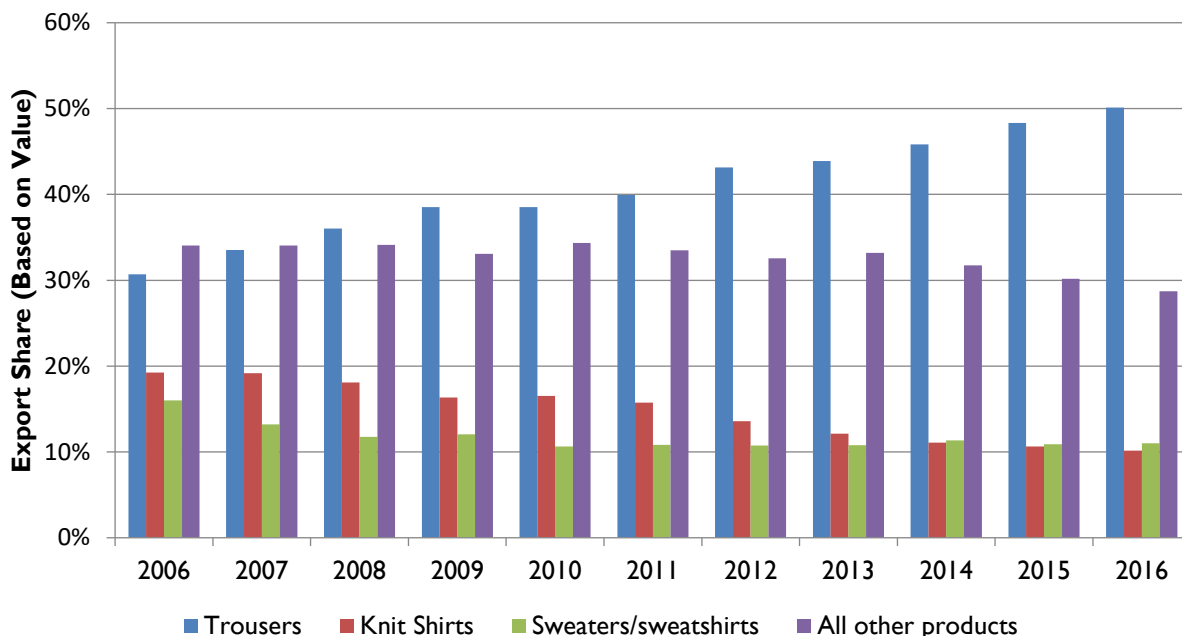
Although it has not enjoyed the dramatic, double-digit growth of regional peers (see Figure 4 in global section), Pakistan’s apparel exports have steadily increased in recent years. The country ranked as the world’s eighth leading apparel exporter in 2016 with US\$5.7 billion in trade, ninth if one considers the EU-15 as an aggregated bloc.²³ Its annual growth rate in the period from 2010 to 2016 was 7.5%, which is the fourth highest among the leading 10 exporters, trailing only Cambodia, Vietnam and Bangladesh.

Pakistan’s exports are concentrated in three product categories: trousers, knit shirts and sweaters. Together, the trio accounted for 66-71% of the country’s exports in the period from 2006 to 2016. Much of the increase has been driven by trousers, which had an annual growth rate of 11.6% during that same span. The growth rates for the other two exports—knit shirts and sweaters—have been more moderate. Figure 7 below charts trousers’ overall increase in export share as measured by

²³ The totals described in this subsection differ slightly from the figures outlined in the “Firm Profile” subsection for at least two reasons: 1) They capture the 2016/17 fiscal year instead of the 2016 calendar year; and 2) the firm-level data is based on Pakistan’s exports whereas the trade data reflects Pakistani imports reported by trading partners. Exchange rate fluctuations may also play a role.

value; Table 5 that was introduced earlier has individual data points. Of the country’s second-tier apparel products, hosiery & socks and accessories are two categories where annual growth exceeded 5% in the period from 2006 to 2016 and total export value was at least US\$300 million.

Figure 7: Share of Total Export Value for Leading Apparel Products, Pakistan



Source: Authors based on UN Comtrade (2002-2016).

Trousers’ growth comes at a time when Pakistan’s jeans manufacturers have enjoyed some success, with denim being identified as a growth opportunity (Mangi, 2018). The value of the country’s exports places it sixth individually in the world, trailing China, Bangladesh, Vietnam, Turkey and Cambodia.²⁴ Pakistan captures a higher unit value for its pants than its regional peers, trailing only the EU-15 and Turkey for highest unit value among the world’s 10 largest trouser exporters. The “Upgrading in Pakistan’s Apparel GVC” examines this trend in further detail, while Table 14 in the Advantages subsection lists the leading trouser exporters.

Consistent with its profile as a major cotton producer, Pakistani apparel exports skews heavily toward the material. Cotton’s share of total apparel exports has been between 82-87% in the decade from 2006 to 2016. MMF exports have comprised 6-9% of the country’s total during the same period.

In terms of fabric construction, woven products have become Pakistan’s most common, overtaking knitted outputs in 2012 and increasing market share from 41% in 2006 to 53% in 2016. Knitted products still accounted for 47% of Pakistan’s apparel exports in 2016. This trend distinguishes Pakistan from the global industry, where knitted products have grown at a faster rate than woven.²⁵

²⁴ The EU-15 combined had US\$9.2 billion of trouser exports in 2016. However, no individual country ranked ahead of Pakistan—Italy was the EU’s leader with US\$2.2 billion in trouser exports.

²⁵ At the same time that it imports fabric, yarn and fiber in significant quantities, Pakistan also regularly exports textile components. In 2015, importers from around the world reported US\$2.5 billion in imports of fabric from Pakistan, 98% of which was woven fabric, and US\$1.8 billion in yarn (98% staple), for a combined total of US\$4.4

3.2.4. End Markets

Pakistan's apparel products are largely exported to one of two destinations: the EU-15 and the US. One of the more prominent developments in the Pakistan apparel industry in recent years is its increased access to European markets. The US had been Pakistan's top trading partner throughout the early 2000s before the EU-15 took over that position in 2009. EU's ascension has continued in the years since—the 15 countries that comprise the EU-15 received 54% of Pakistan's apparel exports compared to 24% for the US. Growth markets include Poland (exports were up 27% on an annual basis in the years between 2012 and 2016) and China (up 39% annually in the same span), although these markets still receive small percentages of final products. Figure 8 below charts the EU-15's and the Rest of World's recent gains as well as the US's decline.²⁶

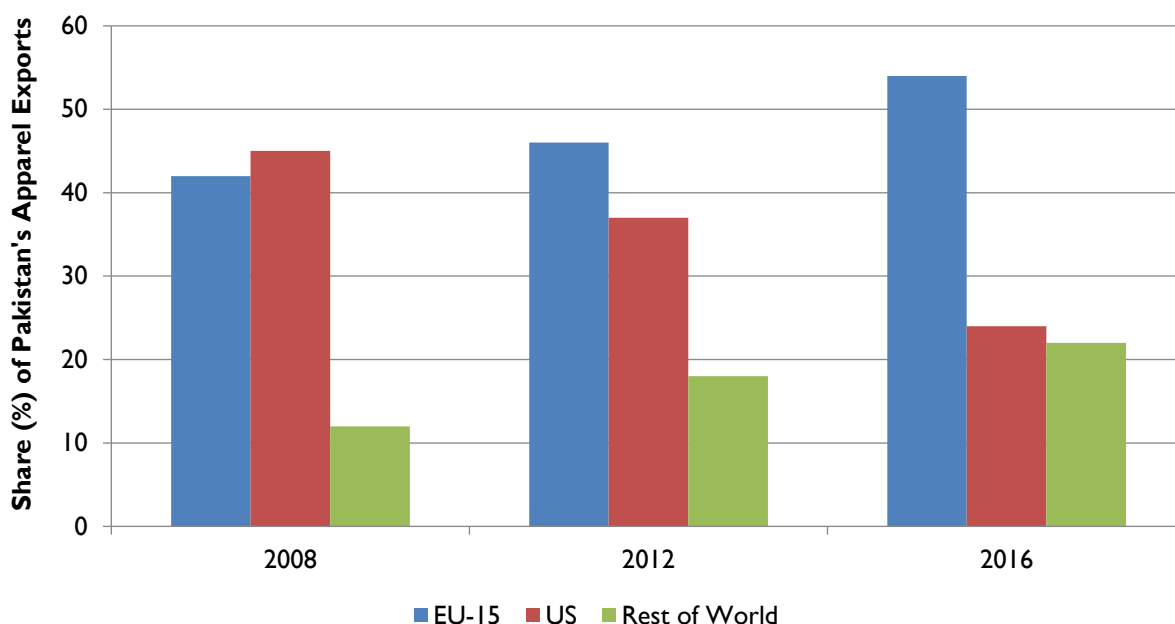
One reason that Pakistan's exports to the EU-15 have surged in recent years is the country's participation in the GSP+ program since 2014. As part of the initiative, the EU provides preferential market access to developing countries in exchange for that country committing to improve both human capital and labor rights. Although Pakistani exports to the EU have been on an upward trajectory for some time, the growth rate has increased in more recent years.

At the same time, exports to the US have declined significantly because of political and security considerations. The US State Department has regularly issued travel advisories against visiting the country since the September 11th terrorist attacks, and the relationship between the two countries has been strained at various points since Osama Bin Laden was killed in Abbottabad in 2011. With the travel restrictions, Pakistani suppliers must travel to the US or nearby countries (Bangladesh, Sri Lanka, the UAE) to meet global buyers or work via intermediaries. The limited access hinders opportunities to engage in product development and design with US buyers and facilitate economic upgrading.

billion. Both are primarily cotton-based (87%). The main fabric importer is Bangladesh (19%) and China (68%) for yarn (UN Comtrade, 2002-2016a). The country ranked seventh in global yarn exports and eighth in fabric.

²⁶ In terms of products and fabric construction, there is only minor variance in terms of destination. The most important products in both the US and EU-15 markets are trousers and sweaters and sweatshirts. In terms of fabric construction, there have been recent changes in the composition of exports to the US compared to the EU-15 countries, with knit exports to the US declining in importance.

Figure 8: Pakistan’s Top Apparel Export Destinations, Final Products, 2008-2016



Source: Authors based on UN Comtrade (2002-2016).

3.3. Governance and Industry Organization

A defining characteristic of Pakistan’s apparel industry is that it is mostly oriented toward the domestic market, notwithstanding the largest 8-10 companies, which sell almost exclusively to foreign buyers. With limited amounts of FDI and thousands of SMEs that struggle to export to foreign countries in significant volume, there are only limited connections to the global industry. Using the distinctions outlined earlier in the report, there are no OBMs and only scattered examples of ODMs. The majority are either OEMs or second-tier CMT manufacturers.

The companies that have managed to integrate into the supply chain of global buyers generally owe their success to longstanding textile production. The largest firms often were established in the second half of the 20th century and used the country’s cotton base as a foundation for entering the industry as yarn manufacturers. With access to cotton inputs as well as country-level supporting features that did not serve as debilitating constraints—Pakistan’s labor costs were not exorbitant, human capital was reasonably skilled and the port of Karachi served as an effective point of distribution—a small handful of businesses earned high returns by performing low-value, CMT-like activities. While subsequent economic upgrading has mostly occurred on a delayed basis, the leading firms have managed to diversify to a degree, with the largest performing ODM activities.

There are exceptions to this general narrative. Some companies that started in apparel production have consolidated their position through strategic integration, both backward into textiles and forward into finishing activities. Critically, the firms that followed this path progression made investments in human capital that allowed for the development of higher-value activities such as washing and finishing that have allowed a small number of firms to distinguish themselves for regional competitors and attract the attention of prominent OBMs (Field Research, 2018).

3.3.1. Lead Firms

Major buyers such as Target, the Gap, Levi’s, C&A and others have supply chains that extend into Pakistan. These global lead firms typically purchase garments from a small network of Tier I suppliers that are located throughout the country. There are 5-10 Pakistani companies that sell to more than one large global buyer while 25-30 more that have assimilated into the supply chain of at least one lead firm (see Table I I). There are still other businesses that either aggregate purchases across many smaller suppliers (intermediaries/agents) or others that have niche product categories and interact more directly with specialty buyers. Three of the largest intermediaries/sourcing agents for the apparel industry in Pakistan are Matrix Sourcing, Li & Fung and Texlynx.

Table I I: Pakistani Tier I Apparel Suppliers of Major Global Buyers

Pakistani Suppliers	Global Buyers	Segment/Products	Location	Workers in Pakistan	Year Est.
Nishat Mills	C&A, New Look, Target, Levi’s, Gap	Weaving, dyeing, finishing, woven apparel	Lahore, Faisalabad	1000-5000	1951
Sapphire Group	—	Yarn, Fabric, Knitwear, Woven apparel	Lahore	25,000	1970
Artistic Fabric & Garment	Gap; C&A; New Look; Target; VF	Denim manufacturing/yarn	Karachi	5000-10,000	—
US Apparel & Textile (US Denim)	Tesco, Levi’s, C&A	Denim fabric; Jeans	Lahore	18,250 (1,650 denim)	1975
Mahmood Group	—	Yarn, woven	Kabirwala Multan	12,500	1935
Gul Ahmed Textile Mills	M&S, Target	Yarn, stitching	Karachi	10,000+	1953
Interloop Limited	H&M; Tesco; Levi’s; Target; C&A	Hosiery	Lahore, Faisalabad	15,000	1992
Masood Textile Mills (MTM)	Levi’s, Target	Yarn, knit fabric, knitwear	Faisalabad	22,000	1984
Klash Private Ltd.	Europe	Knit fabric, Knit cotton tops	Faisalabad	10,000	2002
Comfort Knitwear	H&M	Yarn, Dyeing, Knitwear	Lahore	7,500 (5,500 apparel)	1987

Source: Authors based on company websites, LinkedIn profiles.

The largest of these firms generally have established histories as textile producers, with any backward or forward integration most often occurring in the recent past. Nishat Mills, for example, is one of the larger T&A companies in the country. It began in 1951 as a textile manufacturer in Lahore before supplementing with apparel manufacturing in 2007. Smaller numbers of businesses were more proactive in diversifying their product portfolio earlier in their existence. Artistic Denim is an example of an exception to the larger trend of specialization in textiles. The denim producer began manufacturing jeans decades ago, which has allowed it to build expertise that has been identified as a key factor in the company’s growth trajectory (Mangi, 2018).

There are many large denim manufacturers that have supported Pakistan's strong trouser exports. Levi's—a leading global brand of jeans—purchases from at least 10 Pakistani suppliers in Karachi, Lahore and Faisalabad: Akhtar Textile Industries, Akhtar Textiles, Combined Fabrics, Cotton Web Limited, Crescent Bahuman, Dynamic Sportswear, Firhaj Footwear, Interloop Limited, Masood Textile Mills, Nishat Mills and US Apparel & Textiles (Levi, 2018).

3.3.2. Institutional Context

There are number of domestic institutions that have helped give Pakistan's T&A industries its shape. Some of these are broad-based organizations that interact with multiple stakeholders across the broader economy. Examples of these groups include the Ministry of Commerce, Ministry of Industry and Production, the Small and Medium Enterprise Development Authority (SMEDA), the National Tariff Commission (NTC), the Engineering Development Board (EDB). There are also export promotion agencies such as the Pakistan Export Processing Zones Authority and the Trade Development Authority of Pakistan. Labor issues are then handled by the Ministry of Human Resource Development and the provincial labor secretaries.

There are then industry-specific actors. Owing to its historical importance of cotton, many of these organizations have a textile focus. At the government level, the most prominent is the Ministry of Textile Industry, which coordinates programs and strategies for the entire sector. It is supported by active industry associations, including the Pakistan Readymade Garment Manufacturer & Exporter Association (PRGMEA), the All Pakistan Textile Mill Association (APTMA) and the Pakistan Textile Exporters Association (PTEA). Table 12 below provides a summary of the key stakeholders.

As the government agency charged with formulating textile policy, the Ministry of Textile Industry plays a significant in shaping strategy. Its most recent policy document is the *Textiles Policy 2014-19* document, which was released in 2016 and replaces the 2009-14 version. The latest edition outlined 15 goals, many of which have quantifiable targets, including doubling textiles exports from US\$13 billion to US\$26 billion, facilitating new investments of US\$5 billion in machinery and technology, boosting the composition of non-cotton materials in fibers from 14% to 30%; and improving the non-cotton mix in garments from 28% to 45% (MOTI, 2015).

To support the broader strategy, the Ministry of Textiles pledged a variety of budgetary support mechanisms through 2019. These include the reduction of local taxes, access to easy finance, a sales tax refund regime, duty-free imports on machinery, and funding for vocational training. Additionally, the document proposed policy interventions to address the following issues or challenges: 1) tariff rationalization; 2) product diversification; 3) funding support for technology upgrades; 4) SME development; 5) establishment of product development centers; 6) OHS audits and trainings;²⁷ 7) Joint Ventures, mergers or relocation of international manufacturers; 8) strengthening textile firms; 9) electricity and gas; and 10) awareness and information dissemination.

²⁷ As part of this effort, the government proposed conducting analysis on energy usage and distributing information about best practices related to conserving energy.

Table 12: Textile & Apparel Specific Supporting Stakeholders in Pakistan

Name	Classification	Established	Description
All Pakistan Textile Mills Association (APTMA)	Industry Association	1957	Largest trade association, representing textile spinning, weaving, and composite mills
All Pakistan Textile Processing Mills Association (APTPMA) Faisalabad	Industry Association	1990	Processing of textile products in Dyeing, Bleaching and Printing. 372 members
Karachi Cotton Association (KCA)	Industry Association	1933	Cotton association for the whole of Pakistan.
Ministry of Textile Industry (MOTI)	Government Agency	1973	Formulates programs and strategies to bolster the competitiveness of textile sector
Pakistan Cotton Ginners Association	Industry Association	1958	Industry association for cotton ginners, representing more than 1,200 members
Pakistan Hosiery Manufacturers Association (PHMA)	Industry Association	1960	Represents hosiery and knitwear industry
Pakistan Readymade Garments, Manufacturers & Exporters Association (PRGMEA)	Industry Association	1981	Provides assistance to manufacturers and exporters to promote trade environment
Pakistan Textile Exporters Association (PTEA)	Industry Association	1985	Advocates for textile exporters and communicates with government

Source: Authors.

While the *Textiles Policy 2014-19* document provides some strategic guidance to the sector, there are three regulatory areas that influence Pakistan’s participation in the apparel GVC to significant degrees: labor; tax & tariff; and trade & investment. Each is outlined below.

Labor Policies

An important component of the labor environment in Pakistan is the 18th Amendment to the Constitution. Passed in April 2010, it pushed labor as well as 46 other subjects to provincial governments. The result is a patchwork of laws across the country that lack consistency with little harmonization (CNV Internationaal, 2017). The International Labour Organization (ILO) and other NGOs have attempted to provide regulatory foundations to support workplace gains across the whole country, but there is often minimal implementation at the local, provincial or national levels.

The implications for the apparel sector have been pronounced. The most prominent labor issues involve the right to form unions and the ability to earn a minimum wage, although there are also considerations for child workers, workplace safety and limiting excessively long work days. Each is examined below.

- **Freedom of Association:** Unions do not have a strong presence in the T&A industries. This is primarily the result of non-regulatory considerations, although it should be noted that the right to strike is not considered a fundamental right (CNV Internationaal, 2017). Moreover, labor laws do not apply to Pakistan’s Export Processing Zones (EPZs), where workers are not allowed to unionize (Richardson et al., 2017). Estimates indicate that 30-40% of all SEZ employees in Pakistan are female textile workers (CNV Internationaal, 2017).
- **Minimum wages:** The governments of Punjab and Sindh provinces set basic wage laws that govern most T&A workers. After variance between regions prevailed in previous years, all

provinces have set the minimum wage for unskilled work to PKR 14,000 (roughly US\$115) per month (Wage Indicator, 2018).

- **Workplace safety:** While there are basic protections enshrined into national law, prominent incidents have highlighted their inadequacy.²⁸ Both the Punjab and Sindh provinces have initiated processes to improve occupational health and safety, although there are hurdles—including an untrained and largely illiterate workforce—preventing progress.
- **Use of child labor:** Child labor is prohibited through Article 11 of the constitution. However, the informal sector is characterized by the employment of children as young as 10, with many working in various segments of the textiles chain (CNV Internationaal, 2017).

Tax and Import Tariff Policies

There are many components of the tariff and tax regime for apparel exporters. Three of the more prominent are the Duty Drawback of Taxes (DDT), the Drawback of Local Taxes and Levies (DLTL) and the Duty and Tax Remission (DTRE).²⁹ Key features of each are as follows:

- **DDT:** Pakistan's Economic Coordination Committee approved a 50% refund on duties, taxes and fees collected on the importation of textile inputs that are then used for export. Additional drawbacks are possible if companies increase exports by at least 10% or trade with non-traditional markets in Africa, Latin America and the Commonwealth of Independent States (Fibre2Fashion, 2017). Originally offered as a benefit to companies for the 2017 fiscal year, the government extended the benefit in 2018.
- **DLTL:** The DLTL provides textile exporters with refunds for local taxes and levies. Refunds are on values of their enhanced exports on an incremental basis if increased beyond 10% over previous year's exports. The rates vary by stage of the supply chain, with home textiles receiving 6%, apparel earning 7% and components between 3-4% (MOTI, 2015; Observer., 2017).
- **DTRE:** The DTRE allows businesses to import inputs duty free provided they re-export them (i.e., if a firm needed to import synthetic fibers or yarn, the same entity would need to export the product). However, only direct exports receive the benefit, thereby encouraging firms to integrate vertically to be eligible for the program.

The average tariff on cotton imports from Most Favored Nations (MFNs) is 3.8%, with individual rates ranging from 1-10% (WTO, 2015).³⁰ These rates are subject to fluctuations. In 2017, for instance, the government imposed a 4% tariff and 5% sales tax on imported cotton while excluding local cotton from the tax (USDA, 2018). The government then eliminated the tariff and taxes in 2018 to reduce

²⁸ One example is a 2012 fire at a textile complex in Karachi that killed nearly 300 workers. Windows were barred at the site and many of the exits locked (ur-Rehman et al., 2012).

²⁹ There are other policies designed to offer benefits to exporters, including manufacturing bonds. In the interest of brevity, this report focused on the schemes directly cited during field research. The government announced a plan in 2018 to offer security bonds for tax refunds; however, T&A exporters have expressed concerns about the proposal (The Express Tribune, 2018).

³⁰ For comparison, Pakistan's average (MFN) tariff on textiles and textile articles is 18.7%, with the individual range between 1-25% (WTO, 2015).

The cost and complexity of importing synthetic fibers is also an issue that inhibits product diversification in Pakistan (Kumar et al., 2016). Tariffs on imports of MMF are higher than cotton; the range, depending on the product is 5-16% (Pakistan Federal Board of Revenue). Due to the nature of the DTRE program, if a firm needed to import synthetic fibers or yarn, the same entity would need to export the product. However, given that most companies are structured as independent units—fabric and cut/sew are separate entities—the woven fabric would have to be exported to get the drawback unless the fabric manufacturer and the apparel producer are the same entity.

Trade and Investment Policies

Pakistan's Board of Investments (PBOI) helps coordinate strategies related to FDI while also managing the country's SEZs. The organization released two strategy documents in 2013 to help shape the country's approach to foreign investors: the *2013 Investment Policy* and the *FDI Strategy 2013-17*. Both identified the textile industry as a priority sector; neither includes apparel.

One component of the *2013 Investment Policy* was the Special Economic Zones Act 2012, which allowed for the creation of processing zones in the country. The benefits for businesses located within the 50-acre minimum tracts included: 1) duty-free import of capital goods; 2) income tax exemptions; 3) infrastructure support; 4) allowances for captive power generation; 5) one-window facilities operated by the BOI for administrative and compliance requirements; 6) dry port facilities; and 7) security considerations (Pakistan BOI, 2013). The SEZ regime provides similar services as the country's Export Processing Zones (EPZs), which are managed by the Export Processing Zone Authority, which is also housed under the Pakistani government. EPZs were first established in Pakistan in 1980, and there are eight spread throughout the country. Economic benefits include competitive lease rates on buildings as well as tariff and tax reductions for inputs and exemptions from foreign currency exchange repatriation regulations (EPZA, 2018).

A critical difference between EPZs and SEZs is that EPZs are more oriented toward foreign trade. Businesses in EPZs must export 80% of products, while companies in SEZs can sell in higher volume to the domestic market (Richardson et al., 2017). Another difference is the Export Processing Zone Authority provides more active management of EPZs while private companies or public-private initiatives often govern SEZs (Richardson et al., 2017).

Finally, the award of GSP+ status is one of the more significant recent developments as far as trade. GSP+ status allows more than 76% of Pakistan's T&A exports to enter the EU-15 without duties or quotas (EC, 2018b). To receive GSP+ benefits, products must have undergone double transformation. For apparel, this means the yarn, fabric and final garment must all originate from a beneficiary country. Pakistan is also a beneficiary of preferential market access under GSP to Canada, Japan, New Zealand, Norway, Russia, Switzerland, and Turkey, and it also has signed bilateral Free-Trade Agreements (FTAs) with countries such as Indonesia, Malaysia, Sri Lanka, Iran and Mauritius.

³¹ Non-tariff barriers are also a constraint, with the government sometimes raising phytosanitary concerns on imported cotton that arrives on vehicles instead of through the port in Karachi (USDA, 2018).

3.4. Upgrading in Pakistan's Apparel GVC

With its historical roots in cotton and textile production, Pakistan has been primarily active in supporting activities of the apparel GVC. There has been some recent industry evolution, with most of the country's largest exporters adding apparel capacity at different points in the last 10-15 years. However, the delayed nature of the economic upgrading has led to relatively modest product diversity and limited activity in value-generating activities.

The upgrading that can be detected is somewhat limited and has often worked in tandem with each other.³² For example, **process upgrades** in the form of reduced lead times to important destinations along with investments in human capital have allowed for **product upgrades** in the form of increasing amounts of woven products with more sophisticated washes and finishes. Combined, these factors have allowed the country to access markets that pay high price premiums while also diversifying to new markets (**end market upgrading**).

As highlighted in the "Firm Profile" and "Lead Firms" subsections, the industry is top-heavy. It is notable that the largest companies generally focus on one product, suggesting a sophistication with specialization and scale economies that serves as an advantage. It is these companies that have been most proactive about making progress to improve competitiveness in other respects. The apparel industry's most tangible gains include the following:

Process upgrading: Although it is difficult to quantify gains associated with improvements to Pakistan's production processes, officials from many of Pakistan's leading companies repeatedly highlighted gains in lead times as being critical factors that have allowed some to sell into the supply chains of lead firms such as Levi's and H&M.³³ The exact lead times vary depending on the product and market; however, most businesses reported reductions from 4-6 months to 2-3 months to as little as 35 days to ship products from Karachi to the EU, depending on the buyer (Field Research, 2018). Some firms have also invested in human capital, recruiting textile engineers and other skilled labor from production hubs in Turkey and elsewhere to develop capacity within Pakistan to generate garments with sophisticated washes and finishes.

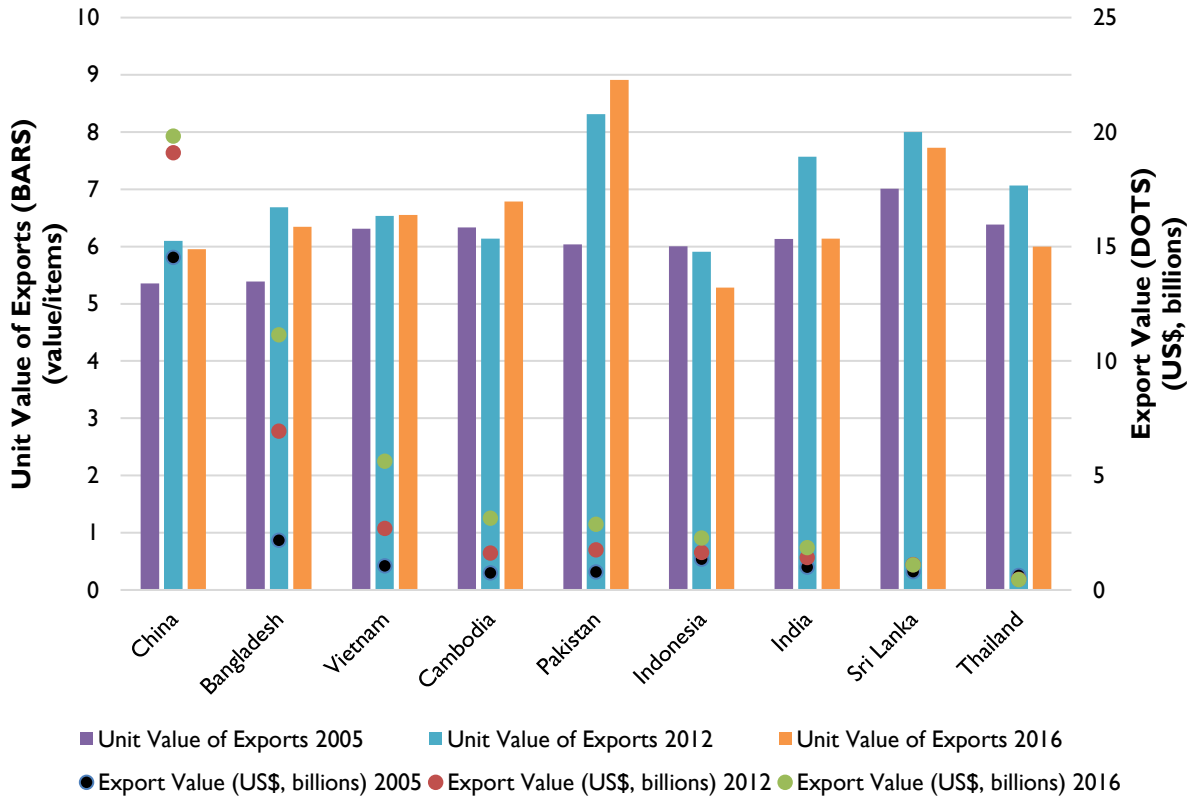
Product upgrading: Pakistan has made some moves into higher-value products in apparel production. Pakistan has a strong presence in denim manufacturing, with at least 10 companies active in Levi's supply chain. Many started selling to the jeans' manufacturer in the last 10 years, with some crediting improvements to their wash and finishing processes described above. During that time, Pakistan's unit value for exports of trousers has climbed to the third highest among the leading 10 global exporters. This has been driven by the country's increasing exports to the EU-15—the share of overall trouser exports to the EU-15 jumped from 55% in 2012 to 61% in 2016, and the unit value of Pakistan's EU-15 trouser exports is higher than its global average (US\$9.5 vs. US\$8.9). Overall, the unit value of the country's trouser exports increased 48% in the period from 2005 to 2016, giving Pakistan the highest unit value of trousers of anywhere in South and Southeast Asia. Figure 9 below charts the unit value of trouser exports for regional peers.

³² This section considers only apparel upgrades. There are other examples if one includes textiles. The widespread addition of spinning capacity for textile production is one. A common progression for integration involves adding spinning capabilities followed by weaving, knitting and finishing.

³³ Surveys based on the perceptions of buyers have placed Pakistan with India for having the worst performance on lead times and reliability of eight Asian nations: China, Vietnam, Sri Lanka, Indonesia, Cambodia, Bangladesh, India and Pakistan (Frederick, 2016).

Pakistan’s overall shift toward more woven products can also be considered a product upgrade. Woven’s share of Pakistan’s apparel exports increased from 41% in 2006 to 53% in 2016. This is notable for two reasons: 1) the unit prices associated with woven garments were US\$9.8 per unit in 2015 compared with US\$4.3 for knitted; and 2) the global industry has moved more toward knitted products.

Figure 9: Unit Value of Trouser Exports, South and Southeast Asia, 2005, 2012, 2016



Source: Authors based on UN Comtrade (2002-2016). **Note:** Bars illustrate unit value of exports while dots indicate the total value of trousers for a given year (US\$, billions). As with all UN Comtrade data presented in this report, unit values were calculated using mirror data from importers. Unit value was calculated by dividing the export value into the number of units sold.

End market upgrading (diversification): Most of the apparel from Pakistan is still bound for two large markets: the US and the EU-15. However, there has been diversification in export destinations, with markets outside those locations receiving increasing share. The “Firm Profile” subsection highlighted how apparel companies export to 175 total markets. The aggregated share of Pakistani exports going to countries outside the EU-15 bloc and the US increased from 12% in 2008 to 22% in 2016. The individual percentages are ultimately small, but the growth rates are strong—exports to Poland were up 27% on an annual basis in the years between 2012 and 2016 while China increased 39% annually in the same span.

Industry specialization or intersectoral upgrading: In addition to apparel, Pakistan is also a top exporter of home textiles and textile components (yarn and fabric), which are industries that have substantial overlap with the apparel GVC and make use of local cotton production. Pakistan exported US\$777 million of bathroom and kitchen linens in 2016 and US\$773 million of cotton bed linen (WITS,

2018), which would place both items in the top three of product categories if they were considered apparel exports. Moreover, both rank in the top six in analysis of export potential for the country's outputs, with Southeast Asia being targeted as potential growth markets.

3.5. Human Capital

The sizes of apparel workforces are difficult to ascertain. The overlap and inconsistencies in definitions associated with the T&A sectors is one reason for the challenge. Another is the high number of informal workers in developing countries. With respect to Pakistan, recent estimates have suggested there are as many as 2.2 million apparel workers and 4.2 in the greater T&A sectors (Huynh, 2017). However, the authors believe these estimates include home textiles in addition to footwear, neither of which are the focus of this study. Interviews conducted for this report suggest there are 700,000-1 million workers in Pakistan's apparel industry and that the T&A industries employ 2.5 million (Field Research, 2018).

Regardless of the size, there are three features associated with Pakistan's apparel workforce that are worth accentuating: 1) its low wages when compared with larger markets such as China, India, Indonesia and others (but not Bangladesh and Cambodia);³⁴ 2) its relatively low percentage of female workers; and 3) its shortage of skilled and literate workers in some areas. The first two characteristics are reinforced both through regional analysis as well as discussions with local stakeholders. The third factor—the skills gaps—can be best detected through country-level analysis. The following subsections explore each issue in further detail. Many data sources aggregate both T&A in their surveys; this subsection distinguishes between the two when possible and uses the T&A distinction when it is not.

3.5.1. Wages

The average monthly wage for Pakistani workers across all industries during the 2014/15 financial year was PKR 14,971, which was roughly the equivalent of US\$145 at that time (PBS, 2015).³⁵ Financing, insurance, real estate and business services had the highest monthly salaries (PKR 36,659 or US\$360) while agriculture, forestry, hunting and fishing had the lowest (PKR 7,804 or US\$76). As was detailed in the Labor Policy subsection, provincial governments are responsible for setting minimum wage guidelines—the current minimum wage is PKR 14,000 across all provinces.

Most apparel workers in Pakistan are still paid on a piece-rate basis for each basis of apparel generated (AASR, 2015). There is a wide range of salaries. Interviews with company officials associated with this project indicated that many paid their factory employees roughly US\$200 per month (Field Research, 2018). A survey of workers in the Punjab province indicated that the highest paying positions include dyeing managers (average monthly salaries are from PKR180,000-300,000 or US\$1,717-2,862), production planning (PKR65,000-90,000), cutting masters (PKR50,000-120,000), washing masters

³⁴ It is possible to make a comparison of apparel wages in Asian countries through different sources (see Huynh, 2017; van Klaveren, 2016; van Klaveren & Tijdens, 2018). One can estimate that Pakistan's apparel wages were higher than Bangladesh's and comparable to Cambodia's, while being significantly lower than India, Indonesia and China. However, none of the data points were from within the last three years, and they do not include supplementary features such as pensions and healthcare. Furthermore, the authors' estimates of Pakistani apparel workers' wages (US\$200 per month) was higher than external sources.

³⁵ The last Labor Force Survey published by the Pakistan Bureau of Statistics was after the 2014/15 financial year.

(PKR 45,000-100,000), weaving masters (PKR45,000-70,000), knitting masters (PKR40,000-70,000) and industrial engineers (PKR30,000-85,000) (AASR, 2015). Knitting helpers and assistants, stitching helpers, bundle makers, and applique thread cutters are all at the other end of the spectrum, with all paying either minimum wage or just below.

3.5.2. Female Participation

The T&A is slightly more inclusive of female workers than Pakistan's entire economy. Of the 57.4 million total workers active in the country's labor force in 2014/15, 44.1 million were males (nearly 77%) compared with 13.4 million females (PBS, 2015). The share of females in the garment, textile and footwear sectors was 35% (Huynh, 2017). There have been recent increases in the female share, yet Pakistan still trails all its regional peers except for India (24%). Myanmar (95%), Vietnam (79%), Sri Lanka (76%) and China (66%) all have demonstratively higher women participation rates in apparel than Pakistan (van Klaveren & Tijdens, 2018).

Individual estimates highlight the low numbers of female workers across Pakistan's apparel GVC. In Punjab, a survey of garment manufacturers reported that the departments with the highest shares of female employees were Human Resources & administration (17%), finishing (16%), stitching (16%), product development (12%) and embroidery (11%) (AASR, 2015). The least popular divisions for females were logistics (1%), weaving (2%), production planning (2%), dyeing (2%), knitting (3%) and research & development (3%).

The high percentage of male workers has historical roots in many factors, including cultural norms about women's suitability for factory work, perceived security and safety issues, the lack of public transportation and insufficient child care all playing key roles (Huynh, 2017; Munir et al., 2018). Under the old system, males were paid for each unit produced and had independence to work at different locations and determine their own schedule (Munir et al., 2018). With the phaseout of the MFA, Pakistan had to compete with countries in the region that had lower wage rates. That presaged the development of a more structured, salaried system that appealed less to the experienced males and provided increased opportunities for women, who proved to be less resistant to change. Supporting programs initiated by internal and external stakeholders also played critical roles in increasing access for women (Munir et al., 2018). Among the more prominent are the United Nations Development Programme's Gender Promotion in the Garment sector through Skills Development (GENPROM) and the ILO's Gender Equality for Decent Employment (GE4DE).

These changes and programs have led to quantifiable participation gains. The average annual growth rate for women's employment (10%) exceeded men's (4.3%) from 2010/11 to 2014/15 (Huynh, 2017). In textiles, the average annual growth rate for women's employment was nearly 23%. Yet despite these increases, women's pay remains well below men's, with a pay gap of as much as 64% (Richardson et al., 2017). Research into the issue has found that 93% of women apparel workers earn less-than-minimum-wage salaries (Richardson et al., 2017).³⁶

³⁶ It is worth pointing out that women work at smaller businesses to much higher degrees than men. Roughly 69% of men worked at businesses of five or less employees compared to nearly 100% of women (Huynh, 2017).

3.5.3. Skilled workers

A sizeable percentage of Pakistan lacks basic foundational education skills. The literacy rate of the population above 10 years old is 61%: 72% for males and 50% for females (PBS, 2015). The majority of the literate population attended formal schools but did not complete 10 years. Roughly 6% of the literate population completed high school while 5% finished high school and earned a formal degree.³⁷

The workforce in the apparel industry is not without its strengths. While wages are higher than low-cost competitors such as Bangladesh, they are lower than many markets, including China, India and others (van Klaveren, 2016). Some companies have invested in human capital in areas such as washing and finishing, and surveys have indicated that at least 25% of the workforce is highly skilled in a number of areas, including stitching, design, production planning, dyeing and merchandising (Field Research, 2018; AASR, 2015).

However, companies also report significant volumes of average or poorly skilled workers (AASR, 2015). The specific gaps often depend on the geographic regions; however, an underlying feature is that training systems are underdeveloped (Field Research, 2018). Only 32% of businesses in Punjab had a formal system to train their employees, while 52% believe it is a waste of resources (AASR, 2015). While there is an established Technical and Vocational Education and Training (TVET) system, there are only limited amounts of spots available for the close to 1 million new labor market entrants each year (Sandhu, 2018). Moreover, only 2.5% of TVET students receive formal, on-the-job training through the program (Sandhu, 2018).

3.5.4. Education and Training

Pakistan offers T&A-specific education and training at all levels—technical/vocational, industry-specific institutes and four-year universities offering B.S., M.S. and PhD programs. This is relatively unique and is often a key bottleneck for countries wishing to upgrade by increasing skills.

- **Universities:** There are two main universities that provide textile and apparel-specific degree programs: National Textile University and the Textile Institute of Pakistan. These institutions offer bachelor’s and master’s degrees in classes that focus on T&A subjects.
- **Industry-Specific Training Institutes:** The Ministry of Commerce/Ministry of Textiles and the industry association for the different stages of the supply chain in Pakistan have set up a series of technical training institutions in the country. Operational funding is provided by the relevant industry association (via membership dues) with some support from the national or provincial government for consumables. Institutes also receive funding from international NGOs for specific programs or machinery. These relationships are facilitated by the Ministry of Textiles. The main programs include the Pakistan Readymade Garments Technical Training Institutes (located in Lahore and Karachi) and the Pakistan Knitwear Training Institute (located in Lahore).

³⁷ The Labor Force Survey uses a category labelled “intermediate” to describe students who completed 12 or 13 years of education while “degree and above” includes students who finished 14 or more years of education.

- **Technical and Vocational Programs:** TVET has textile courses. Of the 339,624 graduates from 2009-2018, approximately 7% (23,629) were from textile or apparel-related programs (not including tailoring). Programs with the most graduates are dressmaking, machine embroidery, fashion designing, hand embroidery and stitching operator. Some of the constraints with the program were outlined above, with as little as 2.5% of the program’s graduates receiving formal on-the-job trainings (Sandhu, 2018).

3.6. Advantages and Constraints

There are strengths and opportunities associated with the sector, with the country’s expansive cotton production, its growing exports in certain product categories and its access to the European market being three of the more prominent. The high rate of domestic ownership also offers potential for future upgrading. Balanced against the reasons for optimism are a number of challenges, both related directly to the industry as well as the country as a whole. Table 13 summarizes both the strengths and weaknesses. The most prominent advantages and constraints are then outlined in the section that follows. The potential upgrading section expounds on possible opportunities.

Table 13: SWOT of Pakistan’s Apparel Industry

Strengths	Weaknesses
<ul style="list-style-type: none"> • Status as leading cotton producer has strengthened backward linkages to allow for presence in trousers • Low labor costs distinguish country from some regional peers • GSP+ access to EU-15 markets • High rates of domestic ownership provide familiarity with downstream activities • Supporting environment provides industry with institutional foundation • China-Pakistan Economic Corridor (CPEC) project could improve infrastructure 	<ul style="list-style-type: none"> • Cotton production is declining, and the quality is low • Gaps in the supply chain have limited product diversity and upgrading • Concerns with lead times • The supporting environment is fragmented • Limited amounts of FDI leave parts of domestic sector disconnected from global industry • Skills deficiencies continue to undermine sector’s potential • Complicated and inefficient trade and investment regimes • Infrastructure and safety remain leading concerns
Opportunities	Threats
<ul style="list-style-type: none"> • Increased specialization in trousers and denim • Diversification of apparel products or move into related outputs (medical textiles) • ODM and OBM for select products • Boosting share of women workers 	<ul style="list-style-type: none"> • Climate change • Terrorism and political instability

Source: Authors.

3.6.1. Advantages

Many of Pakistan’s advantages in the apparel industry can be traced to its historical position as a cotton and textile producer. Enhanced access to European markets, cost-competitive labor and high percentages of domestic ownership are also important considerations. The follow subsection expounds on Pakistan’s strengths in further detail.

1. **Status as leading cotton producer has strengthened backward linkages to allow for presence in trousers.** Although its output has been stagnant for the better part of 20

years, Pakistan still ranks in the top five globally in terms of annual cotton production. Access to the material has provided textile manufacturers with a critical input and facilitated the country becoming a top-10 exporter of yarn and fabrics. The backward linkages have also allowed Pakistan to carve out a niche in certain product categories where the country's limited supply of MMF materials does not act as a roadblock.

Trousers are the most compelling example. If Pakistan is going to have a strong presence in one category, trousers are an advantageous one. Globally, they are the leading apparel export product. In 2014, 69% of all trouser imports around the world were cotton, 23% were MMF, 6% was other material and 2% were wool. That profile has suited Pakistan well. At a time when it has expanded its capacity for denim production, Pakistan ranked as the sixth largest individual trouser exporter in 2016 (seventh if the EU-15 is considered as one bloc), and the value of its exports are the third highest among the leaders. Table 14 below lists the world's top 10 trouser exporters in 2016 and includes each market's unit value.

Table 14: Top 10 Global Trousers Exporters, 2016

Partner	Value (US\$, billions)	Volume (items, billions)	Shares (%)		Unit Value
			Value	Volume	
World	76.3	10.5	—	—	7.3
China	19.8	3.3	26%	32%	6.0
Bangladesh	11.1	1.8	15%	17%	6.3
EU-15	9.2	0.8	12%	7%	12.1
Vietnam	5.6	0.9	7%	8%	6.6
Turkey	4.3	0.4	6%	4%	11.0
Cambodia	3.1	0.5	4%	4%	6.8
Pakistan	2.9	0.3	4%	3%	8.9
Indonesia	2.3	0.4	3%	4%	5.3
India	1.8	0.3	2%	3%	6.1
Mexico	1.8	0.2	2%	2%	8.7

Source: (UN Comtrade, 2002-2016c). Exports based on world imports from all countries.

- 2. Low labor costs distinguish country from some regional peers.** While there are exceptions (Bangladesh is a prominent one), Pakistan's wage rates are lower than many regional competitors (van Klaveren, 2016), especially large economies such as China, India and Indonesia. The relatively cheap labor provides Pakistan with advantages, especially since it can distinguish itself from lower-cost competitors such as Bangladesh with an integrated supply chain as well as capacity to produce export products with sophistication, including finishes on denim and trouser outputs.
- 3. GSP+ access to EU-15 markets.** The EU-15 reaffirmed Pakistan's GSP+ status in 2018, providing the country with preferential access to its markets. Under the scheme, 76% of Pakistani T&A exports—including trousers—qualify for duty-free access with as much as 80% receiving preferential rates. As highlighted through the report, the EU-15 has become Pakistan's largest market for apparel products. All told, T&A products account for roughly 80% of all Pakistani exports to the EU-15 markets (EC, 2018a).
- 4. High rates of domestic ownership and vertical integration.** Pakistan's low levels of FDI offer both advantages and disadvantages. On the positive side, it affords a familiarity with

downstream activities such as marketing and distribution. Whereas branch plants of foreign owned companies usually only engage in assembly, Pakistan's largest exporters are vertically integrated. They also tend to focus on one product, which suggests a sophistication with specialization and scale economies that serves as an advantage. The potential of moving into design and brand development is higher than Southeast Asian competitors such as Vietnam and Cambodia, which represents a significant opportunity since markets outside the US and EU do not have established sourcing relationships with East and Southeast Asian firms (Kumar et al., 2016).

5. **Supporting environment provides industry with institutional foundation.** Pakistan has numerous institutions and organizations specific to the T&A industry. One of the most prominent is the Ministry of Textiles, which sets policies and strategies for the entire sector. There are also a range of industry associations for each stage of the chain as well as an assortment of educational institutions. While each of these groups of stakeholders have shortcomings (see Weaknesses), their presence and engagement provides a foundation that often serves as a key impediment when these groups do not exist.
6. **China-Pakistan Economic Corridor (CPEC) project could improve infrastructure.** China and Pakistan's ambitious CPEC project is slated to improve infrastructure throughout Pakistan, especially in areas that have textile capabilities. Improved roads and electricity facilities are potential benefits, and Chinese officials are reportedly interested in investing in Pakistani yarn and cloth production (Husain, 2017).

3.6.2. Constraints

Despite the country's strengths, Pakistan faces multiple challenges in the apparel industry. Some are sector-specific while others impair the country's larger economy. Most have been entrenched for a long period of time. The most pronounced are explored in the subsection below, with the weaknesses that are unique to the apparel sector presented first before the discussion moves toward weaknesses that inhibit the competitiveness of Pakistan's broader economy.

- I. **Cotton production is declining, and the quality is low.** Despite its status as one of the world's largest cotton producers, the country's overall production level has been stagnant for some time, notwithstanding a dramatic plunge in 2015.³⁸ Beyond the productivity challenges, contamination associated with the cotton is a concern. A number of reasons for the inferior output have been observed, including a pricing system that favors weight over quality, poor seeds and antiquated picking techniques (Batool & Saeed, 2017). Additionally, the government has supported other crops such as sugarcane to a higher degree in recent years, thereby depriving farmers of extension services while also distorting economic returns associated with agricultural activities (Field Research, 2018; (Batool & Saeed, 2017). Aggregated, these factors have pushed exporters to import cotton to meet internal demand, using the higher quality raw materials from other countries to blend for textile production that serves as an input for apparel. Although some of the sourcing from abroad is a means of accessing longer staple varieties that are unavailable domestically, the underdeveloped linkages between upstream

³⁸ The drop was the result of a variety of challenges, some of which characterized the global industry and others that were more localized (pests, floods, human capital constraints and sub-standard inputs) (USDA, 2018).

and downstream actors serves as a constraint.

2. **Gaps in the supply chain have limited product diversity and upgrading.** Three product categories—trousers, knit shirts and sweaters/sweatshirts—accounted for 71% of Pakistan’s exports in 2016. In order to achieve greater product diversity, domestic companies need increased access to a variety of inputs. Apparel companies import cotton, dyes & chemicals, accessories & trim, and elastic in significant volume. The local supply chain also does not generate polyester and other MMFs in bulk. Without access to the MMF materials, apparel exports have largely concentrated on cotton outputs, thereby running against the grain in the global industry. MMF’s share of global apparel exports increased from 26% in 2005 to 35% in 2016; MMF apparel was only 9% of Pakistan’s exports in 2016. Clothing made from MMF has higher unit values compared to cotton: US\$7.3 per unit compared with US\$5.2 in 2015.
3. **Concerns with lead times.** The global section emphasized how lead times often determine whether businesses can integrate into the supply chains of lead firms. Previous studies have grouped Pakistan with South Asia’s least competitive countries in terms of lead times and reliability, primarily due to import logistics (Lopez-Acevedo & Robertson, 2016) (see Table 15 below). It should be stressed there is anecdotal evidence Pakistan’s industry has made improvements in this area, reducing it down from 4-6 months to as little as 35 days (Field Research, 2018). Furthermore, interviews with stakeholders indicated that current lead times do not appear to act as a major constraint for apparel manufacturers based on the country’s existing product mix, which does not rely on imported MMF materials to a significant degree.

Although lead times associated with existing paradigm might not be disqualifying for firms supplying global buyers, if Pakistan looked to diversify its exports, they would likely emerge as a prominent issue. Delays associated with the country’s complicated tariff regime could be expected to add time to shipments. Pakistan’s apparel production centers are also more inland than competitors and not clustered in EPZs or SEZs. These features, combined with the country’s undistinguished road infrastructure, would be likely to act as a roadblock.

Table 15: Hours to Process Import Container Through Customs

Sri Lanka	China	Vietnam	Pakistan	Bangladesh	India
130	158	170	294	327	350

Source: Lopez-Acevedo and Robertson (2016).

4. **The supporting environment is fragmented.** There are at least eight prominent industry associations with ties to Pakistan’s apparel industry, with each stage of the broader T&A value chain having its own body. While the Ministry of Textiles is the organization that should provide a holistic direction for the industry, that does not appear to be its focus, instead providing resources to each stage but not an overall direction (Field Research, 2018). With the sheer number of conflicting voices, there is not a body that provides unified direction for the entire chain.
5. **Limited amounts of FDI leave parts of domestic sector disconnected from global industry.** Although there are benefits associated with the limited amount of foreign ownership, there are also costs. Pakistan ranks among the lowest recipients of FDI in the apparel industry, which deprives it of access to new markets and inputs that could facilitate

product diversification. Moreover, the limited FDI deprives Pakistani firms of the ability to distinguish themselves in existing markets such as the US, which is potentially debilitating in light of the global trend toward supply chain consolidation. There are other possible benefits of FDI, including access to modern technology and skilled labor that may help local businesses refine internal processes. Table 16 presents a regional comparison on FDI, organized by countries that have the highest local ownership. Pakistan has the third highest share of national ownership (93%), trailing only Turkey and India. On the other end of the spectrum, Cambodia has the highest share of FDI (97%).

Table 16: Foreign vs. National Ownership in Apparel Factories, 2017-18

Country	National	Foreign	Joint Venture	Total Factories
Turkey	99%	1%	0%	695
India	95%	5%	0%	1,001
Pakistan	93%	5%	2%	134
South Korea	88%	11%	1%	177
Bangladesh	79%	20%	1%	579
China	79%	20%	1%	3,387
Sri Lanka	78%	17%	5%	202
Mexico	77%	21%	2%	211
Thailand	63%	34%	3%	111
Indonesia	54%	45%	1%	280
Vietnam	46%	54%	0%	628
Myanmar	14%	85%	1%	106
Cambodia	3%	97%	0%	263
Total	78%	21%	1%	8,110

Source: van Klaveren and Tijdens (2018). **Note:** Based on a database of apparel factories for 24 lead firms that included 8,110 production sites in 25 countries. While only countries with at least 100 factories were included in this table, the total line includes all locations.

- 6. Skills deficiencies continue to undermine sector’s potential.** The high numbers of low-skilled workers have been widely identified as a constraint to growth in Pakistan’s apparel industry. The specific skills gaps often depend on geographic regions; however, an overarching characteristic is that businesses do not invest in formal training systems while government-run programs do not respond to industry needs or are not effectively implemented (Field Research, 2018; Nabi & Hamid, 2013). Key impediments include lack of coordination between the private sector and educational institutions on curriculum design and job placement, outdated training equipment and unqualified teachers (AASR, 2015). The issues exist throughout the chain, with shortages of candidates who could fill management positions at larger firms or provide leadership at SMEs for logistical and administrative challenges associated with complying with export regulations.
- 7. Complicated and inefficient regimes for trade, investment, taxes and tariffs.** A reason for Pakistan’s low levels of FDI is its high tariffs and complicated tax regime, which has been widely identified as an impediment to growth and integration into manufacturing and agricultural GVCs (WTO, 2015a). While many of the challenges are systemic and not unique to apparel, the industry has been impaired by the assortment of taxes, duties and tariffs on a wide range of goods. Technically, SEZ and EPZs programs do exist, although most apparel

companies that export from Pakistan are located in neither.³⁹ Table 17 below lists the factories located in Pakistan that have integrated into the supply chains of selected lead firms; it is instructive how few are located in SEZs or EPZs. Almost all stakeholders interviewed described the administration for these initiatives as weak or complicated (Field Research, 2018).

Table 17: European Lead Firms Sourcing from Pakistan’s EPZs and SEZs

Company	Headquarters	Suppliers Operations in Pakistan’s EPZs and SEZs
H&M	Sweden	29 manufacturing factories (1 in EPZ); 10 processing factories (1 EPZ)
Inditex	Spain	No information
Marks & Spencer	United Kingdom	3 factories (0 in EPZ or SEZ)
C&A	Belgium & Germany	23 factories (1 in EPZ)
Espirit	Germany	17 factories (0 in EPZ or SEZ)

Source: Richardson et al., 2017; Authors.

The country’s tariff and tax programs are instead more important for apparel exporters; however, schemes such as the DDT, DTL and DTRE are fraught with pitfalls, from complicated administrative requirements to delayed payments of refunds for tariffs on imports and other expenses (Field Research, 2018). The implications are expansive. The cost and complexity of importing synthetic fibers limits product diversification, and with the DDT and DTRE programs only providing rebates for direct exports, many businesses are discouraged from selling to local markets. Furthermore, with the complicated nature of the tariff regime and limited use of SEZs and EPZs, there is little incentive for foreign companies to establish operations in Pakistan.

- 8. Infrastructure and safety remain leading concerns.** There are multiple challenges that industry stakeholders face that are beyond their control. Pakistan’s infrastructure has long been a concern, with its comprehensive network of roads, ports, railways, airports and electricity ranking 110th out of 137 countries (WEF, 2017). Energy infrastructure ranked 115th in the same surveys, and officials from the country’s leading apparel exporters almost universally list it as their top challenge (Field Research, 2018). With the 18th Amendment’s provisions that provinces have first right to energy resources, there is sometimes geographic discrepancies to the energy challenges.⁴⁰ However, as a general rule, electricity prices threaten Pakistan’s competitive position. Estimates suggest that Pakistan’s knitwear manufacturers pay PKR 13 per unit for electricity compared to PKR 8-9 in Sri Lanka, India and Bangladesh, while uncertainties about its availability during production lead some buyers to view local suppliers as unreliable (Sandhu, 2018; Shaikh, 2015).

Security is another example. The Global section of the report highlighted how political considerations can limit buyers’ willingness to meet and engage with stakeholders from risk-prone markets. Pakistan’s reputation and the corresponding travel advisories that have been instituted by the US government and others limit networking opportunities for Pakistan

³⁹ The first EPZ established is located in Karachi and focuses on textiles with 18 garment and clothing factories; it had exports of US\$358 million in 2014-15 (Richardson et al., 2017).

⁴⁰ In 2012, for instance, businesses in Punjab suffered daily outages of 8-12 hours, which raised costs for companies that could afford to buy generators while slashing production for smaller firms that could not (Shaikh, 2015).

exporters. With the challenges, domestic companies must work through intermediaries or fly to nearby locations to meet with global buyers or new clients.

4. Lessons for Pakistan's Upgrading in Apparel GVC from Global Experiences

There are two pathways for upward growth in the apparel GVC. A country can pursue both simultaneously; however, the policies and skillsets needed to achieve these two paths are quite different. Table 18 below provides a summary of the individual economic upgrading trajectories.

The first pathway is focused on expanding exports, particularly in volume and higher-value goods. It most often includes both *product* and *process* upgrading, which describes the following:

- **Product upgrading:** The production of more complex products, which requires increasing the capabilities of the firm. As countries gain experience, they can move from low-cost commodities to higher value-added fashion goods that warrant higher returns as labor rates increase (e.g., progressing from basic to complex products).
- **Process upgrading:** This reduces cost and improves flexibility by improving production methods; it requires capital investment and better worker skills to operate new machinery and/or information and logistics technology.

A subcomponent of this strategy includes supply chain upgrading, which describes increasing backward linkages into textiles.

The second path is towards functional upgrading into related service industries associated with apparel, including sourcing, supply chain management, design, product development, marketing and branding. The four main stages of functional upgrading in the apparel GVC are as follows:

1. **Entry into the chain via Assembly/CMT:** This is the most basic stage of the apparel industry. As outlined in the global section, CMT manufacturers are responsible for cutting, sewing, supplying trim, and/or shipping the ready-made garment. The buyer purchases the fabric and supplies it to the manufacturer, along with detailed manufacturing specifications. The contract manufacturer has a variety of customers and does business on an order-by-order basis. Work is frequently carried out in EPZs or similar geographic areas that offer tariff reductions for export production to the buyer's country.
2. **OEM/Full Package/FOB:** The apparel manufacturer takes responsibility for all production activities, including the CMT activities, as well as finishing and distribution. The firm must have upstream logistics capabilities, including procuring and financing the necessary raw materials, piece goods, and trim needed for production. In some cases, the buyer specifies a set of textile firms from which the garment manufacturer must purchase materials; in other cases, the firm is responsible for establishing its own network of suppliers. The firm is also often responsible for downstream logistics, including packaging for delivery to the retail outlet and shipping the final product to the buyer at an agreed selling price.
3. **ODM/Full Package with Design:** This business model includes design in addition to manufacturing. A garment supplier that does full package with design carries out all steps involved in the production of a finished garment, including design, fabric purchasing, cutting, sewing, trimming, packaging, and distribution. Typically, the supplier will organize and

coordinate the design of the product; approval of samples; selection, purchasing and production of materials; completion of production; and, in some cases, delivery of the finished product to the final customer. Full package with design arrangements is common for private-label retail brands.

4. **OBM:** This is a business model that incorporates branding of products, in addition to or in lieu of design and manufacturing. Many firms in developing countries enter OBM with brand development for products sold on their domestic or neighboring country markets. While the progression from OEM to ODM to OBM is not altogether common, there are prominent examples, including countries such as Turkey.

Table 18: Selected Upgrading Trajectories in the Apparel GVC

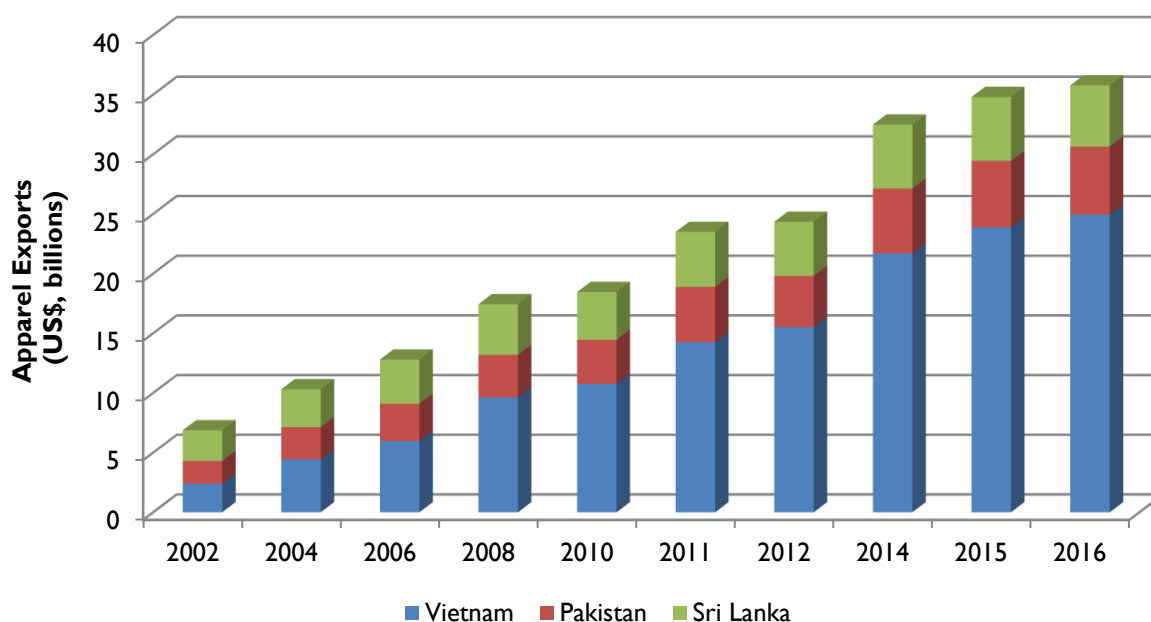
Upgrading Trajectories	Description
CHAIN ENTRY (Assembly/CMT)	<ul style="list-style-type: none"> • Assembly (CMT): The focus of the supplier is on production alone; suppliers assemble inputs, following buyers' specification • Inputs—such as textiles, accessories, and packaging—may be imported due to limited availability and quality concerns over local inputs • Product focus may be relatively narrow
PRODUCT UPGRADING	<ul style="list-style-type: none"> • Increase unit value by producing more complex products, which requires increasing the capabilities of the firm • Countries must move from low-cost commodities to higher value-added fashion goods that warrant higher returns as labor rates increase
PROCESS UPGRADING	<ul style="list-style-type: none"> • Machinery: improving productivity through new capital investments • Information and Logistics Technology: improving the way the firm carries out these activities, which benefits both the firm and the chain because it reduces the total time, cost and increases the flexibility of the supply chain process
SUPPLY CHAIN UPGRADING	<ul style="list-style-type: none"> • Increasing forward and backward integration in production stages
END MARKET UPGRADING	<ul style="list-style-type: none"> • Diversifying or expanding sales to new geographic locations or types of buyers
CHAIN/ INTERSECTORAL UPGRADING	<ul style="list-style-type: none"> • Using the skills and knowledge acquired in apparel to move into another GVC.
FUNCTIONAL UPGRADING (Full package/OEM)	<ul style="list-style-type: none"> • Firm takes on a broader range of tangible, manufacturing-related functions, such as sourcing inputs and inbound logistics, as well as production. • The supplier may also take on outbound distribution activities related to delivering the final product to the buyer's preferred destination.
FUNCTIONAL UPGRADING (Full package/ODM)	<ul style="list-style-type: none"> • Supplier carries out part of the pre-production processes, such as design or product development • Design may be in collaboration with the buyer, or the buyer may attach its brand to a product designed by the supplier • In many cases, ODM firms work with designers from the lead firms to develop new products
FUNCTIONAL UPGRADING (Product Brand/OBM)	<ul style="list-style-type: none"> • Supplier acquires post-production capabilities and is able to fully develop products under its brand. There are two options: (1) Supplier maintains a relationship with the buyer and develops brand collaboratively. (2) Supplier establishes its own distribution channels by establishing a new market channel that is typically more profitable and allows the firm to expand skills.

4.1. Case Studies

In analyzing different prospective paths for upgrading in the Pakistan apparel industry, it is useful to look more in depth at specific examples from countries that have success in the apparel GVCs with different strategies. Two cases were selected for further examination:

- Vietnam** is an example of a country that has realized its potential in the apparel GVC. The country's labor force is roughly comparable to Pakistan's (57.4 billion for both; 1.3 million in apparel for Vietnam; 700,000-1 million in apparel for Pakistan), yet it has ascended to the position of the world's fourth leading source of apparel with US\$24.9 billion in exports in 2016 (see Figure 10). Its upgrading trajectory is most closely aligned with the first path described above (product and process upgrading). FDI has played a critical role, and export activity is broad based across all product categories. Designated industrial or export zones have played an important role in Vietnam's apparel development.
- Sri Lanka** is an example of a country that outperforms some of its baseline metrics. The country's apparel workforce and its overall GDP are both dramatically lower than Pakistan.⁴¹ Yet the country's apparel exports are roughly on par with each other (US\$5.1 billion in 2016 for Sri Lanka vs. US\$5.7 billion for Pakistan). Moreover, Sri Lanka has used strategic JVs to build out its capacity in certain product niches as well as assist in the cultivating its design and branding capabilities (functional upgrading). Given Pakistan's light footprint in the broader apparel industry, it might be an approach to replicate.

Figure 10: Vietnam, Sri Lanka and Pakistan Apparel Exports, 2002-16



⁴¹ Sri Lanka's apparel workforce is 300,000 and its GDP was US\$87 billion in 2017 compared to Pakistan's US\$305 billion (Sri Lanka [EDB](#), 2016; World Bank [database](#)).

Source: Authors based on UN Comtrade (2002-2016).

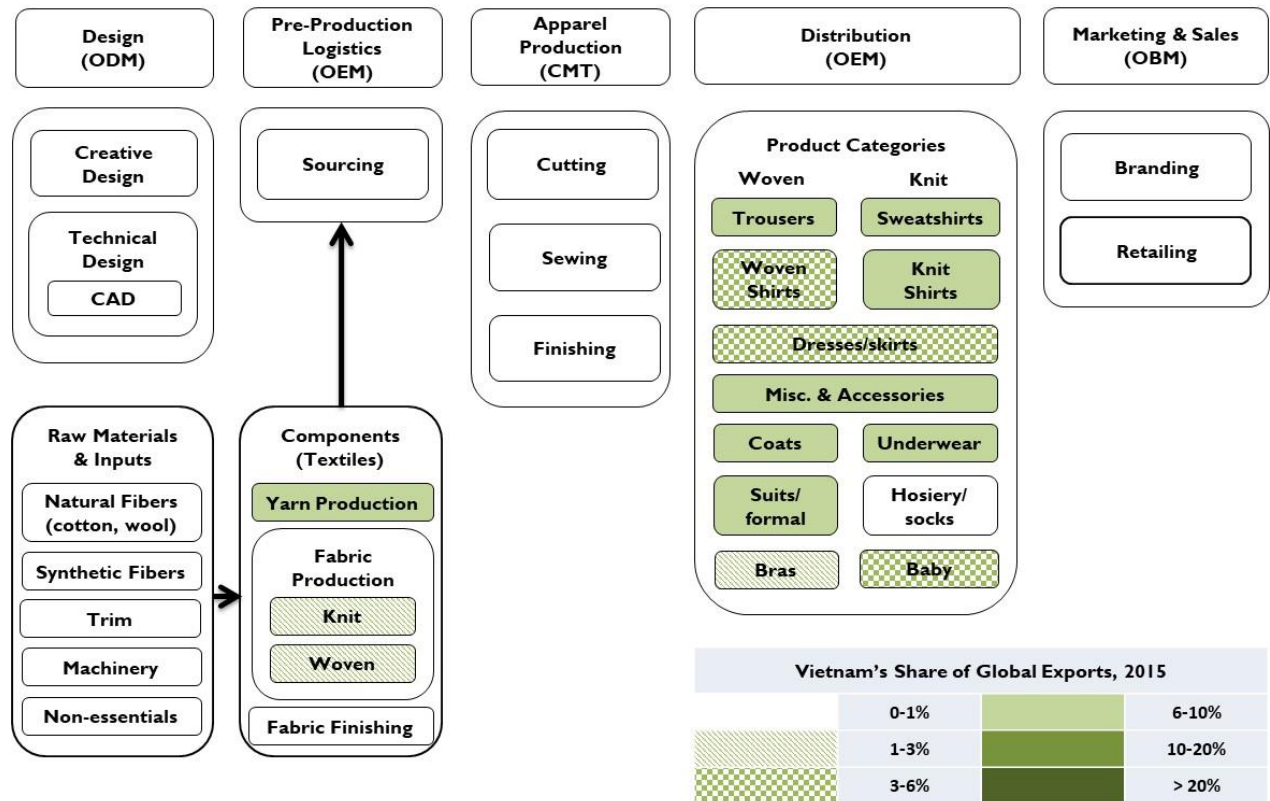
4.1.1. Vietnam

The apparel sector played a key role in Vietnam's export-led development strategy. Other labor-intensive manufacturing industries such as footwear and electronics also became important export sectors during the 1990s, but apparel always played a catalytic role. Exports have then increased at rapid rates in the 2000s. Import data from Vietnam's trading partners show an increase from less than US\$6 billion in 2006 to US\$24.9 billion in 2016, an annualized growth rate of 15.4%. That jump has allowed Vietnam to climb to the position of world's fourth largest apparel exporter in 2016 while its share of global exports increased from 2% to 6.6% in the same period. Overall, apparel has accounted for between 12-14% of Vietnam's total exports during that time.

The sector is also significant employment generator. Official statistics from Vietnam's General Statistics Office (GSO) report T&A employment of 1.58 million in 2015, with 85 percent of the total in apparel. Unofficial industry estimates typically state employment levels of 2 million or more workers (AFTEX, 2010; Better Work Vietnam, 2011; Saheed, 2012). Collectively the industries accounted for 25% of manufacturing employment in 2015 (GSO Vietnam, 2014b).

A notable feature of Vietnam's growth is that it has been comprehensive across product categories. Vietnam's CAGR between 2005 and 2015 was greater than the world average in every area. Its share is the highest for coats (11% in 2015), but there are six other areas where it has at least 6% share. Figure 11 below presents Vietnam's participation in the apparel GVC.

Figure 11: Vietnam in the Apparel GVC



Source: Authors.

Overall, Vietnam is not necessarily the most cost competitive country, but it is the closest country to matching China in terms of overall capabilities. China and Vietnam both perform better than expected when analyzing the unit values of exports alone. Vietnam's rank by unit value varies across product categories, but it delivers in all other areas important to global buyers when choosing a sourcing partner as the first or second-ranked country. China and Vietnam's ability to deliver in all non-cost related factors important to buyers is a key reason they have been able to continue export growth despite higher unit values (Frederick, 2016).

Upgrading and Importance of FDI in Vietnam's Apparel Industry

Vietnam's upgrading in the apparel GVC has mostly followed the path of increasing exports and backward linkages into textile production. Between 2005 and 2013, Vietnam's average unit value for items increased from US\$5.7 per item to US\$5.9. The three subsectors in which Vietnam holds the most significant share of world exports are also those in which the country has unit values above the global average (coats, miscellaneous apparel and athletic wear).

A critical feature of Vietnam's apparel industry is the high volume of inflowing FDI. There are three types of firms in the country: state-owned enterprises (SOEs); domestically-owned private firms; and foreign-owned firms (including 100% foreign ownership and joint ventures). SOEs can be entirely funded with national or local capital, or joint stock companies (JSC) with over 50% state capital. Private domestic firms may operate as JSCs or private limited companies or collectives.

FDI in Vietnam’s T&A industry was approximately US\$4.4 billion from 2000 to 2011, accounting for around 9% of total FDI during that time (see Table 19 below). While domestic private firms historically have accounted for the largest numbers of companies, FDI enterprises generate most exports. Firm-level apparel export data by apparel firms in 2015 indicates that two-thirds of exports were by foreign-owned firms.

Table 19: Vietnam FDI, Total and T&C, 2000-11

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2000-11
FDI Total*	1.3	1.3	1.4	1.4	1.6	1.9	2.4	6.9	9.6	7.6	8.0	7.5	51.1
T&A FDI	111	236	406	386	201	426	617	689	530	185	169	450	4,408
T&A FDI Projects	40	74	149	121	71	109	127	148	111	63	72	80	1,165
T&A Share	9%	18%	29%	27%	13%	22%	26%	10%	6%	2%	2%	6%	9%
Average Value	2.8	3.2	2.7	3.2	2.8	3.9	4.9	4.7	4.8	2.9	2.4	5.6	3.7

Sources: Frederick (2017). * = US\$, billions. All other currencies in US\$ millions.

Ownership is dominated by South Korean and Taiwanese firms, with Hong Kong and Japanese businesses also active to a lesser extent. Foreign firms have entered JVs with SOEs and later increasingly set up 100% foreign-owned subsidiaries, which are focused almost exclusively on exports (Huy et al., 2001; Schaumburg-Muller, 2009). Other notable characteristics of FDI firms are its high rate of women employees (67% in 2011 for foreign-owned, compared to 31 and 37 percent for state and non-state) and higher pay than non-state domestic enterprises but less than state-owned (GSO Vietnam, 2014a).

Foreign-owned firms are MNCs that operate in “closed” networks, with raw materials imported from global supply networks and sales coordinated from headquarter locations abroad. Nearly all export-oriented domestic firms are partially-owned by the Vietnam Textile and Garment Group (Vinatex), the former SOE that is now only partially owned by the government. Vinatex has approximately 120 companies in which it either (a) owns entirely, (b) holds partial ownership through JSC arrangements (c) is a partial owner through JVs agreements.

Supportive Policies for FDI

Vietnam has used different strategies to encourage investments. Vinatex played a key role, with its arrangements attracting foreign companies. The Ministry of Planning and Investment (MPI) is the government agency that coordinates specific policies related to FDI, including manufacturing zones that fall under three broad categories: Industrial Zones (IZs); Economic Zones (EZs); and EPZs. IZs and EPZs play an especially important role in attracting investments in Vietnam. Foreign capital is encouraged to locate in these areas through infrastructure and services such as electricity, water and communications.

There are specific benefits associated with each. Industrial zones are designated geographic areas where the manufacture of products occurs. Projects located in the zone receive tax benefits such as 10% corporate income tax rates compared to 20% for other businesses as well exemptions and reductions for 4-9 years (Dezan Shira & Associates, 2013). EPZs are IZs that generate export products. They also receive tax incentives and benefits such as reduced land prices and reduced regulatory oversight. Critically, businesses in EPZs are exempted from tariffs on imports of inputs

provided they are re-exported as apparel products within 90-120 days. They also do not pay export taxes.

Both IZs and SEZs have been used as an industry policy tool to promote inter-enterprise linkages. Several IZs have been planned to create industrial clusters such as T&A industry in Binh Duong and T&A IZs in Hung Yen. The project in Binh Duong featured a US\$760 million investment by a Taiwanese company for textile dyeing and chemical fiber facilities (VIR, 2016). Other investments associated with the project included US\$274 million yarn facilities.

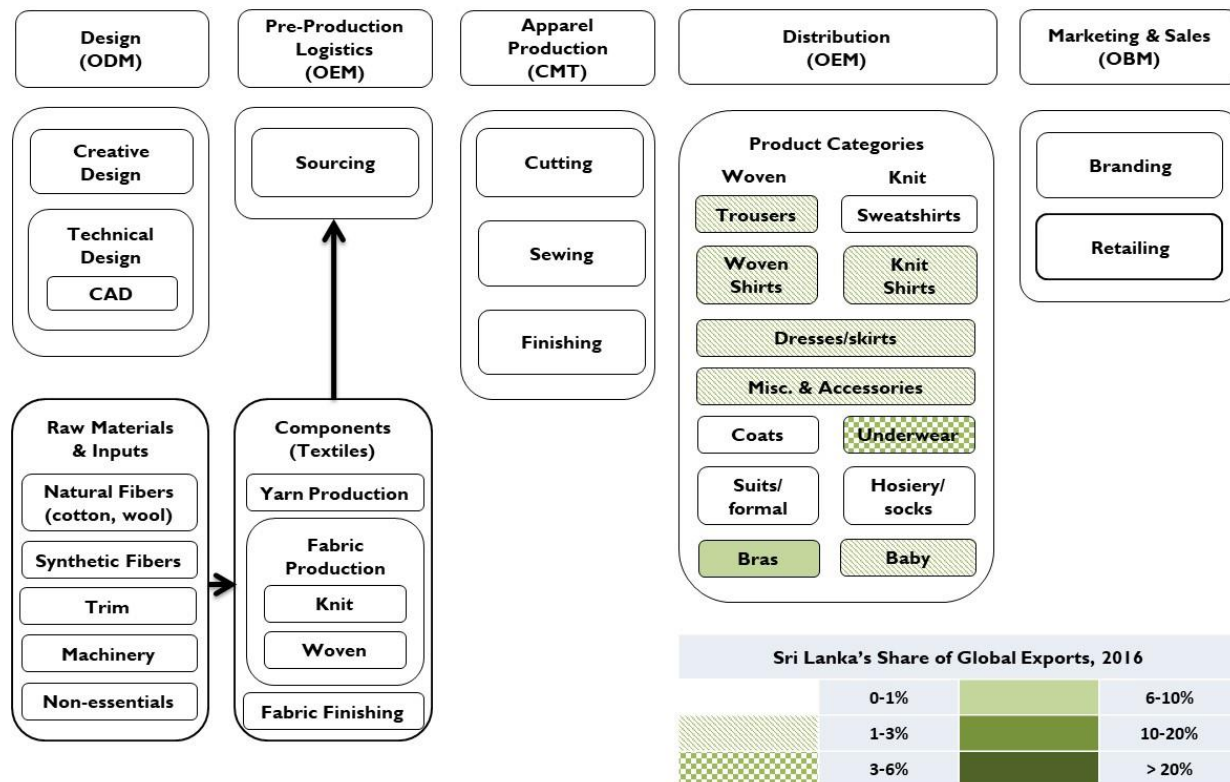
Whereas EPZ/IZs policies provide exporters with tariff and tax exemptions, Vietnam's trade agreements offer preferential access to many markets. Vietnam has enjoyed duty-free market access to Japan since 2009 through the Vietnam-Japan EPA. For the EU market, Vietnam had GSP status, which traditionally reduced tariffs on exports from Vietnam export to the EU to 9.6% on average. In the wake of the US withdrawal from the Trans-Pacific Partnership,⁴² Vietnam's government has agreed with the EU on the EU-Vietnam Free Trade Agreement (EVFTA). When it is finalized, tariffs on apparel exports to the EU will be reduced to zero (Fibre2Fashion, 2018).

4.1.2. Sri Lanka

The export-oriented apparel sector has been the main source of growth of exports and formal employment for the last three decades in Sri Lanka. The industry contributes about 40% of total industrial production and directly employs around 300,000 people (Sri Lanka Export Development Board, 2016), which accounts for around 14% of the industrial labor force and 21% of the manufacturing labor force. Indirectly, more than 1.2 million people are dependent on the sector. Sri Lanka's apparel exports were US\$5.1 billion in 2016. The annual growth rate for the period from 2006 to 2016 eclipsed the global average (3.3% for Sri Lanka vs. 2.3% for the world). But while Vietnam is an example of a country that has increased its capabilities across almost all product categories and materials, Sri Lanka is more like Pakistan in that focuses on specific niches (see Figure 12 below).

⁴² Vietnam's apparel exports to the US—its most important export market—face MFN tariffs.

Figure 12: Sri Lanka in the Apparel GVC



Source: Authors.

Intimate apparel (bras) and underwear/pajamas are the most prominent examples. Sri Lanka's exports in the bras HS category rose from US\$200 million in 2006 to US\$600 million in 2016, an overall increase of 200% that helped push the country's global share in the category from 2.9% to 6%. Underwear and pajamas—a related product category that features similar materials and companies active in the supply chains—followed a similar trajectory, jumping from US\$531 million in 2006 to US\$925 million in 2016. Sri Lanka now controls almost 5% of global export market share in that product category. Otherwise, the country has a relatively light market share in other goods, with accessories (2.5%) and baby apparel having the largest presence (2.2%). These are all the HS codes where Sri Lanka's growth has concentrated in the most recent decade where trade data is available.

Process upgrading is something of a prerequisite to be competitive in intimate apparel. The production of bras and swimwear, in particular, are complicated and demand a certain level of skill from suppliers. As a result, there is a degree of stability in the relationship between lead firms and their key suppliers, and the global competition is less cost sensitive. Outputs in these categories have also facilitated a degree of end market diversification. While the US and the EU-15 still receive 78% of Sri Lanka's apparel exports, the share going to other countries increasing from 6% in 2006 to 22% in 2016. China, Russia and Australia have had the largest growth. Table 20 below provides a synopsis of the critical background data associated with Sri Lanka's apparel industry.

Table 20: Sri Lanka's Apparel Exports to the World

	Value (US\$, Billions)						Share of Apparel Exports			Change
	2006	2008	2010	2012	2014	2016	2006	2012	2016	2006-16
Trousers	1.0	1.1	1.0	1.1	1.2	1.1	26%	25%	21%	13%
Underwear, Pajamas	0.5	0.6	0.6	0.7	0.9	0.9	14%	15%	18%	74%
Intimate Apparel (Bras)	0.2	0.3	0.4	0.5	0.6	0.6	7%	10%	13%	169%
Knit Shirts	0.5	0.6	0.5	0.5	0.6	0.6	12%	11%	11%	23%
Woven Shirts	0.3	0.3	0.3	0.3	0.4	0.4	7%	7%	7%	33%
Accessories	0.1	0.2	0.2	0.3	0.3	0.3	4%	6%	7%	129%
Sweaters	0.3	0.4	0.3	0.3	0.3	0.3	9%	6%	6%	-3%
Dresses & Skirts	0.2	0.3	0.3	0.3	0.3	0.3	6%	7%	5%	16%
Baby	0.1	0.1	0.1	0.2	0.2	0.2	3%	4%	4%	97%
Athletic	0.1	0.1	0.1	0.1	0.2	0.2	3%	3%	3%	62%
Misc. Apparel	0.1	0.0	0.0	0.1	0.1	0.1	1%	1%	2%	92%
Coats	0.2	0.1	0.1	0.1	0.1	0.1	4%	2%	2%	-47%
Suits/Formalwear	0.1	0.1	0.05	0.05	0.04	0.04	2%	1%	1%	-48%
Hosiery & Socks	0.03	0.04	0.03	0.03	0.03	0.02	1%	1%	0.4%	-33%
Total	3.7	4.3	4.0	4.5	5.4	5.1				39%
By Fabric										
Knit (HS61)	1.7	2.2	2.1	2.4	3.0	3.0	47%	53%	59%	73%
Woven (HS62)	2.0	2.1	1.9	2.2	2.3	2.1	53%	47%	41%	8%
Top Five Export Destinations										
USA	1.8	1.6	1.2	1.6	1.9	2.1	48%	35%	40%	15%
EU-15	1.7	2.3	2.2	2.1	2.3	2.0	46%	46%	38%	14%
Russia	0.01	0.03	0.04	0.10	0.12	0.09	0%	2%	2%	625%
China	0.00	0.01	0.01	0.02	0.05	0.09	0%	1%	2%	3403%
Australia	0.01	0.01	0.01	0.03	0.05	0.06	0%	1%	1%	597%

Source: UN Comtrade (2002-2016b)

The role of JVs in Sri Lanka's Apparel Industry

Just as in Vietnam, FDI played a central role in Sri Lanka's upgrading in the apparel industry. There are, however, points of differentiation between the two countries. Specifically, Sri Lanka's gains are primarily the result of JVs between global buyers and large local firms—not direct investment, as in Vietnam. Most partnerships involved buyers that provided access to important markets as well as technology and knowledge transfers.

Two of the larger Sri Lankan firms include MAS Holding and Brandix Lanka. Both are engaged in a variety of JVs. Brandix started in 1972 with the production of casual wear, largely woven bottoms. As part of its development, the company purchased several local firms and engaged in JVs with foreign and local firms. The company entered into at least eight JVs between 1990-2009, pursuing partnerships in the US, Hong Kong and the United Kingdom to expand supply chain linkages. Brandix has been the key domestic investor in the opening of apparel sundries plants in Sri Lanka for thread, buttons, hangers, elastic, and dyeing. The company has also spent money on knit and woven fabric facilities to meet part of its own demand as well as for external customers.⁴³

⁴³ In 2018, Brandix's website said it was a US\$750 million business that employs 48,000 people and has 42 production facilities in Sri Lanka, India and Bangladesh.

MAS Holdings started in 1987 and is Sri Lanka's largest intimate apparel manufacturer. JVs have provided the company with critical advantages, including the following: 1) access to major brands and retailers such as Limited and M&S, Bhs, and Next; and 2) world-class apparel manufacturing technology (Barrie 2004). MAS Holdings also has JVs in other countries: India (Intimate Fashions), Maldives (Linea Clothing), Madagascar (Cottonline) and Vietnam (Fashionline). The intimate division produces for buyers such as Victoria's Secret, Gap, Marks & Spencer and Nike (the largest four buyers). The active division produces for buyers such as Nike, Speedo, Adidas, Reebok, Ann Taylor and Columbia and involves mostly swimwear.⁴⁴

The JVs have also indirectly led to other companies building facilities in Sri Lanka. MAS Holdings' expertise in intimate apparel products can be traced to the JV with MAST Industries, which is the US-based sourcing arm for Limited Brands (IFC, 2007). That specialization allowed the company to enter Victoria's Secret supply chain, which is also owned by The Limited. Over time, Victoria's Secret has asked some of their raw material providers to relocate to Sri Lanka, including suppliers of various components that go into making bras and underwear, like lace and pads and also warp knit fabric (just-style.com, 2006).

Advanced Forms of Upgrading in Sri Lanka's Apparel GVC

MAS and Brandix have both helped Sri Lanka's apparel sector move into to higher value products. Lingerie is one example, with the product upgrading driven by the JV arrangements described above. A JV between MAST, MAS and Triumph was instrumental in starting the lingerie business in Sri Lanka in the end of the 1980s/beginning of the 1990s. Unit value analysis shows that Sri Lanka's apparel exports have traditionally had higher unit values than other Asian apparel exporter countries, highlighting some of the country's product upgrades (Tewari, 2008).

While technology levels vary across the sector, the large manufacturers have invested in new technology and workforce development (JAAF, 2002). The Joint Apparel Association Forum launched the Productivity Improvement Program (PIP) in 2004 in the context of the Five-Year Strategy to reduce waste, provide leaner organizations and increase productivity in factories. The large manufacturers in Sri Lanka have been engaged in implementing lean manufacturing methods in their production processes to reduce wastage and lead times and lower production costs. The largest manufacturers have also invested in supply chain enabling technologies such as enterprise resource planning (ERP) systems as the efficient management of supply chains has become increasingly important in the apparel sector (Wijayasiri & Dissanayake, 2008).

More recently, the three largest manufacturers have started to invest into environmentally compliant facilities due to growing concerns regarding the environmental impact of industries and pressure from buyers to adhere to environment-friendly standards. MAS, Brandix and Hirdaramani invested in "green factories" which ensures that environmental impacts are minimized, especially through the reduction of energy and water consumption.⁴⁵

There have also been clear steps toward functional upgrading. An important part of the apparel sector in Sri Lanka today provides full manufacturing services offering input sourcing and at least an understanding of ODM activities. These efforts were driven by large manufactures such as Brandix

⁴⁴ In 2018, MAS was a US\$1.8 billion business, employs 44,000 people and has over 42 production facilities.

⁴⁵ UNIDO recommended Brandix's 'green apparel factory' as a model of sustainable production to manufacturers around the world. The 130,000 square-foot Brandix Eco Centre is the Group's lead manufacturing plant for Marks & Spencer and has been rated Platinum under the Leadership in Energy and Environmental Design (LEED) Green Building Rating System of the US Green Building Council (USGBC) (just-style.com, 2010).

and MAS that started in the early 1990s to increase their capabilities and develop broader services. They established their own design centers with in-house staff that worked closely with the design teams of brand owners. MAS has since established design studios in the UK, the US and Hong Kong to offer design solutions to its main customers Victoria Secret, Gap and Speedo. Brandix has not opened design centers abroad but marketing offices in New York and London to improve links with buyers (Wijayasiri & Dissanayake, 2008).

Some large manufacturers have also established their own brands to move into the OBM segment. MAS developed a range of intimate wear under the brand Amante in 2007, which was a significant innovation as Sri Lanka's apparel industry did not have any brands until that point. Amante was first introduced in Bangalore, Chennai and Hyderabad, but it hopes to expand across India and to the rest of South Asia with further potential in the Middle East. The brand caters to the middle and upper income class and competes with international brands such as Triumph, Etam and La Senza (Wijayasiri & Dissanayake, 2008).

Holistic Government Policies to Attract JVs and FDI

The prevalence of JVs in Sri Lanka's apparel industry can be partially attributed to holistic efforts by the Sri Lankan government and Board of Investment to make the country attractive to outside investors. Beginning with the 200 Garment Factory Programme, which was initiated in 1992 and has been hailed as being a "turning point" for Sri Lanka's apparel industry (Kelegama & Wijayasiri, 2004),⁴⁶ the government has attempted to nurture the sector through a comprehensive set of policies designed to make Sri Lanka appealing.⁴⁷ Some of the more notable strategies that have been employed include the following:

- **Tax concessions among other fiscal incentives.** Sri Lanka offers a range of fiscal incentives to exporters, including concessions with income taxes, National Building taxes, the Ports and Airports Development Levy and VAT exemptions (WTO, 2016). While many of those benefits are available to all firms, the apparel has lower threshold for some incentives (WTO, 2016). Depending on the size of investments, large enterprises can receive tax holidays and incentives for between 6-12 years.
- **One-stop customs shops helps reduce wait times.** The number of hours it takes Sri Lankan customs to process imports are among the lowest in the region (see Table 15 above). As part of its strategy to encourage investment, Sri Lanka's EPZs offer customs facilities to simplify customs processes. There are 13 EPZs in the country, including two dedicated entirely to apparel manufacturing (WTO, 2016).
- **Duty-free imports of inputs and capital goods.** All imports of textile materials, yarn, and related intermediate and capital goods required for the garment export industry are free of import duty (US Commercial Service, 2017). Table 21 below presents the import tariffs for Sri Lanka, Pakistan and other countries in the region.

⁴⁶ The 200 Garment Factory Program set the goal of establishing 200 apparel factories in rural areas to help stimulate Sri Lanka's economic development. It has been credited for increasing female participation in the sector (**social upgrading**). It also showed that female workers benefit from working in factories located close to their villages (Kumar et al., 2016).

⁴⁷ It should be noted that not all have succeeded. The WTO noted that the incentive regime was complex and somewhat overlapping, and seems to have fallen short of the goals of expanding the industrial base, both product- and region-wise" (WTO, 2010).

Table 21: Import Tariffs for Inputs in Asian Apparel Industries

Product Category	Sri Lanka	Pakistan	India	Bangladesh	Cambodia	China	Vietnam
Yarn							
Cotton	0%	5-25%	10%	5-10%	0%	5-6%	5%
MMF	0%	0-10%	10%	5-25%	0%	5%	0-5%
Woven Fabric							
Cotton	0%	15-25%	10%	25%	7%	10-14%	12%
MMF	0-15%	15%	10-12.5%	25%	7%	10-18%	12%
Knit Fabric	0%	20-25%	10%	25%	7%	10-12%	12%
MFN Avg. Duties (Textiles)	3.5%	16.6%	12.2%	19.4%	5.5%	9.6%	9.6%

Source: Kumar et al. (2016).

There are other ways the government has boosted the sector, including infrastructure. Sri Lanka's railroad, port and road infrastructure all rank between 55th and 61st in the world (WEF, 2017). In recent years, the government has made improvements to ports in Colombo and Hambantota, which is on the southern tip of the island. The Hambantota is a US\$1.12 billion project that is part of China's One Belt, One Road Initiative (Sri Lanka EDB, 2018).

4.2. Key Lessons for Pakistan

Vietnam and Sri Lanka both offer lessons for Pakistan as it looks to increase growth in the apparel GVC. While both countries have pursued foreign investment to drive product and process upgrading in the sector, there are nuances that are worth accentuating. These include the following:

- **Vietnam's** growth in the apparel sector over the last 15 years has been dramatic. With annual growth of 15.4% in the period from 2006 to 2016, it has solidified its position as the world's fourth-leading apparel exporter. Significantly, Vietnam's expansion has been broad-based across product categories. Strong backward linkages have provided access to key inputs that support diverse manufacturing activities. Foreign companies generally locate in designated industrial or export zones. These are active components of the government's strategies for attracting investors.
- **Sri Lanka's** participation in the apparel GVC exceeds expectations based on population and GDP figures. Growth in the sector centers on a narrow range of products, including intimate apparel (pajamas, bras and swimwear). JVs between the some of the country's largest manufacturers and global buyers have been common. Foreign companies are willing to locate in Sri Lanka because of a comprehensive suite of strategies enacted by the government, including infrastructure investments, tax concessions, duty-free imports and one-stop customs shop. The supportive environment has helped Sri Lanka initiate more complicated upgrading activities, including functional, environmental and social.

5. Proposed Upgrading Trajectories for Pakistan Apparel GVC

Pakistan has had some moderate success pursuing upgrading in the apparel GVC. The advances that can be quantified the most easily include **product upgrading** within the trouser category—denim manufacturers have moved into the supply chains of leading global brands such as Levi's, and the unit value associated with Pakistan trouser exports increased 48% in the period from 2005 to 2016—**process upgrading** within the entire sector—interviews conducted for this report indicated that

many firms have reduced lead times from 4-6 months to as little as 35 days—and **social upgrading** with the increase of female workers—the average annual growth rate for women’s employment from 2010 to 2015 was 10% (Huynh, 2017). However, all these advances come with caveats; since women’s participation in the apparel sector is still among the lowest in the world, there are hesitations to even label the gains as social upgrading.

There are plausible paths to generate increasing returns in the form of higher exports and employment opportunities. With its strengths—an integrated industry with high domestic ownership located in a country with a long history of producing cotton and relatively competitive labor prices—there are multiple options. The following section outlines the potential upgrading trajectories. It is loosely ordered by time horizon and complexity.

In terms of greatest likelihood of success, Duke GVCC believes that Pakistan solidifying its position in existing products (the first upgrading trajectory) is the most straight-forward. The Sri Lanka case study highlighted countries in similar positions in the chain who have excelled by concentrating on a narrow sub-set of outputs. If, however, it is a priority for Pakistani stakeholders to increase exports across the board (like Vietnam), then it can pursue steps that will lead to product diversification. Both the long-range trajectories would require sustained vision and implementation strategies. In terms of probability, Pakistan could likely expect results in pursuing increased social upgrading, especially since it is starting at a low base.

- 1. Short- to medium-term product and process upgrading to solidify position in existing product categories.** Pakistan’s largest category of apparel exports are trousers. Led by a strong cluster of denim manufacturers that have integrated into the supply chains of companies such as Levi’s and others, Pakistan is the sixth largest individual trouser exporter in the world, seventh if one considers the EU-15 as one bloc. While Pakistan’s annual growth rate in export value in trousers was 11.6% from 2006 to 2016, its global market share (4% by value, 3% by volume) indicates there is still room to grow. To sell more jeans and trousers and other product categories where Pakistan has a presence, stakeholders can concentrate on steps that increase direct connections with buyers. Human capital should also be a focus to increase awareness of fashion trends and brand awareness. Foreign investment would likely be a critical enabling factor. The case study on Sri Lanka offer examples on how it created investment environments that were attractive to global apparel companies and build its presence in intimate apparel.
- 2. Short- to medium-term product upgrading (diversification) by increasing backward linkages in supply chain.** A defining feature of Pakistan’s apparel industry is the limited expanse of export products by type and material. The result is 71% of the country’s exports are concentrated in three product categories: trousers, sweaters/sweatshirts and knit shirts. Gaps in the supply chain with respect to MMF materials is a major reason for this specialization. Pakistan imported US\$1.55 billion of MMF fabric, yarn and fibers in 2016. The “Backward Linkages” section of this report detailed other prominent import categories, including cotton, labels, trim and accessories.

There is certainly reason to emphasize diversification. As detailed in the Global section, buyers are consolidating their supply base and looking for capable Tier I suppliers that can produce a broad range of products to reduce complexity and costs. Pursuit of this upgrading strategy would involve some of the same steps as solidifying positions in individual products; however,

the country's complicated tariff regime should be a focus more so than stabilizing cotton production. FDI attraction can also target specific supply chain gaps, with trim and accessories manufacturers necessary to expand product diversity.

- 3. Medium- to long-term functional upgrading by moving into OBM & ODM activities such as design and branding.** Because Pakistani firms are domestically owned and vertically integrated, the potential of moving into design and brand development is much higher than Southeast Asian competitors. In countries such as Vietnam where there are high rates of foreign ownership, the subsidiaries tend to cater to the needs of headquarters. That, in turn, limits the potential for functional upgrading in the country where manufacturing is located since higher-value activities often remain with the overseas headquarters. Strategic JVs in Sri Lanka have allowed major companies in that country—MAS and Brandix—to master skills that have supported moves into branding and design activities. With FDI dynamics less of a factor in the local industry, Pakistan could potentially engage in downstream activities such as design and branding, especially for regional countries where there has been less market penetration by leading global brands.

- 4. Medium- to long-term social upgrading by increasing share of women workers in the sector.** As highlighted, the share of women workers in Pakistan's T&A industry (36%) is lower than most peer countries, save for India. There is a myriad of reasons for the low female participation, including cultural norms, poor public transportation and inadequate child care options. While the situation is evolving, with programs sponsored by international aid organizations playing a prominent role, Pakistan's low numbers of female workers is an opportunity to attract additional donor support. That could provide benefits for the sector, including increased productivity, and for the country as a whole, including poverty reduction and health and education outcomes.⁴⁸

In countries such as Bangladesh and Cambodia where women already account for 80% or more of the apparel workforce, firms are (1) less likely to let workers miss work to advance skills, (2) families are unable to let women stop working for 3-6 months to attend training courses because they are dependent on female wages, and (3) international organizations are not as abundant in countries that already have high female participation rates. Donors are often keen on increasing female participation and are willing to provide funding for training programs to support such efforts. Pakistan's domestic ownership could also prove advantageous since local management, if lobbied, would have the power to attempt to increase female labor force participation.

⁴⁸ For an in-depth look at the benefits associated with women's participation in the T&A workforce, see chapter 4 of (Lopez-Acevedo and Robertson (2016).

6. Appendix

Table A-1: Worldwide Cotton Production and Exports, 2014-17

Country	Volume (480-pound bales, 1000s)			Share		
	2014/15	2015/16	2016/17	2014/15	2015/16	2016/17
Top Five Producers (Ranked by 2016/17)						
India	29,500	25,900	27,000	25%	27%	25%
China	30,000	22,000	22,750	25%	23%	21%
United States	16,319	12,888	17,170	14%	13%	16%
Pakistan	10,600	7,000	7,700	9%	7%	7%
Brazil	7,180	5,920	7,020	6%	6%	7%
Top Five Exporters (Ranked by 2016/17)						
United States	11,246	9,153	14,917	32%	26%	40%
India	4,199	5,764	4,550	12%	17%	12%
Australia	2,404	2,828	3,727	7%	8%	10%
Brazil	3,910	4,314	2,789	11%	12%	7%
Uzbekistan	2,600	2,200	1,750	7%	6%	5%

Source: USDA FAS (2018). Note: Each year of production data is from growing seasons that begin each August.

Table A-2: Top 10 Apparel Importers by Year and Value, 2008-16

Partner	Value (US\$, billions)					World Share				
	2008	2010	2012	2014	2016	2008	2010	2012	2014	2016
EU-15	153	143	144	165	152	45%	43%	39%	41%	40%
United States	76	73	81	86	84	22%	22%	22%	21%	22%
Japan	24	25	32	29	26	7%	8%	9%	7%	7%
Hong Kong	18	16	15	15	12	5%	5%	4%	4%	3%
Canada	7	8	9	9	9	2%	2%	2%	2%	2%
Rep. of Korea	4	4	5	8	8	1%	1%	2%	2%	2%
China	2	2	4	5	6	1%	1%	1%	1%	2%
Australia	3	3	4	5	6	1%	1%	1%	2%	2%
Switzerland	5	4	5	5	6	1%	2%	1%	1%	1%
Poland	—	—	—	—	6	—	—	—	—	1%
Russia	4	5	8	7	—	1%	2%	2%	2%	—
Top 5	278	264	280	304	284	81%	80%	77%	76%	75%

Source: UN Comtrade. **Note:** HS02, 61+62 codes. (—) indicates a country was not in Top 10 in given year.

Table A-3: Apparel Lead Firm Types and Examples

Lead Firm Types and Sub-Types			Description	Examples	
				US	EU
Retailers	Mixed Retailers/ Mass Merchants	Hypermarkets, Discount stores	Like department stores, but sell a wider variety of products; rather than private-label, the term “store brand” may be used	Walmart, Target, Kmart	Asda (Walmart), Tesco, Carrefour, Metro
		Department stores	Carry private label, exclusive, or licensed brands only available in the retailers' stores	Sears, Macy's, JC Penney, Dillard's, Kohl's	Marks & Spencer, Karstadt, El Corte Ingles, Harrod's, Debenhams
	Specialty Retailers	Specialty stores	Specialty stores that carry a mix of brand types, including private, exclusive and others	REI, Dick's Sporting Goods	
		Specialty Apparel Stores (Private Label)	Retailer develops & owns private label brands only available in stores	Gap, American Eagle, Abercrombie & Fitch	H&M, Mango, New Look, NEXT, C&A, TopShop
Non-Retailers	Brand owner	Brand marketer	Firm owns brand name, but not manufacturing; products are sold at mass merchant stores and often through specialty store.	PVH, Ralph Lauren, Carter's, Nike, Levi's	Espirit, Adidas, Hugo Boss
		Brand manufacturer	Firm owns brand name and manufacturing; more likely to coordinate supply of intermediate inputs	VF, Hanesbrands	Inditex (Zara)

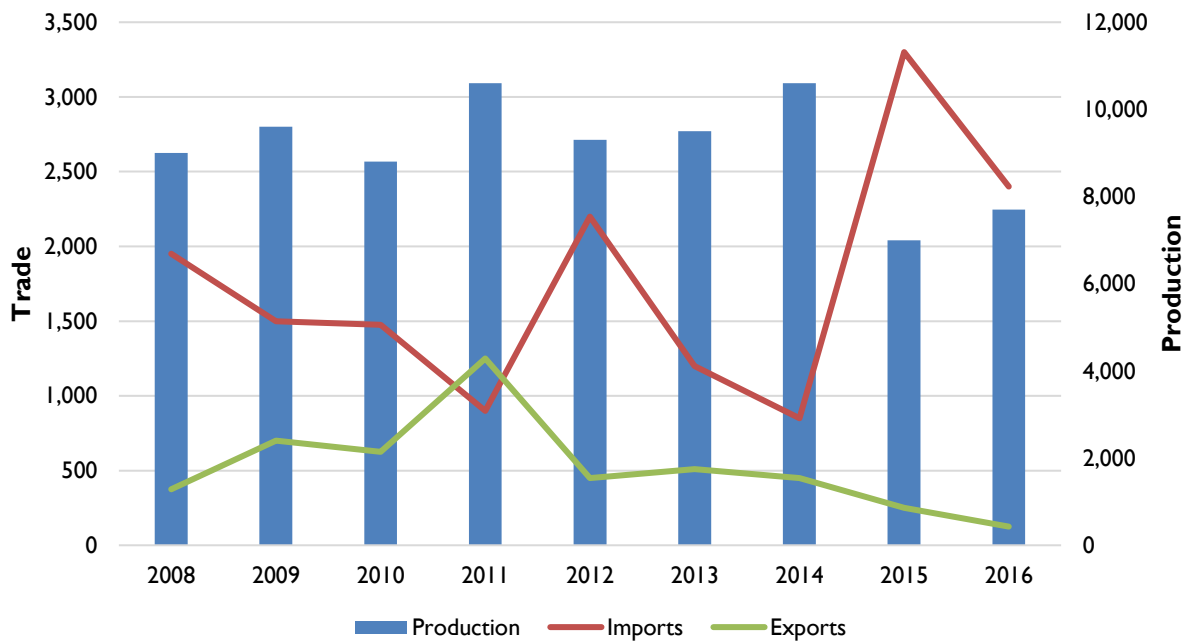
Source: Frederick, 2015.

Table A-4: Selected Apparel-Related Private Labor Standards and Organizations

Name	Members	Funding Model	Scope	Est.	Certified Factories
Global					
Fair Labor Association Workplace	Yes: Buyers, Suppliers, Colleges, Civil Societies	Membership Fees (Annual)	Multi-industry, majority apparel	1999/2001	44 companies; 21 suppliers (2013)
Worldwide Responsible Accredited Production (WRAP)	No	Application Fees; Auditor Fees	Multi-industry; majority apparel	2000	1,826 (2013); China (33%), India, BNG, Vietnam (~10% each)
SAI 8000	Yes: Corporate Members	Certification Fees; Donations	Multi-industry; ~25% apparel	1997	3,388/892 (Total/T&A; 2014, June); India (55%); China (21%) of T&A
Regional/National					
Fair Wear Foundation	Yes: EU Buyers (80)	Government, Membership Fees, NGOs	Apparel	1999/2001	15 production countries
ILO/IFC Better Work Programs	Buyer Partners (28)	Membership Fees (Annual) + Cost per Factory/Year	Apparel		
	39 (2014)	GMAC, Cambodia Gov., US DOL		2001	Cambodia: 500 factories (government mandatory)
	28 (2013)	US DOL; Jordan MOL		2008	Jordan: 60 factories (government mandatory)
	—	US DOL		2009	Haiti: 29 (all government mandatory)
	43 (2014)	SECO, Irish Aid, NL MOFA, Service Canada		2009	Vietnam: 200 factories
	7 (2014)	US DOL		2010	Lesotho: 23 factories
	9 (2013)	US DOL		2011	Nicaragua: 23 factories
	18 (2014)	NL MOFA, SECO		2011	Indonesia: 100 factories
	—	US DOL, SECO, NL MOFA, Service Canada, DFID, Travail		2014	Bangladesh: n/a
Advocacy Groups/Initiatives					
Clean Clothes Campaign (CCC)	Yes: EU: trade unions, NGOs	Government & Private	Apparel	1989	

Source: Frederick (2015).

Figure A-1: Pakistan's Raw Cotton Production, Imports and Exports, 2008-16



Source: USDA Annual Reports. **Note:** Both trade and production are measured in 480-pound bales (thousands). Each year represents financial years, beginning in July and ending in June of the following year. Thus, the 2016 year depicted above is the 2016-17 financial year.

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Pakistan in the Offshore Services Global Value Chain

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Prepared by
Vivian Couto and Karina Fernandez-Stark

Duke Global Value Chains Center,
Duke University

Duke  Global Value Chains Center



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Acronyms

BOI	Board of Investment
BPM	Balance of Payment and International Investment Position Manual
BPO	Business Process Outsourcing
CMMI	Capability Maturity Model Integration
CRM	Customer Resource Management
ERM	Enterprise Resource Management
F&A	Finance and Accounting
FAST	Foundation of Advancement of Science and Technology
FDI	Foreign Direct Investment
FTE	Full Time Employees
GDP	Gross Domestic Product
GSLI	Global Services Location Index
GSP	Global Services Program (Uruguay)
GVC	Global Value Chains
HEC	Higher Education Commission
HIPPA	Health Insurance Portability and Accountability Act
HRM	Human Resource Management
ILO	International Labor Organization
ITC	International Trade Center
ITeS	Information Technology Enabled Services
ITO	Information Technology Outsourcing
KPO	Knowledge Process Outsourcing
LUMS	Lahore University of Management Sciences
MNC	Multinational Company
NSDC	National Skills Development Center (India)
NUST	National University of Sciences and Technology
P@SHA	Pakistan Association of Software Houses
PITB	Punjab Information Technology Board
PSEB	Pakistan Software Export Board
R&D	Research and Development
SEZ	Special Economic Zone
SLA	Service Legal Agreement
STEM	Science, Technology, Engineering and Mathematics
STP	Software Technology Park
WEF	World Economic Forum

I Introduction

Pakistan entered the offshore services¹ GVC in the mid-2000s, gaining recognition as an alternative offshoring location in 2009. By this time, India and the Philippines had already achieved maturity in the global market, as other countries in Eastern Europe and Latin America were emerging (e.g. Poland, Mexico, Czech Republic). Coupled with perception issues, the late engagement of Pakistan in the GVC places the nation in the initial stages of development. To date, leading global third-party providers have no presence in the country, with the majority of exports deriving from domestically-owned companies. In 2017, Pakistan exported US\$655 million in offshore services, while India and the Philippines surpassed US\$117 billion and US\$25 billion in export revenues, respectively (ASEAN Briefing, 2017; NASSCOM, 2017a; PSEB, 2018). While underdevelopment is apparent vis-à-vis global market leaders, Pakistan's offshore services exports have shown steady growth—15% CAGR in the 2008-2017 period (PSEB, 2018).

Pakistan's offshore services industry is centered on rudimentary Information Technology Outsourcing (ITO) sectors (e.g. software maintenance, troubleshooting management, website development). Driven by the growth of one single large company (6,000 FTE in Pakistan and 14,000 worldwide) funded by Pakistani-American in the early 2000s, the country is slowly expanding its participation in Business Process Outsourcing. Like in ITO, most BPO services are reckoned as transactional tasks (e.g. virtual assistance and voice-based customer support). Pakistan's engagement in sophisticated sectors is embryonic but successful; by 2018, about half a dozen large companies provide high-end solutions to large verticals in the US, including Financial and Insurance, Healthcare and Energy.² The entire IT-BPO industry is built on strong business ties with clients in the United States. Accordingly, the destination of about one half of IT-BPO exports is the United States (PSEB, 2018).³

Pakistan has been ranked amongst the top fifty economies to relocate IT-BPO processes since 2009 and is the most cost-effective location in the world in 2017 (A.T. Kearney, 2011, 2014, 2016, 2017). One highlight of the nation is its positioning in the freelance market; Pakistan is ranked as the fourth most popular country for freelancing in the world, according to the 2017 Online Labor Index by Oxford Internet Institute (OII)—after India, Bangladesh and US.⁴ Main advantages of Pakistan's offshore services industry revolve around its sizable talent pool and low labor costs. Quality of service and talent adaptability to foreign markets is evolving favorably. As awareness grows amongst foreign clients, the industry is projected to boom in the following five to ten years (Field Research, 2018).

¹ Offshore services refer to services conducted in one country and consumed in a different country. It includes Information Technology Outsourcing, Business Process Outsourcing (BPO) and Knowledge Process Outsourcing (KPO). Information Technology Services (ITO) is the basic building block for the offshore services value chain and is centered around the production and use of software and IT services. Business Process Services (BPO) is a highly diverse category that contains activities related to the management of business functions. Knowledge Process Services (KPO) refers to specialized activities that often require professional licensing, such as in the legal, and financial fields.

² Examples include IT security platforms for financial institutions (NETSOL Technologies), artificial intelligence platforms for the healthcare industry (e.g. 'Afiniti' by The Resource Group), and geoscience management solutions for the exploration and extraction of petroleum (LKMR).

³ For the purposes of this report, offshore services is also under the name IT-BPO exports.

⁴ The Online Labor Index of the University of Oxford is the first economic indicator providing an online gig economy equivalent of conventional labor market statistics. It measures the supply and demand of online freelance labor across countries and occupations by tracking the number of projects and tasks across platforms in real time (Kässi & Lehdonvirta, 2016).

Looking forward, government stakeholders must reckon that the offshoring services GVC is generally largely dependent on foreign investment from developed countries such as the US and UK, and leading economies from the demand side, like India. Constrained by the country's poor security perception, Pakistan will need to intensify its efforts to address challenges deriving from an ambiguous fiscal framework, inadequate specialized infrastructure, weak quality of tertiary level education, and limited budget for international marketing and investment attraction strategies.

This report uses the Global Value Chain (GVC) methodology to understand how Pakistan participates in the global offshore services industry. GVC analysis has proven to be an effective tool for advising country governments on economic development and specific policies for industry upgrading. The study incorporates global and local analyses using both qualitative and quantitative data. Secondary information was used, including industry reports, journal articles and company data. Finally, a number of interviews were conducted during a field trip to Pakistan. More than 25 interviews with industry stakeholders were conducted, including private companies, educational institutions and Pakistani government officials.

This report is structured as follows: first, it provides an overview of the offshore services GVC to present a clear understanding of the scope of the industry, how markets are structured and how changing distribution of demand and supply destinations alter structural dynamics in the chain. It then analyzes the industry within Pakistan, detailing the country's position in the global market as well as the internal organization of the industry and the human capital status. After assessing the advantages and constraints observed in Pakistan, it looks to India and Uruguay for comparative case studies, detailing the lessons learned for Pakistan. The report concludes by outlining potential upgrading strategies to enhance the country's competitiveness in the global market. Across the entire report, focus is placed on the opportunities than Pakistan can leverage in the export market, excluding the domestic market space.

2 The Offshore Services Global Value Chain

Key Points

- The industry has grown exponentially in the last decades. Companies from developed countries looking to improve their efficiency, decided to unbundle and offshore several of their non-core business operations.
- Two of the leading suppliers of these services are India and the Philippines. Countries export services in three major forms: captive centers; global third-party providers; and domestically-owned third-party providers.
- The offshore services industry refers to services produce in one country and consumed in a different nation. The broad categorization of services is as follows: Information Technology Outsourcing (ITO); Business Process Outsourcing (BPO); Knowledge Process Outsourcing (KPO); and services specialized by sector.

The offshore services industry describes the trade of services performed in one country and consumed in another. This includes direct exports, as well as the international relocation of services activities that companies previously performed in their home country, ranging from software maintenance to research and development. To illustrate, in 1998 Microsoft established a

fully-owned division in Hyderabad (India) to become the largest R&D center outside the US. Ten years later, over 45% of the top 500 global R&D spenders such as Amazon, Boeing and Microsoft had established a captive center in India (Thakur & Ghosh, 2018). The relocation of activities can also be attained through international outsourcing, e.g. subcontracting a third-party provider based abroad. India is also the home of some of the top global outsourcing players in the world (Everest Group, 2018c). In 2017, India's largest IT exporter (TCS) signed a US\$2.25 billion outsourcing deal with Nielsen (a US television rating measurement firm) to provide a wide range of professional services like application development, management sciences, and financial planning (Business Today, 2017).

The offshore services GVC consists of general business services that can be provided across all industries as well as services that are industry specific. The first category includes three main segments:

- Information Technology Outsourcing (ITO) is the basic building block for the offshore services value chain and is centered around the production and use of software.
- Business Process Outsourcing (BPO) is a highly diverse category that contains activities related to the management of business functions, including finance and accounting, procurement, supply chain management, and human resources management.⁵
- Knowledge Process Outsourcing (KPO) refers to specialized activities that often require professional licensing, such as in the legal, and financial fields. Examples of tasks within this category include: legal, business intelligence and data analytics services.⁶

2.1 The Global Offshore Services Industry

Offshore services emerged as a dynamic global sector over the past two decades. The information and communication technology (ICT) revolution that began in the early 1990s transformed the way companies do business by allowing for the separation of the production and consumption of services. In the search for efficiencies and economies of scale, firms began offshoring and outsourcing a variety of corporate functions. Driven by the need to lower costs and access talent, firms looked beyond the boundaries of the developed world. This has provided important opportunities for growth and employment in developing regions. Firms are attracted to less developed countries as offshore destinations because of their competitive advantages in areas such as low human resources costs, technological skills, language proficiency, time zones, and geographic and cultural proximity to major markets. As more sophisticated work such as new product development, research and development (R&D), and other knowledge-intensive activities are performed abroad, the supply of scientific, engineering and analytical talent offered by developing countries has also become key in attracting firms.

Measuring offshore services industry is not a simple task because official statistics do not provide accurate quantitative assessment.⁷ While the market figures for this industry may vary because of

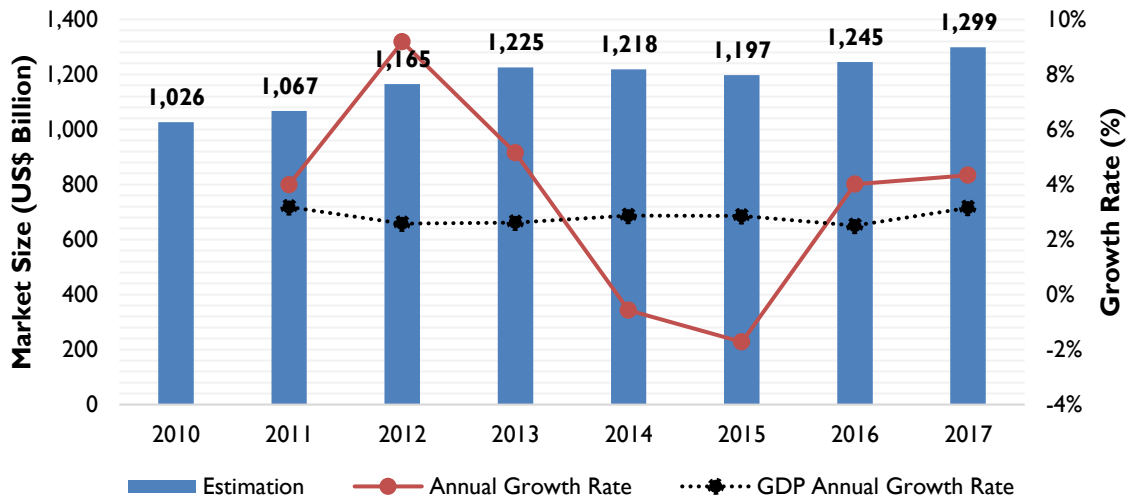
⁵ List is indicative and non-exhaustive.

⁶ List is indicative and non-exhaustive.

⁷ Generally, countries do not collect detailed data on services exports within the global offshoring market frame. There are a relatively small number of trade classification codes to accurately identify services activities and companies have little incentive to disclose this information, while globally consensus has yet to be reached on how to collect data that correspond to appropriate definitions of services. In addition to this dearth of available

the different terminologies and methodologies adopted, private associations and consulting firms managing global outsourcing deals provide fair estimates. By 2017, estimations of the market size ranges from US\$262 billion to US\$1.3 trillion in revenues (Figure I), and around 6 million employees globally (Everest Group, 2018b; KPMG, 2017a; NASSCOM, 2018). Estimates from KPMG indicate that the offshore services industry grew at an average annual rate of 22.7% between 2012 and 2017, which is far greater than global GDP growth rates, which ranged from 2.5% to of 2.8% in this period (Figure I).

Figure I. Market Size of the Global IT-BPO Industry, 2009 – 2017



Source: Authors based on Fernandez-Stark et al. (2011); IBI (2005); NASSCOM (2011, 2012, 2014, 2018); The World Bank (2018).

Several trends have shaped the offshore services industry in recent years. The following are the most likely to create both threats and opportunities for Pakistan:

- I. Global expansion and sophistication of Indian services providers.** Between 2011 and 2018, the top ITO Indian providers (TCS, Wipro, Infosys and HCL) expanded their global footprint significantly, investing at least US\$6,274 million in more than 132 new delivery centers (or expansions) around the world. The largest share of investment has been in Western Europe and North America (33% and 30%, respectively) while, the United States accounts for the largest portion of jobs (44%).⁸ The spread of Indian providers was accompanied by a strategic shift oriented towards engaging in projects focused more in business value and outcomes and less in the firms' traditional cost arbitrage-based inputs (HfS, 2018). This, along with the following trends, suggests labor demand is increasingly leaning towards even more qualified talent and specific knowledge.

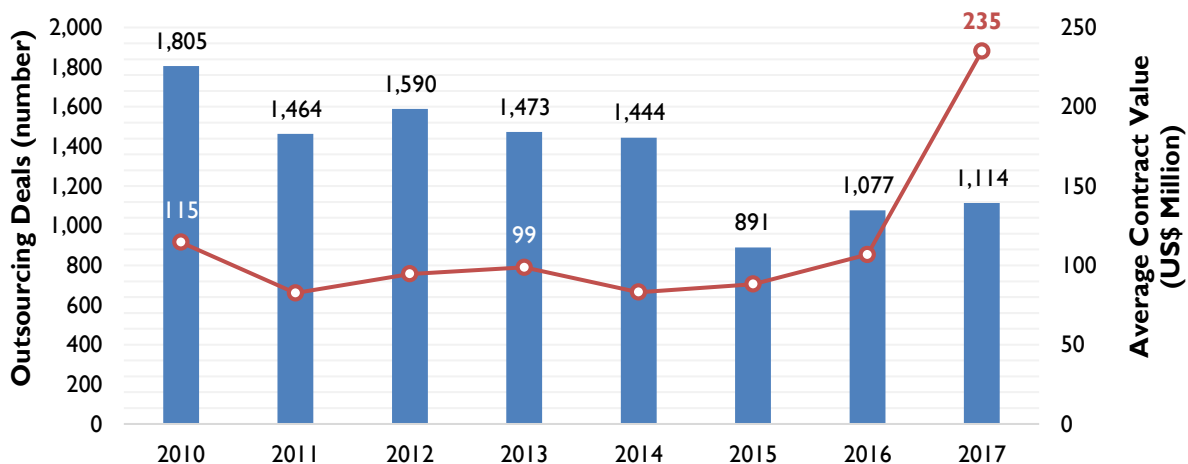
and reliable data, the different methodologies adopted to quantify the size of the offshore services industry have resulted in widely varying estimates from disparate sources (Fernandez-Stark et al., 2011).

⁸ To illustrate, since May 2017 to August 2018, Infosys (India's second largest ITO firm) hired over 4,700 in the US, including nearly 500 people for its technology hub in North Carolina. In addition, the company announced the creation of 10,000 new jobs in multiple innovation hubs across the US with a focus on artificial intelligence, machine learning and other emerging digital technologies.

2. **Rise of intelligent process automation and digital technologies.** Intelligent process automation in this report encompass latest productivity-enhancing ICT, including sophisticated business software packages and other technologies developed to better understand customer tastes and better tailor goods and services to identified needs. The combination of intelligent process automation with manufacturing, known as Industry 4.0, is expected to drive the offshore services market towards digitalization and automation. This adjustment is progressively diminishing the importance of traditional offshore services; hence, third-party providers have been moving their value proposition from labor arbitrage to automation arbitrage, developing hyper digital platforms such as ‘Infosys Nia’ and ‘Holmes’ by Wipro.⁹ As the intelligence processes market develops, the labor demand will shift from computer science engineers to technology and data specialists with computational, design, systems, and management skills (CBI, 2017; EESC, 2017).

3. **Increased complexity is pushing average contract value up.** In line with increasing sophistication and digital transformation of the offshore services industry, between 2010 and 2017 the average value of global outsourcing contracts doubled, whilst the number of outsourcing deals, experienced a 38% fall.¹⁰ In spite of this, in 2017, as much as 79% and 86% of ITO and BPO deals (respectively) were valued at less than US\$100 Million (KPMG, 2017a). Thus, while companies will need to remain active in terms of upskilling and incorporating most up-to-date technologies, the services offshoring space is likely to continue to give room to small and medium-sized companies.

Figure 2. Global Outsourcing Deals (2010 – 2017)



Source: Authors based on KPMG (2014, 2017a). **Note:** Deals analyzed are offshore services contracts of size US\$5 million and above only. The count and value of the deals may vary notably in reality and is only indicative of market movements and trends in the offshore services space.

⁹ ‘Infosys Nia’ is an AI platform that forecasts revenues and products need to be built, as it analyzes customer behavior, content of contracts, compliance and fraud (Infosys, 2017). *HOLMES* helps enterprises hyper-automate processes, redefine operations and reimagine their customer experiences (WIPRO, 2018).

¹⁰ This trend has also been recorded by other leading consulting firms, such as Everest Group, which evidenced a 20% increase in the average annual contract value of outsourcing deals in the 2014 – 2017 period (Everest Group, 2018g).

- 4. Automation is emerging as a threat to developing countries, but contact-center services delivery continues to grow.** The threat of automation replacing humans, especially, contact-center representatives, has been intensively debated in the past decade. Yet, the contact-center industry is expected to continue growing, outpacing the US\$91-93 Billion by 2020 (Everest Group, 2018a). Indeed, automation will reshape the processes within these operations, but technologies will most likely work alongside contact-center agents, not replacing them (Naumov, 2018). For instance, it can be expected that automation enables agents to pass on monotonous tasks such as tagging and categorizing emails or responding to basic queries and rerouting calls. This would enable more agents to focus on higher-level service interactions that contribute to customer satisfaction and retention (Clinton, 2018; Naumov, 2018). To illustrate, the largest provider of customer support services in the world, the Philippines, has increased its revenues from US\$8.9 Billion in 2010 to an estimated US\$22.9 Billion in 2016; within this period, employment grew from 0.5 to 1.2 million (Site Selection Group, n.d.; TESDA, 2017).

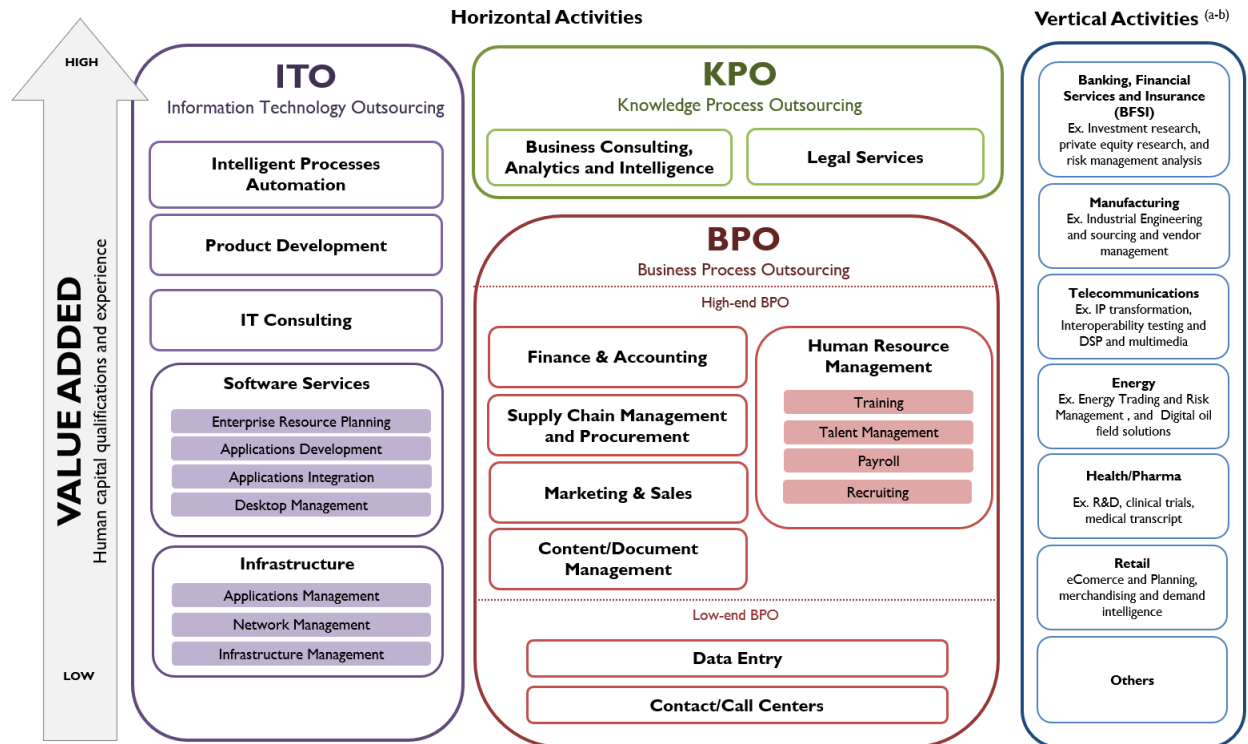
In brief, customer experience will continue to be heavily dependent on high-empathy and creativity skills, thus on human talent (Clinton, 2018; Fersht & Snowdon, 2018). In addition to the behavior resistance to automation, evidence shows technological and organizational barriers to adopt automation in the short and medium term. The proliferation of ecommerce is also a source for additional contact-center demand (Franca et al., 2018).

2.2 Offshore Services Global Value Chain

The offshore services GVC is composed by different functions which can be organized according to employee education and experience level. As seen in Figure 3, these functions can be subdivided in horizontal services provided across all industries (presented on the left of the diagram) and vertical services specific to particular sectors of the economy (presented on the right). The activities included in horizontal services support generic business functions and rely on process expertise. These services range from manual, repetitive, and transactional processes to judgment-based operations that depend on analytical skills. Overall, there are three horizontal main segments, described in the text below. Table 1 describes its subsegments thoroughly, providing examples and total contract value by 2017.

Information Technology Outsourcing (ITO). This segment dominates the global outsourcing space with a contribution of 52% of the total deal value in 2017 (KPMG, 2017a). Most ITO contracts (85%) combine services belonging to two or more subsegments. The bundling of several ITO services into one contract grew from US\$7.2 in Q4 2015 to US\$21.2 in Q4 2017 (KPMG, 2017a). In brief, large organizations are hiring less service providers able to provide a wide range of solutions rather than multiple specialized vendors. On the meantime, high value-added activities, such as *Product Development* and *Intelligent Process Automation*, still capture a very small share of the market, contributing to 3% of ITO contract value in Q4 2017 (KPMG, 2017a).

Figure 3. Offshore Services Value Chain



Source: Authors. **Notes:** This diagram captures the industries with the highest demand for offshore services. ^(a) Each industry has its own value chain; within each of these chains, there are associated services that can be offshored; ^(b) This graphical depiction of vertical activities does not imply value levels; each vertical industry may include ITO, BPO and advanced activities.

Business Process Outsourcing (BPO). The segment accounts for 18% of worldwide outsourcing contract value (KPMG, 2017a). BPO can be subdivided into two categories: low-end BPO and high-end BPO. Low-end BPO consists of customer support services primarily, and accounts for 0.4% of the entire BPO contract value in Q4 2017 (KPMG, 2017a). High-end BPO comprises repetitive yet judgment-based activities such as finance and accounting, human resources management and supply chain management. These accounted for 7%, 27% and 30% of BPO revenues in Q4 2017, respectively (KPMG, 2017a). Opposite to ITO, BPO contracts combining several BPO services accounted for 4% of total contract value in Q4 2017 (KPMG, 2017a). This suggests that specialization is far more important in the BPO segment as compared to the ITO segment, which is more likely to favor large organizations able to provide a wide range of solutions within one single contract.

Knowledge Process Outsourcing (KPO). This segment captures the highest value-added of horizontal services in the chain, such as market intelligence, business analytics and legal services. While KPO and BPO require different levels of qualifications and expertise, they frequently involve similar functions. As a result, statistics are difficult to separate; thus, several consulting firms would include KPO data within the BPO segment. These indicate that 10% of BPO deals in Q4 2017 entailed KPO solutions, adding to US\$41 million (KPMG, 2017a).¹¹

¹¹ Unfortunately, more concrete and reliable estimations of this segment are currently not available.

Vertical services require specific industry knowledge. These may be so highly specialized to their sector that they have limited applicability in other industries; for example, information security software for the finance industry, loyalty program management in the travel and hospitality sector, and transcription services in the medical sector are vertical services (Fernandez Stark & Gereffi, 2016).

In the GVC literature, value is generally determined by examining the transformation of inputs to outputs at each stage. Inputs in the services sector, however, are intangible, including factors such as critical thinking, analytical and communication skills. This creates difficulties in accurately depicting “value-add”. However, industry analysis shows that participation in different stages of the GVC depends primarily on two key factors: labor costs and expertise (Fernandez Stark et al., 2011). Value in the classification scheme presented in Figure 3 is thus determined by using human capital requirements as a proxy, that is, the approximate employee education and experience level required to perform different service functions for each stage (Fernandez Stark et al., 2010).

Employees located in the lower part of the value chain diagram have less education and experience, while the employees in the upper section of the value chain are more educated and have more years of experience. By indicating the human capital required at different levels of the offshore services value chain, this classification scheme provides decision-makers with an instrument for determining where they may be best suited to play a role in the industry (Fernandez Stark & Gereffi, 2016).¹²

¹² Section 2.5 provides more detail on Human Capital in the Offshore Services GVC.

Table I. The Offshore Services GVC Horizontal Subsegments: Definitions and Total Contract Value in Q4 2017 (US\$ million)

Subsegment	Description	Value (Share)
Information Technology Outsourcing: US\$ 24,950 Million (Q4 2017) ^(a-b)		
Infrastructure	Management of software applications, network resources, and services required for the existence, operation and management of an enterprise IT environment. <i>Examples:</i> data center outsourcing, network management, hardware deployment and support, hosting services.	200 (1%)
Software Services	Pre-defined support and maintenance solutions adapted to software products owned by foreign clients. <i>Examples:</i> remote troubleshooting, installation assistance, basic usability assistance	2,600 (10%)
IT Consulting	Advisory services that help clients assess different technology and methodology strategies and, in doing so, align their network strategies with their business or process strategies. <i>Examples:</i> Assessment of network requirements and formulation system-implementation plans (advisory services); development of logical design of network environment and supporting infrastructure (architecture planning); advising on the rollout and testing of new network deployments (implementation planning).	250 (1%)
Product Development	Development and trade of own software packages, applications or digital platforms, owning the IP of all new software. <i>Examples:</i> packed, mass-market software.	0 (0%)
Intelligent Process Automation (IPA)	Solutions where technology used is smart (e.g. robotics, chat bots, image recognition, machine learning) and can be utilized to automate processes. <i>Examples:</i> Specification of detailed instructions for robot to perform (process development); assignment of jobs to bots and monitoring activities (robot control).	700 (3%)
Business Process Outsourcing: US\$ 7,156Million (Q4 2017) ^(a-b)		
Finance and Accounting	Services belonging to the Finance and Accounting function of organizations. <i>Examples:</i> accounts payable, accounts receivable, general ledger, financial reporting, treasury and cash management.	1,517 (22%)
Human Resources Management	Service belonging to the management of organizations' personnel. <i>Examples:</i> recruiting, training, payroll, administration of health benefits plans, retirements plans, and workers' compensation insurance.	3,981 (56%)
Procurement and Supply Chain Management	Solutions pertaining to Procurement, Logistics and Supply Chain Management functions of organizations. <i>Examples:</i> management of logistic, purchase orders process, support of internal category managers.	384 (6%)
Content/Document Management	Document and content management solutions to support the business functions of organizations. <i>Examples:</i> document shredding, storage and imaging.	28 (0.1%)
Contact/Call Center	Customer Relationship Management (CRM) solutions and services. <i>Examples:</i> outbound calls, inbound calls, voice-based technical support, support through social media.	28 (0.4%)
Marketing and Sales	Management of sales and marketing functions of an organization. <i>Examples:</i> design of marketing strategy, lead generation, management of sales pipeline to social media.	n.d.

Source: Authors based on Gartner (2018); Golecha (2018); KPMG (2017a); Arvato Bertelsmann (2017). **Notes:** This table captures the segments with the highest demand for offshore services, thus KPO is excluded. ^(a) Total value of service offshoring deals of size US\$5 million and above only. ^(b) Total includes other ITO or BPO services, as well as bundled services, which describes any combination of two or more ITO or BPO subsegments. Value and shares are retrieved from KPMG member firms' research and analysis based on IDC contract database.

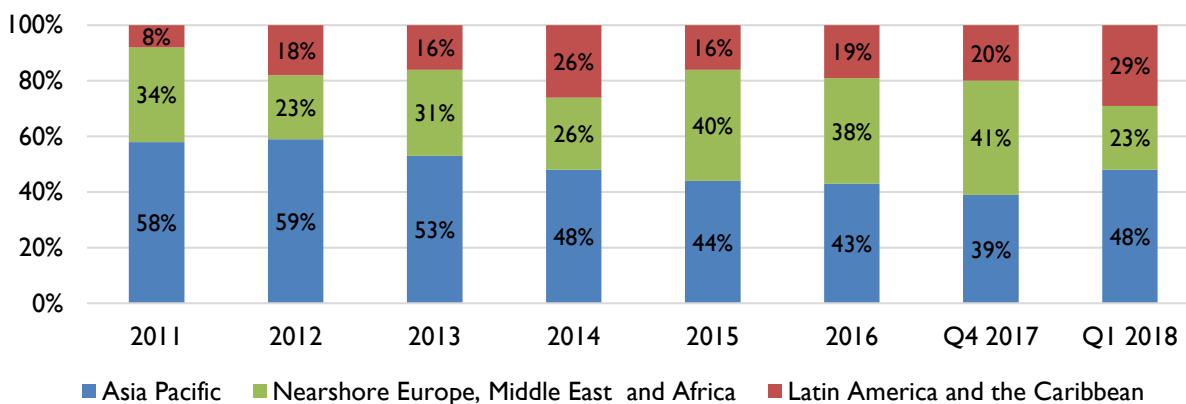
2.3 Distribution of Supply and Demand in the Offshore Services Global Value Chain

The supply of offshore services is principally located in developing countries, mainly concentrated in two countries: India and the Philippines. Driven by low-cost yet educated labor forces, combined, these economies account for about 70% and 63% of global Full Time Employees (FTE) and revenues, respectively (Everest Group, 2017). Nearshore Europe (e.g. Poland, Ireland, Scotland and Ukraine) is the second largest offshore services workforce, accounting for 14% of total FTE. Third in place is Latin America and the Caribbean (LAC), followed by Africa (10% and 6%, respectively) (Everest Group, 2017).

While still leading supply, Asia Pacific’s portion in the offshore services industry has been gradually declining since 2011 (Figure 4).¹³ Currently, seven countries from the region rank in the first ten positions on one of the most reliable offshore locations rankings, the Global Services Locations Index (GSLI).¹⁴ These economies are: India, China, Malaysia, Indonesia, Vietnam and Philippines. Almost two thirds of Asia Pacific’s share of the global market is composed by India and Philippines (42% and 20%, respectively) followed by Singapore (13%) and Malaysia (10%). The remaining 15% is scattered amongst other countries within the South Asia and East Asia and the Pacific regions (Everest Group, 2017).

Within the ITO segment, India remains the leader for large-scale projects, as measured by revenue and scale of IT-ready resources. The second most attractive location within the GSLI, China, continues to make extensive investment in an effort to leverage ITO scale and compete for coveted market share (Longwood et al., 2017).

Figure 4. Geographical Distribution of Service Delivery Centers, 2011 – 2018 (%)



Source: Authors based on Everest Group (2018b, 2018e); Srivastava and Raychaudhuri (2017). **Note:** Asia Pacific includes both ‘South Asia’ and ‘East Asia and the Pacific’ categories from the World Bank.

Demand is concentrated in developed countries. The largest buyer of the offshore services industry is North America (namely the US), accounting for 36% of the international outsourcing

¹³ ‘Asia Pacific’ includes both ‘South Asia’ and ‘East Asia and the Pacific’ categories from the World Bank.

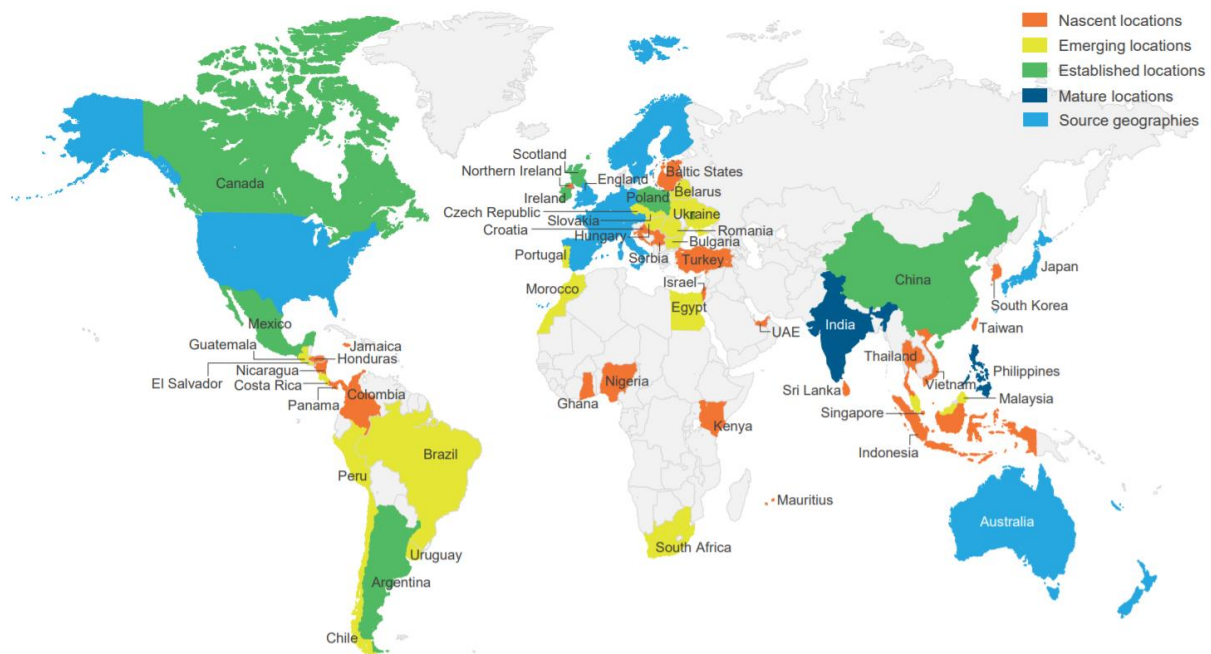
¹⁴ The Global Services Location Index (GSLI) is elaborated by one of the few most respectable consulting firms in the offshore services industry: A.T. Kearney. It evaluates 55 countries against 38 measurements across three major categories: financial attractiveness, people skills and availability, and business environment. Financial factors constitute 40% of the total weight in the published Index. The two remaining categories – people skills and availability and business environment – constitute 60% of the total weight (A.T.Kearney, 2017).

deals announced in 2017. The European Union follows with 28% of total share, while the UK accounts for 12% of the demand side, a slowdown from 2015 due to Brexit (Everest Group, 2017).

The map in Figure 5 illustrates the geographical distribution of supply and demand in this industry by country. To create this map Everest Group surveys national trade promotion and investment attraction agencies, or private associations from each colored country. While Pakistan would classify as an “nascent location”, the country did not provide any formal information to Everest Group as to be placed on the map. This information already suggests limitations in marketing efforts.

At the firm-level, demand for offshore services is led by large firms and MNCs with global operations. The scope and size of their activities and the complexity of their infrastructure and systems led to significant operational costs, which, in turn, impacted their competitiveness. High overhead pushed MNCs to look for strategies to reduce costs, including establishing delivery centers in low-cost countries or alliances with outsourcing providers. In 2017, three quarters of deals were made by companies with annual revenues exceeding US\$ 1.5 Billion (Everest Group, 2018d).¹⁵

Figure 5. Dynamics of Supply and Demand in the Offshore Services GVC (2018)



Source: Everest Group (2018b). **Notes:** Analysis based on headcount for offshore services exports in 2015, i.e. FTEs employed locally in offshore services exports across IT and BPO activities. **References:** Nascent locations (<20,000 FTEs); Emerging locations (20,000 – 100,000 FTEs); Established locations (100,000-500,000); Mature locations >500,000 FTEs). Information is based on country or city-level investment promotion agencies, Offshore Services organizations, and Everest Group. Source geographies represent most relevant demand markets.

¹⁵ Demand levels differ by industry: the largest share of buyers from ITO and BPO deals is controlled by the Government sector (24%), followed by the Banking, Financial Services and Insurance (BFSI) sector with 16% of share, and the Technology and Communication industry, with a portion of 12% (Everest Group, 2018d).

2.4 Lead Firms and Governance

The industry is composed of three groups of key players that govern the industry: (i) captive centers; (ii) global third-party providers; and (iii) domestically-owned third-party providers (Gereffi & Fernandez-Stark, 2010). Each group represents a distinct delivery model. These are examined below:

Captive centers are divisions or subsidiaries of multinational companies that provide services to the home company from a nondomestic location. This business model allows the organization to keep control of their internal operations while reducing costs by establishing in less costly locations. In 2018, enterprises such as Alibaba, Analog Devices, BMW, Cisco Systems, Dropbox, Samsung and Volkswagen opened captive centers performing digital functions in countries different to their headquarter (Everest Group, 2018f).

Global third-party providers are large specialized companies providing a wide range of IT and BPO services to different clients. The latter select these providers based on competitiveness factors; in 2018, Centers for Medicare and Medicaid Services (US) selected Intelenet (earlier Serco) for analytics services, while KMD selected IBM for cloud services (Everest Group, 2018f). Among the top 20 ITO services providers, 12 are based in the United States and other developed countries (e.g. Accenture, Cognizant, IBM, Capgemini) while 8 are new multinationals from India like Infosys, HCL, Wipro and Tech Mahindra. During the 2000s, third-party providers acquired sufficient maturity and financial capability to assume operations not only in their own country but others as well. Establishing delivery centers in new emerging locations enabled third-party providers to mitigate concentration risk and take advantage of skills and time zones, as well as to tap into new markets. By 2018, TCS had over 147 delivery centers in 21 countries (TCS, 2018a). More recently, third-party providers partnered with specialized firms to accelerate their entry into higher value-added segments. To illustrate, in 2018 IBM partnered with a Russian oil producer (Gazprom Netf) to develop new technologies in the areas of Artificial Intelligence, predictive analysis, big data, and industrial IoT for improved efficiency of geological exploration and production of onshore oil reserves (Everest Group, 2018f).

The third group is comprised by domestic firms based in developing countries which provide IT and BPO solutions for clients abroad, such as NETSOL Technologies and Systems Limited (Pakistan). Different to global third-party providers, these organizations are well less internationalized, with most exporting to regional markets rather than to the US or Europe. SMEs and freelancers with more than 50% of revenues in exports are included in this category.

The governance structure of the industry varies depending on the segment of the GVC. In the lower stages of the chain, interaction between buyer and supplier is limited; the latter is confined by detailed customer's specifications and obligations comprehensively described in a Service Legal Agreement (SLA). In these stages, third-party providers are selected based on cost primarily. As value-added increases, the interaction between client and supplier is greater and the relevance of cost diminishes. Due to higher transactional costs, the relocation high-value added functions, such as business analytics or legal services is predominantly done through captive centers (Fernandez-Stark et al., 2011).

2.5 Human Capital in the Offshore Services Value Chain: Skills and Gender

The educational level and skills in local workforces have been key drivers of location decisions in the offshore services industry. Providing services in any level of the value chain, be it through entry in the value chain or upgrading, thus depends on the availability of required labor qualifications, technical, and soft skills (Fernandez Stark et al., 2011). Table 2 outlines the different educational profiles and training requirements for each segment of the GVC.

Formal education is used as a preliminary screen for potential recruits; in fact, the worldwide offshore services industry employs predominantly tertiary level students. Soft skills are required and are consistent across countries; these include communication skills (e.g. active listening and voice clarity, basic computer skills, and language ability) critical thinking, creativity, and complex problem solving thinking (Gereffi et al., 2011; KPMG, 2017b).

Experience in developing countries has shown that although these may not be adequately covered by official education systems, strategic investments in workforce development by the public and private sectors have been critical in improving competitiveness and positioning in the global market. These include selective competency-based hiring, minimum formal education, induction sessions, specialized and on-the job training, skill certification, mentoring, and leadership development programs (Fernandez Stark et al., 2011).

Table 2. Job Profiles in the Offshore Services Global Value Chain

Position	Job Description	Formal Education Requirements	Training/Experience	Skill Level
ITO				
IT Technician	Maintains equipment and network devices, provides software support for updates	Technical diploma / Degree	Specific technical courses, on-the-job training, and experience	
IT Software Programmer	Programs software applications for general or customized use	Technical diploma / degree	Software programming courses and certifications	
IT Consultant	Provides advice to help firms align IT strategy with their business goals	Master's degree in Engineering	Consulting/management experience	
Software R&D Engineer	Designs, develops, and programs innovative software packages and functions	Bachelor's / Master's / Doctoral degree in engineering/computer science	Software programming courses and certifications	
BPO				
Call Center Operator	Answers in-bound calls regarding specific products and provides general customer services.	High school / Bachelor's degree	Two-three-week of training and on-the-job training	
Finance and Accounting Analyst	Provides accounts receivable and accounts payable processing, reconciliations, ledger keeping, and income and cash statement monitoring.	High school / Technical institute diploma in accounting	Technical training and on-the-job training	
Marketing and Sales Representative	Supports inbound and outbound sales, sales order processes, and customer monitoring.	Technical / Bachelor's degree	Short training and on-the-job training	
BPO Quality Assurance and Team Managers	Ensure BPO agents meet specified client service standards and monitoring agent performance	Technical and university-level professionals	Technical training and on-the-job training	
KPO				
Finance Analyst	Provide guidance to businesses and individuals making investment decisions; assess the performance of stocks, bonds, commodities, and other types of investments.	Bachelor's degree in business administration	Chartered Financial Analyst (CFA) Certification	
Business Analyst	Provides business services, such as market research, business opportunity assessment, strategy development, and business optimization.	Bachelor's / Master's degree in business administration	Experience	
Legal Analyst	Reviews and manages contracts, leases/ licenses. May provide litigation support or intellectual property services	Law degree	Experience and training in specific country legal systems	
Researcher	Undertakes projects to increase the stock of knowledge; develops new products based on research findings.	Master's/Doctoral degree	Experience/industry specialization	
Skill Level:	 Low-Medium: Literacy and numeracy skills; experience	 Medium: Technical education/certification	 Medium-High: Technical Education/Undergraduate Degree	 High: University degree and higher

Source: Fernandez Stark et al. (2011).

Gender dynamics vary significantly across the different segments of the offshore services GVC. In the lowest stages of the GVC, female employees are predominant. In the global call center workforce, 71% of agents are women (Hultgreen, 2018). Despite this figure suggest significant gender integration, the share of BPO female workers decreases in developing countries, falling to 52.5% in the Philippines and 31% in India (David, 2015).

Within this service segment, female employment in call centers is mostly at the agent level, while management is typically male dominated (Ahmed, 2013; Messenger & Ghosheh, 2011; Schwarzer, 2015). To illustrate, in 2016, one quarter of the Indian IT-BPO management were females (Economic Times, 2016). The reasons behind this relate to the strong gender bias in role assignment: women struggle to attain promotion due to disruption in family life and difficulty to balance between the dual burden of work and home.

Worldwide, the ITO segment presents significantly different gender dynamics. Females are vastly underrepresented in Silicon Valley tech jobs, as well as in South and East Asia economies becoming technology hubs; to illustrate, 70% of India and Singapore's tech workforce are male (Agarwal & Malhotra, 2016; Spenser, 2017). Barriers faced by girls and women in South and East Asia include: lower access to ICT tools and connectivity; limited time to pursue skill adoption due to domestic and care work; limited mobility; online harassment; limited gender-sensitive content in ICT training; weaker networks to leverage in job search and greater discrimination as compared to men (SPF & Dalberg, 2017). In addition, female IT workforce is still highly stratified, with the largest numbers of female workers concentrated in entry-level positions and lower-tier segments: by 2011, only 3% of female employees in IT occupied senior roles, 16% were middle management, and 81% were junior (Powell & Chang, 2016). In addition, the Indian IT workforce is largely urban and middle and high class and hail from educated families (Agarwal & Malhotra, 2016). Even when women do enter the IT workforce, most are bound by lifecycle factors such as marriage, childbirth and domestic work (Agarwal & Malhotra, 2016).¹⁶ These create severe barriers for females' career development women in an industry that requires continuous training, application and long-work hours.

2.6 Standards and Certifications

In order to regulate the quality of services, as well as to enable transparency and comparability, the industry has developed a number of standards and certifications. These provide a common language and help to define service requirements, customer expectations and recognized terms and definitions. They also reduce the risks that might affect customers, such as data security vulnerabilities. Relevant certifications and standards for companies are summarized in Table 3.¹⁷

At the firm level, data security and intellectual property protection continue to be increasingly critical, especially in the BPO segment.¹⁸ To address these concerns, global buyers and customers

¹⁶ In India, one third of women that ultimately drop out of the IT industry attribute it to the lack of suitable employment opportunities. Assigned social roles, such as taking care of children and/or family reasons compile 49% of reasons why women fail to continue in the Indian IT industry (Powell & Chang, 2016).

¹⁷ ISO has already published more than 700 standards that apply to specific services, and has also developed ISO/IEC Guide 76 addressing consumer issues (ISO, 2016).

¹⁸ The major concerns include: operational disruption due to cyber-security breaches; liability risks through data loss; unauthorized data extraction/modification within company-internal data flow; damage to company reputation

would only admit service providers certified in Payment Card Industry Data Security Standard (PCI-DDS). The ITO segment relies on a range of voluntary, market-led, standards setting organizations with global reach.

Some verticals within the offshore services GVC (e.g. Healthcare) have also been widely regulated by Acts developed by national bodies, such as the Health Insurance Portability and Accountability Act (HIPAA) introduced by the United States government. HIPAA enforces hospitals, clinics, insurance providers, and all third-party entities that obtain personal information on their behalf, to comply with standards for how Personal Health Information (PHI) can be recorded, accessed, shared and stored. To obtain the HIPAA certification, companies must train their personnel in courses designed to teach agents and technicians how to comply with the privacy and security rules. Different to other certifications, there is no implementation specification that requires a covered entity to “certify” its compliance; rather, covered entities are obliged to perform a periodic technical and non-technical evaluation that establishes the extent to which an entity’s security policies and procedures meet the security requirements.¹⁹ While the exact cost of implementation is very difficult to estimate – and available data is significantly outdated – HIPAA compliance has been compared with Y2K preparations in terms of their impact and costs (Arora & Pimentel, 2005).²⁰

Whilst compliance with PCI-DDS and HIPAA is an essential-to-critical consideration for every company providing customer support to US healthcare organizations, certain certifications remain voluntary, with very limited reach amongst third-party providers that are far below in global rankings. To illustrate, by 2018, the official body of COPC had certified only 7 organizations in India and 25 organizations in APAC (excluding India).

Further, each segment of the offshore services GVC has globally recognized professional certifications or global skills standards. These can include working knowledge of global software platforms (e.g. Microsoft, Cisco, and Oracle certifications) or financial analysis skills (e.g. CFA certification from the Global FCA Institutes).

and loss of trust due to data loss; misuse of data during exchange of information with partners; loss of intellectual property; violation of regulations and laws on data security or data privacy; and endangerment of operators or users (CBI, 2017).

¹⁹ The evaluation can be performed internally by the covered entity or by an external organization that provides evaluations or “certification” services.

²⁰ In 2005, the average costs varied from US\$10,000 for a small private practice to US\$14 million for a larger organization (Arora & Pimentel, 2005).

Table 3. Mandatory Quality Standards of the Offshore Services GVC

Standards and Certifications	Description	Relevance
PCI-DSS	The Payment Card Industry Data Security Standard (PCI-DDS) increases controls on financial services to protect consumer information against fraud. For example, call centers cannot record consumers' confidential information, such as security codes.	Critical
HIPAA	The Health Insurance Portability and Accountability (HIPAA) is a US law that ensures confidentiality, integrity and availability of protected health information (PHI). It applies the Privacy Rule to business associates' contractors, where any vendor which receives or utilizes protected health information from, or for, the covered entity needs to ensure the integrity and security of healthcare information.	Essential
COPC	Customer service provider global standard that focuses on implementing best practices to improve performance metrics in customer satisfaction and service, inbound and outbound sales, dispatch, collections, retention, remittance processing, fulfillment, and other related operations.	Voluntary
ISO 270001 and 27002	The ISO 27000 series of standards covers security. Best practices for privacy data protection include limiting access to personally identifiable information to verifiable need to know, such as payroll personnel, and privacy protection training for individuals with access to that data.	Voluntary
CMMI[®]	The Capability Maturity Model Integration (CMMI) is a globally-recognized set of best practices that enable organizations to improve performance, key capabilities, and critical business processes.	Voluntary
ISO/IEC 30105-1:2016	ISO/IEC 30105 specifies the lifecycle process requirements performed by the IT-enabled business process outsourcing service provider for the outsourced business processes. It defines the processes to plan, establish, implement, operate, monitor, review, maintain and improve its services.	Voluntary

Source: Authors based on Avasant (2012); ISO (2016); CCMI Institute (2018).

3 Pakistan in the Offshore Services Global Value Chain

Key Points

- By 2017, the country accounted for 0.1% of IT-BPO exports in the world. This positions Pakistan well below the top 50 exporters of offshore services globally (ITC, 2018).
- The country's participation in the offshore services GVC is due to a booming IT industry. In 2017 Pakistan exported US\$572 million in IT services (PSEB, 2018). This figure is about 5 times higher than in 2007. The destination of about one half of total IT exports is United States, followed by the United Arab Emirates and European Union, with 9% and 8% of total exports, respectively (PSEB, 2018). Pakistani-Americans have led the expansion of the industry building on their strong business ties with the US.
- Pakistan has yet not been able to attract prominent foreign operations,
- Country exports are highly concentrated in low value-added services within the ITO and BPO segments: in 2017, almost one third of Pakistan's offshore services exports derived from basic/transactional services like software maintenance and voice-based customer support (PSEB, 2018).
- Freelance is a growing activity; however is restricted to rudimentary virtual assistance tasks, including data entry, website technical help and troubleshooting, and social media management (Field Research, 2018).

In 2017, offshore services exports from Pakistan totaled US\$655 million. The majority of revenues (87%) derives from the ITO segment, while the BPO segment accounts for 13% of exports (PSEB, 2018). The industry accounts for 0.2% of the country's GDP, and 2.4% of total country exports (services and goods). These indicators are 0.07 and 1.3 percentage points higher than in 2013 (PSEB, 2018).

Employment is estimated at 15,000 specialists (Rahman et al., 2017). This figure is unofficial and departs from unknown methodologies. Accurate statistics on employment is a challenge for all developing countries competing in this market, i.e. Pakistan is no anomaly. Finally, in Pakistan, services exports deriving from freelance activity is relevant; while total number of freelancers is presumably not reliable, with estimations ranging from 50,000 to 150,000 (Field Research, 2018).

While both quantitative and qualitative data suggest that Pakistan's offshore services industry is thriving, industry experts remark that growth has been driven by firm-level efforts and strong business linkages with Pakistani American in the US. Special treatment from the government side has been reckoned as limited—at least until 2017, when several incentives were announced. Whilst large companies with over 10 years of market experience frequently appraise the lack of intervention, the newest generation of firms and freelancers indicate the need for certain interventions, including improving the quality of tertiary level education and ameliorating the business environment, particularly, the visas regime (Field Research, 2018).

In the light of a sizeable labor pool and low labor costs, potential growth is apparent. Yet, compared to its regional competitors, Pakistan is at the initial stages of progress. Reasons behind this sentence are as follows:

- By 2017, the country accounted for 0.1% of IT-BPO exports in the world.²¹ This positions Pakistan well below the top 50 exporters of offshore services globally (ITC, 2018). Regional competitors such as India, the Philippines and Sri Lanka accounted for 34%, 3% and 0.5% of the total IT-BPO market, respectively (ITC, 2018).
- Different to regional and global competitors, which base its value proposition in the presence of leading third-party providers and MNC, Pakistan has yet not been able to attract prominent foreign operations, recording no presence of the principal IT-BPO providers in the world (e.g. Accenture, Cognizant, TCS). Also, captive centers from multinational corporations are very few, accounting for less than 20% of offshore services exports in 2017 (Field Research, 2018). The dearth of foreign operations continues to hurt Pakistan's perception as a reliable offshore services location.²²
- Pakistani IT firms remain very small in size compared to Indian firms; to illustrate, the largest IT-BPO firm in Pakistan employs about 20,000 workers worldwide, whilst India's largest IT-BPO provider employs up to 395,000 workers (Field Research, 2018; TCS, 2018b).²³ The small size of Pakistani companies limits the possibilities of meeting the needs of large global corporations and deters its credibility as an experienced services provider.
- Country exports are highly concentrated in low value-added services within the ITO and BPO segments: in 2017, almost one third of Pakistan's offshore services exports derived from basic/transactional services like software maintenance and voice-based customer support (PSEB, 2018). Freelance activity is restricted to rudimentary virtual assistance tasks, including data entry, website technical help and troubleshooting, and social media management (Field Research, 2018).
- According to A.T. Kearney (2017) Pakistan is the least attractive location for offshoring services in Asia, excluding high-income economies. As shown in Figure 6, Pakistan is ranked 30th in one of the most relevant offshore services indexes in the world: The Global Services Location Index (GSLI), elaborated by A.T. Kearney, one prominent IT-BPO management consulting company. Pakistan's poor positioning is due to its deficient business environment. In this metric, the country ranks lowest amongst all 55 considered economies.²⁴

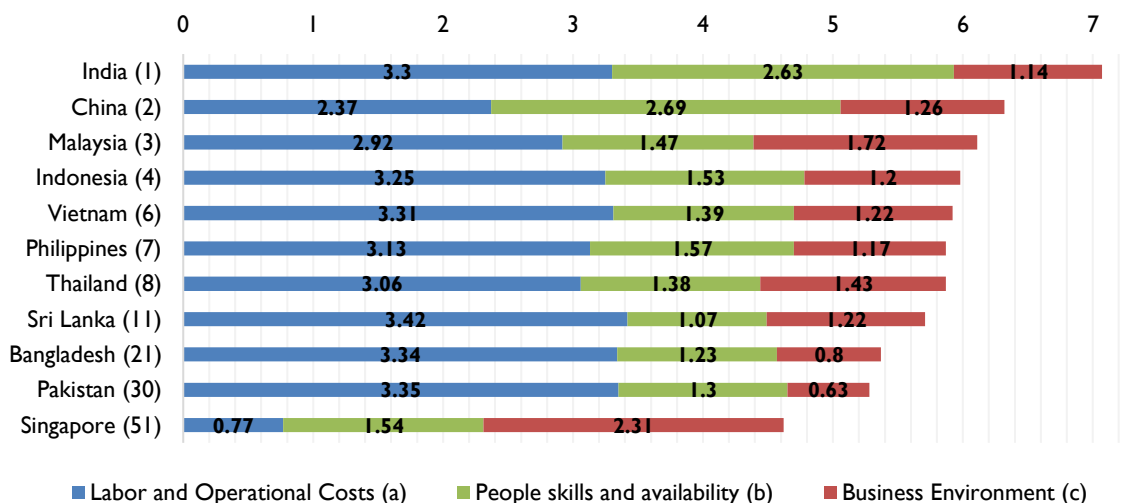
²¹ We use statistics collected by the International Trade Center (ITC) for comparability reasons. Categories considered include *computer services* and *other business services* from Balance of Payment Methodology Revision Sixth (BPM6). *Computer services* consist of hardware and software-related services and data-processing services; they exclude non-customized packaged software (systems and applications) and video and audio recordings on physical media; computer-training courses not designed for a specific user; and leasing of computers without an operator. *Other business services* cover research and development, professional, and management consulting, as well as technical, trade-related and other business services.

²² The presence of captive centers and third-party providers helps countries to build a reputation as a reliable destination to offshore services activities.

²³ The companies are The Resource Group (Pakistan) and Tata Consulting Services (India).

²⁴ See Section 3.5.2 for more details on Pakistan's business environment.

Figure 6. Pakistan in the Global Services Location Index by A.T. Kearney (2016)



Source: Authors based on A.T.Kearney (2017). **Notes:** Numbers next to country's names correspond to the position in the GSLI Index, which ranks up to 55 countries; ^(a) A higher mark corresponds to lower costs of establishing an offshore services operation²⁵; ^(b) A higher mark means a larger and more qualified talent pool²⁶; ^(c) A higher mark equals to a better business environment²⁷.

3.1 Pakistan's Current Participation in the Offshore Services Global Value Chain²⁸

Pakistan participation in the offshore services GVC is depicted in Figure 7. The country is active in the ITO and BPO segments, primarily. These account for 87% and 13% of total exports, respectively (Field Research, 2018). The vertical segment is composed of a small number of companies (about a dozen) that have developed specific knowledge in at least three sectors, including: Banking, Financial and Insurance Services (BFSI), Healthcare industry, and Energy. This segmentation is based on a wide analysis of the entire offshore services industry, including both large companies and SMEs. While a closer look to top 10 exporters provides a more nuanced scenario, segments of participation of these companies are quite illustrative; also, these account for 20% of total Pakistan's offshore services exports. By 2018, 3 out of 10 top exporters provided IT services for a wide array of industries, with 2 of them having opened BPO operations as well. Two other companies exported BPO services exclusively, namely data entry and customer support for different clients around the globe. Firms specialized in vertical sectors totaled 3 out of 10 (PSEB, 2018).

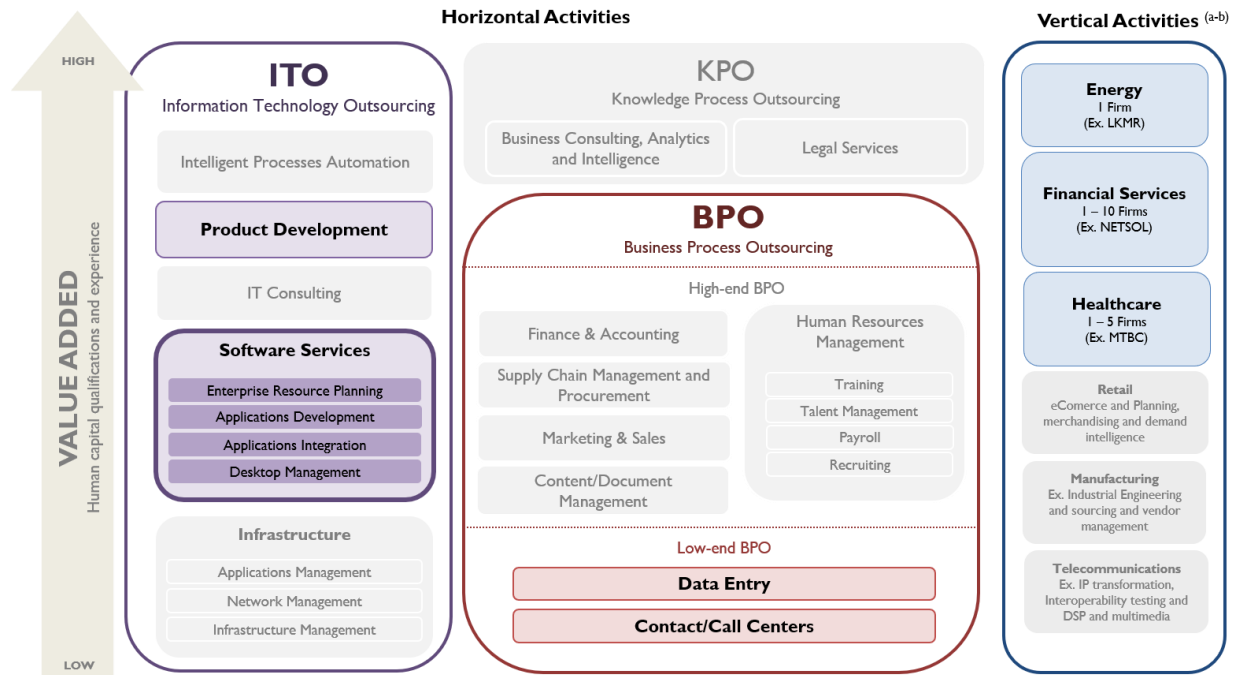
²⁵ Metrics used for this category include: average annual wages, average compensation costs for relevant positions (BPO analyst, IT programmer, contact center representative), average cost of infrastructure (occupancy, electricity, telecommunications), blended travel cost to major customer destinations (New York, London, and Tokyo), relative tax burden, costs of corruption, and exchange rate movements.

²⁶ Metrics used for this category include: estimated IT/BPO sector size, quality/skill ratings for relevant positions (quality of management school, college education quality and relevant industry certifications for IT, BPO, and contact centers).

²⁷ Metrics used for this category include: political risk (political stability, terrorism risk, regulatory burden), foreign investment, ease of doing business, A.T. Kearney Global Cities Index "personal contact" index, blended metric of country infrastructure quality (telecom, electricity), overall local infrastructure quality, ratings of intellectual property protection, ISO information security certifications, software piracy rates.

²⁸ Except for specific citations, the source of this section is Field Research (2018).

Figure 7. Pakistan’s Participation in the Offshore Services GVC, 2017



Source: Authors based on Field Research (2018) and PSEB (2018). **References:** Colored subsegments indicate active participation; Weight of subsegments’ outline indicates the estimated participation in the global market, with thicker outlines representing larger relative participation in total exports; Gray-colored subsegments indicate no current participation

Within the ITO segment, Pakistan participates in the *software services* and *product development* category. The former is much larger than the latter: by 2017, about 90% of offshore services exports derived from *software services* firms (Field Research, 2018). Pakistan is not active in other horizontal ITO activities. Within the BPO segment, Pakistan is positioned in the low-end BPO category, with 90% of revenues deriving from the *contact/call-center* sector (Field Research, 2018). The country is not active in high-end BPO nor KPO activities.

The highest value-added services exported from Pakistan derive from about a dozen large companies with over 10 years of experience in the market and substantial business ties with the US. These firms provide complex IT-BPO and KPO solutions to knowledge-intensive sectors in developed economies, ranging from asset finance and leasing software for the Banking, Financial Services and Insurance (BFSI) in the region (e.g. NETSOL Technologies), to medical transcription and artificial intelligence platforms for the US Healthcare industry (e.g. Medical Transcription and Billing Company), and geoscience management solutions for the exploration and extraction of petroleum in various countries (e.g. LKMR).

One highlight of Pakistan’s participation in the offshore services GVC is the freelance activity. While there are no official estimates of the size of exports, the nation is ranked as the fourth most popular country for freelancing in the world, according to the Online Labor Index published in

2017 by Oxford Internet Institute (OII)—after India, Bangladesh and US.²⁹ Pakistani freelancers export a wide variety of low value-added IT-BPO services, such as virtual assistance for schedule management, web design, software development, online marketing, content writing, graphic design, online search, translation and transcription services, and data entry, among many others (Field Research, 2018).

3.2 Industry Organization

There are about 3,500 companies registered in the Pakistan Software Export Board (PSEB). About 50% of these (1,762) would have been active in the global market during 2017 (PSEB, 2018). This section highlights the organization of the industry, with a focus on the key stakeholders involved in its development.

Different to most offshore services locations, in Pakistan, domestically-owned companies are predominant along the entire value chain; within the Top 10 IT-BPO exporters, only 1 is foreign (Field Research, 2018).³⁰ Leading global third-party providers such as Accenture, Wipro or TCS have no presence in Pakistan. Captive centers from MNC companies are also absent. The dearth of foreign operations severely underscores the nation's positioning in the list of preferred platforms for offshore services operations.

Within the ITO segment, the industry can be organized based on two criteria, namely market share and functions.

- **Market share:** 25% of exports derive from the top 20 exporters (Table 4). The remaining three quarters of exports are captured by micro-freelancing organizations founded by returning expats or successful former freelancers (Field Research, 2018). Companies within this group employ over 1,000 FTE each and many have affiliates in the US or neighboring countries (e.g. NETSOL Technologies, Systems Limited, Teradata). Naturally, these firms can provide quality solutions while maintaining extensive payrolls.
- **Functions:** the great majority of exports (90%) derive from the *software services* sector. Solutions pertaining to the *product development* account for 10% of total ITO exports (Field Research, 2018). Different to *software services* firms, *product development* companies depend more on quality, skills, certifications and business linkages in the US than on scale. To illustrate, most firms within this group would employ 50 to 70 professionals (Field Research, 2018). While most ITO firms have been founded by Pakistani-Americans; some *product development* firms were started by local graduates from incubators in Tier-I Universities such as Lahore University of Management Sciences (LUMS), National University of Sciences and Technology (NUST), and Foundation of Advancement of Science and Technology (FAST) (Field Research, 2018).

²⁹ The Online Labor Index of the University of Oxford is the first economic indicator providing an online gig economy equivalent of conventional labor market statistics. It measures the supply and demand of online freelance labor across countries and occupations by tracking the number of projects and tasks across platforms in real time (Kässi & Lehdonvirta, 2016).

³⁰ S&P Global Market Intelligence Company.

Table 4. Distribution of IT-BPO Exports, by Share in Exports (2018)

Firm Group	Exports (US\$ million)	Share in exports (%)	Share in total number of exporting firms (%)
Top 10 exporters ^(a)	166	20%	0.6%
Top 20 exporters	208	25%	1.1%
Top 115 exporters	416	50%	6.7%
Top 747 exporters	623.5	75%	42.7%
All (1,750 firms)	831	100%	100%

Source: Authors based on PSEB (2018); Field Research (2018). Note: (a) In order of share in revenues: NETSOL Technologies, S&P Global Market Intelligence Company, Systems Limited, Ibex Global Solutions, Teradata Global Consulting, i2c Pakistan, Afiniti Software Solutions, SBT Pakistan, Ahsan Enterprises, Medical Transcription and Billing Company.

Pakistan’s BPO segment is controlled by a few large companies capturing more than 2/3 of BPO revenues, including: Ibex Global Solutions (The Resource Group), SBT Pakistan and Ahsan Enterprises. Remaining exports derive from BPO units within large ITO companies (e.g. Systems Limited) (Field Research, 2018).

Another important group in the Pakistani offshore services industry is composed of freelancers performing virtual assistance through online platforms such as Upwork. Like large companies, freelancers often have some personal or business connection with a relative or acquaintance in the US, which facilitated their establishment as stable IT-BPO services exporters.

Beyond firms, the industry consists of supporting public and private institutions, most based in Lahore and Islamabad (Table 5). In the private sector, Pakistan Software Houses Association (P@SHA) is widely recognized as the most prominent industry supporting institution (Field Research, 2018). P@SHA has led significant lobbying and advocacy initiatives to drive policy development. Public sector efforts for the IT and BPO industry are coordinated by the Pakistan Software Export Board (PSEB), a Government body under the Ministry of IT and Telecom (1995).

Table 5. Key Industry Stakeholders in the Offshore Services GVC

Name	Role in the Offshore Services Industry	Level of Engagement
Pakistan Software Houses Association (P@SHA)	<ul style="list-style-type: none"> Lobby and advocacy to ensure government support. Help formulate policies to strengthen the industry. Address queries from potential clients and foreign agencies interested in outsourcing to Pakistan. 	
Ministry of IT and Telecom	<ul style="list-style-type: none"> Principal counterpart of the private sector and P@SHA 	
Punjab Information Technology Board (PITB)	<ul style="list-style-type: none"> Provides IT services and infrastructure to the local government and private businesses. Develop policy alternatives and plan initiatives for building an internationally competitive IT industry in the province. 	
Higher Education Commission (HEC)	<ul style="list-style-type: none"> Works with private stakeholders to update the IT tertiary courses curricula and develop basic technical courses for freelancers. 	
Pakistan Software Export Board (PSEB)	<ul style="list-style-type: none"> Registers IT and BPO companies. Collects IT and BPO exports. 	

Source: Authors based on Field Research (2018).

PSEB is mandated to promote the offshore services industry in local and international markets; however, the body has not been able to develop sufficient marketing strategies and support mechanisms (Field Research, 2018). To illustrate, in five years, PSEB has only organized six outbound trade delegations to target markets, supporting an average of eight companies per year. (less than 3% of its members) (Field Research, 2018). Reasons behind this are threefold, including: limited resource allocation, visa restrictions for Pakistani engineers and technicians, and lack of engagement from the private sector (Field Research, 2018; Jamal, 2017). More specifically, larger firms rely on its own business network to obtain outsourcing deals, and smaller firms are reluctant to participate in international forums under a Pakistan pavilion due to poor perception in target markets (Field Research, 2018). PSEB is also responsible for the registration of IT and BPO firms; registry requires the payment of an annual fee, which is compulsory for firms to benefit from current and future fiscal and non-fiscal incentives, as well as to transfer US dollars from and to foreign clients.

While PSEB has been mandated with a wide array of other functions—ranging from undertaking research on the state of the industry to assist companies in acquiring quality, security and other certification—it is well documented that PSEB is considered an administrative agency solely. When asked by the most supportive government agency, firms indicate the relevance of topmost authorities from the Ministry of Information Technology and Telecom (Field Research, 2018). In fact, it is largely reckoned that PSEB (along with The Universal Service Fund and the National ICT Research and Development Fund) have little to do with policy-making, and are only focused on narrow mandates (Khilji & Zahid, 2017).

During the past decade, stakeholders described in Table 5 have worked to consolidate key demands of the industry. The most relevant advances and remaining challenges are as follows:

- Software Technology Parks. Pakistan has developed 14 Software Technology Parks. This totaled nearly 1 million square feet. Yet, buildings do not address offshore services companies' requirements such as uninterrupted year around operations, quality bandwidth, reliable power and security, accessibility, expandability and parking space. In addition, most space has been occupied by government agencies. For micro-freelancing companies, these buildings are not affordable (Field Research, 2018)
- Incubators. According to the HEC of Pakistan, currently 8 university incubation centers are established with the objective to support the development of spinoffs and entrepreneurs' access to financial and technical resources along with value added services such as intellectual property rights. Yet, incubators are too away to achieve the maximum output in terms of economic development, job creation, innovation and R&D commercialization (Jamil et al., 2016).

More recently (2017), the Prime Minister announced five incentive packages and tax holidays for the IT industry. These include: (i) extension of the tax holiday on IT exports from 2019 to 2025; (ii) 5% cash reward on IT exports; (iii) reduction of sales tax to 5% on IT within the Federal Areas; and (iv) reduction of the minimum acres of land required to create a Special Economic Zone to 5 acres of land (Field Research, 2018).

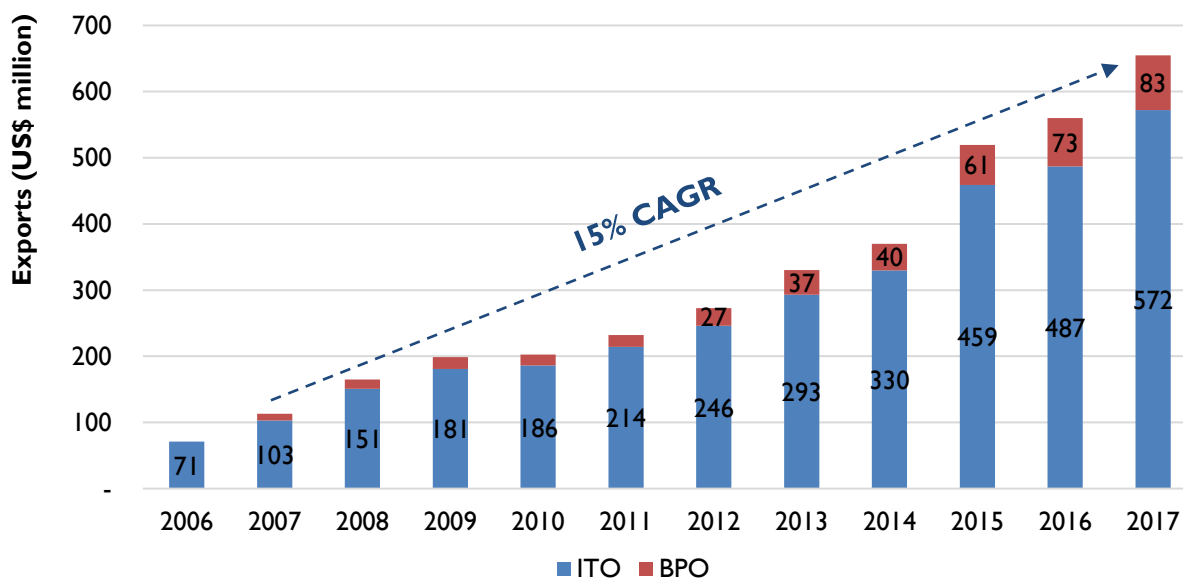
The incentives above will pave a way towards the execution of Pakistan Digital Policy, published in 2018 by the Ministry of Information Technology and Telecommunications.³¹ While this policy goes a long way in terms of signaling its importance as an engine for economic growth, it should be underscored that goals are too general and poorly detailed. In brief, Pakistan’s Digital Policy acts could be appreciated as an affirmation of the importance of the IT sector in the country; however, strategies and sequence of actions required to meet objectives are unspecified. This deters Pakistan’s opportunities to build a valid roadmap for the formulation and implementation of the policy. Finally, the document does not provide with any evaluation or monitoring mechanisms. It could be expected that these failures hinder execution and compliance.

3.3 Industry Evolution in Pakistan’s Offshore Services Global Value Chain

Pakistan entered the offshore services GVC in the mid-2000s through IT exports. However, it was not until 2009 that the country gained some recognition as an alternative offshoring location, when it attained its first admission into the GSLI ranking (A.T.Kearney, 2011). By this time, both India and the Philippines had already achieved maturity in the global market, while others in Europe and Latin America were already emerging (e.g. Poland, Mexico, Czech Republic).

Nonetheless, over the past ten years, IT-BPO exports increased by a factor of four, going from US\$113 in 2007 to US\$655 in 2017 (Figure 8). Within this period, the Compound Annual Growth Rate (CAGR) stands at 15% (PSEB, 2018). This indicates that Pakistan’s sector, while still relatively small, has embarked on what should be a prosperous upgrading trajectory within the offshore services GVC. Text below Figure 8 describes each segment evolution separately.

Figure 8. Pakistan’s ITO and BPO Exports, 2006 – 2017



Source: Authors based on PSEB (2018).

³¹ Section 3.5.2 expands upon the Pakistan’s Digital Policy.

Information Technology Outsourcing. As evidenced in Figure 8, the country's participation in the offshore services GVC is due to a booming IT industry. In 2017 Pakistan exported US\$572 million in IT services (PSEB, 2018). This figure is about 5 times higher than in 2007. The destination of about one half of total IT exports is United States, followed by the United Arab Emirates and European Union, with 9% and 8% of total exports, respectively (PSEB, 2018). Pakistani-Americans have led the expansion of the industry building on their strong business ties with the US. The great majority of IT companies serve a wide range of industries, with less of half a dozen companies providing solutions for vertical industries (see segment 'Verticals').

Business Process Outsourcing. In 2017, Pakistan exported US\$83 million in BPO services (PSEB, 2018). This figure is 7 times higher than in 2007. The emergence of the BPO segment traces back to 2002 when a group of Pakistani American investors based in the US relocated some of these firms' customer support to Lahore. As founders owned several American start-ups, the group grew rapidly through acquisitions and private equity (Field Research, 2018). Currently, the company has 20,000 employees globally, from which around one third is based in Pakistan.³² Segment expansion and global recognition as a reliable BPO location has been constrained by Pakistan's high-risk perception and rigid visa regime. In the *contact/call-center* industry, customers typically visit the offshore operations as a quality assurance strategy. However, Americans are reluctant to travel to Pakistan for security reasons. This constraint is hard to overcome for new companies, placing much needed efforts in supporting the upgrading of existing operations.

Verticals. Companies providing services for vertical industries are by far the most sophisticated players of Pakistan's offshore services GVC. Based on interviews with experts, firms included in this category include; (i) NETSOL Technologies, which provide IT and KPO services for the Financial and Insurance sector; (ii) Medical Transcription and Billing Company (MTBC), which specializes in high-end IT-BPO solutions for the Healthcare industry; (iii) and LKMR, a formerly captive operation responsible for software development and data analysis for companies in the Energy Sector, specifically in oil and gas exploration. Box 1 expands on the MTBC example to provide the reader with a good example of how Pakistani companies can upgrade their offerings and expand its global footprint.

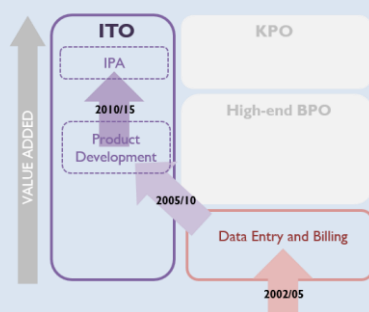
³² Other locations include Philippines (8,000 FTE), Jamaica and Nicaragua (Field Research, 2018).

Box I. Upgrading Trajectories of the Medical Transcription and Billing Company

MTCB, Medical Transcription Billing Corp. is a publicly traded company that provides a wide range of ITO and BPO solutions for healthcare clients in the US, from data entry to electronic health record, and voice recognition software (Figure 9 displays the company's upgrading trajectory). The company serves an expanding array of healthcare entities from single physicians, to medium sized health institutions as well as independent physician associations spread across over 40 US states. In 2017, global FTE reached 2,450, 80% of whom work in Pakistan's center (remaining 20% seats are split between the US headquarters, and a development center in Sri Lanka).

MTBC was founded in the US in 1999 by a Pakistani American. The firm began operations as a billing company, providing electronic claim services for healthcare providers located in New Jersey. Thanks to growing demand, the company grew quickly. In 2002, it established its first subsidiary in Islamabad to support the headquarters in the US. Location choice was based on the founder's business ties with Pakistani entrepreneurs, as well as on personal knowledge of the country's economics, talent, and culture.

Figure 9. MTBC Upgrading Trajectory in the Offshore Services GVC for the Healthcare Industry



In the early 2000s, the Pakistan operation provided data entry, transcription and billing services for MTBC US headquarters. During this time, services were provided through a third-party software which connected MTBC to clients. By 2005, the operation had developed its own software; at first, the software enabled physicians to schedule their medical appointments and manage their agenda. Later, they included a tool for physicians to evaluate the patient eligibility for insurance. Over the course of the next five years, MTBC upgraded to provide online electronic medical records, allowing clients to access their patients' medical

record away of the office. By 2018, MTBC's comprehensive product portfolio included fully integrated artificial intelligence, revenue cycle and practice management solutions, as well as other lower value-added services, such as transcription and data entry. Company management cite the quality of Pakistani professionals as key to their success. MTBC is currently exploring new vertical markets and IT products, including software development for health insurance companies.

Source: Authors based on Field Research (2018); MTBC (2018).

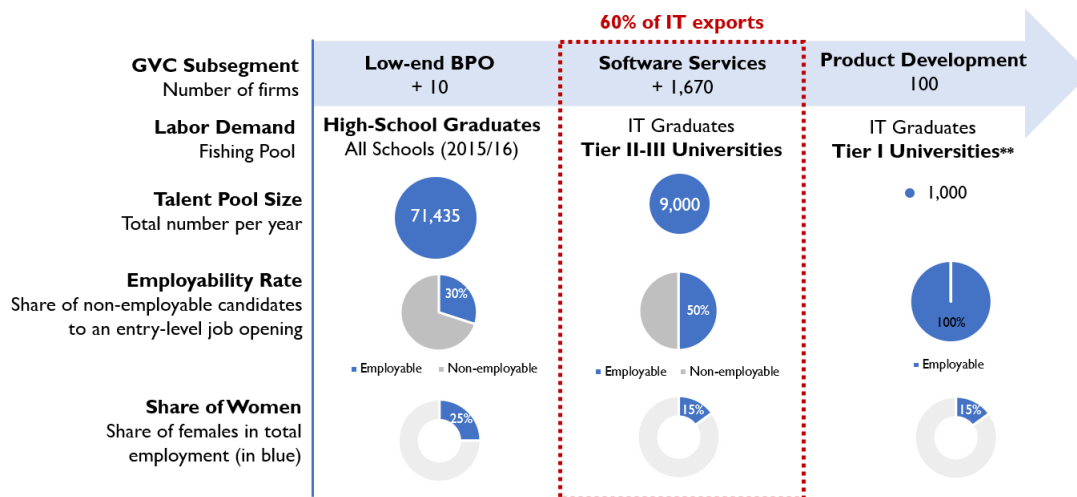
3.4 Human Capital and Gender of Pakistan's Offshore Services Industry

A sustainable offshore services industry is entirely dependent on the availability of human capital equipped with the necessary skills and proficiencies to deliver outsourced processes. A large population represents greater possibilities to host a variety of GVC processes with high potential to scale operations. Nevertheless, the human capital structure of the offshore services GVC generally begins at 12 years of education (Gereffi et al., 2011). While Pakistan is the sixth largest population in the world, high-school graduates account for just 3.85% of total population and only about 2% of individuals between 20 to 29 years old have completed a tertiary level degree (PBS, 2014; UNDP, 2017).

3.4.1 Availability and Employability

In Pakistan, the labor demand of the offshore services industry spans from high school graduates to tertiary level graduates, depending on the segment in which companies participate (Figure 10). Low-end BPO employ high-school graduates with good English communication levels. While the labor pool of Pakistan would seem large enough to enable expansion in the BPO segment, English-language skills, combined with neutral accents and cultural understanding of the customer host environment, exist only among the highest-educated strata of the Pakistani society.

Figure 10. Summary of Pakistan’s Offshore Services Industry Talent Pool (2017)



Source: Authors based on Field Research (2018) and PBS (2014). **Notes:** (*) 2014/15; (**) 2016/17.

Labor demand in the ITO segment differs significantly depending on the level of sophistication of the services: while *software services* companies that provides basic services employ IT graduates from Tier-II and Tier-III universities, *product development* firms that offer more complex tasks engage exclusively with IT graduates from Tier-I universities such as LUMS, NUST and FAST (Field Research, 2018). While no precise figures of graduates are available, the private sector estimates that around 10,000 individuals graduate from all universities annually.³³

Equally important for success in the offshore services GVC is the employability of the talent pool. That is, talent should be equipped with basic technical skills (i.e. computer literacy, English language comprehension, etc.) and relevant domain proficiencies (i.e. coding, graphics design proficiencies, etc.) that can ensure quality delivery of specific outsourced services. In Pakistan, the employability rate is very low; *product development* firms consider that graduates from Tier-II and Tier-III universities lack the most critical programming skills and English language fluency necessary. Only 10% of the graduates from the Tier-II and Tier-III universities are considered employable by product development firm, so they mainly hire from Tier I universities. (Field Research, 2018). For *software services* and BPO companies, which hire graduates from any university (namely, Tier-II and Tier-III) and high school institutions, the employability rate increases to 50%, and 30% respectively since they require less skilled workers (Field Research, 2018).

³³ Estimates range from 10,000 to 20,000 (Field Research, 2018). These disparities highlight that the lack of reliable and disaggregated statistics on human capital is a major challenge that needs to be addressed.

As a result, *product development* companies only hire talent graduated from ‘progressive’ universities such as LAMS, FAST and NUST. These Tier-I universities are highly linked to Pakistan’s IT industry. However, these institutions graduate fewer than 1,000 students annually (Field Research, 2018). Furthermore, as graduates from these universities usually come from wealthy families, they usually seek job opportunities in higher paying sectors or abroad; as a result, firms must pay a considerable wage premium for IT graduates of these Tier I universities over their peers at Tier-II and Tier-III programs.

Major skill gaps in computer science engineers include: (i) inability to code in contemporary technology platforms; (ii) weak English skills (Box 2); (iii) poor comprehension readiness to address foreign clients’ concerns; (iii) inadequate soft skills, namely communication and teamwork; (iv) poor knowledge of corporate culture, e.g. reporting, compliance, escalations, e-mail etiquettes and protocols. Firms also highlight that Pakistani graduates generally lack critical thinking, creativity and problem-solving skills (Field Research, 2018).

Box 2. English Skills in Pakistan: Issues and Challenges

Literacy in English is considered a prerequisite for participating in the offshore services GVC. While Pakistan is the world’s third largest English-speaking country after India (2nd) and United States (1st), with almost one half of its population speaking English as a second language, proficient English speakers are more likely the highest strata of Pakistani population.

The English constraint is rooted in the two distinct systems of education based on the medium of instruction: English and Urdu. The English medium schools are privately owned and cater to the upper class as well as some sections of the middle class. In contrast, the Urdu medium schools are mainly public sector schools catering to the lower income groups and they offer free education in addition to other incentives such as free textbooks (at least at the primary level).

Private schools offer ‘quality’ education to elite children in highly resourced classrooms through the medium of English. The outcomes for these children, who also have acquisition-rich home environments, are higher levels of proficiency in English compared to those children studying in poorly resourced classrooms who have little or no exposure to English outside the 30–35-minute English class every day in school. At the tertiary level, most teachers do not have formal qualifications or training in English language teaching.

Source: Authors based on Capstick (2011); Kroulek (2017)

While some firms (especially *software services* firms) are less pessimistic about the talent shortage (profile of employee does not require advanced coding skills and can be trained on-the-job) all firms interviewed indicate that English language remains a severe constraint. This is particularly true for graduates of Tier-II and Tier-III universities, where most teachers lack formal qualifications or training in English language (Capstick, 2011).

Lack of technical and technological skills are rooted in weak fundamentals in Science, Technology, Engineering and Mathematics (STEM), low quality of tertiary level professors, and inadequate teaching methodologies. Pakistan biggest constraint is the lack of educational materials and qualified teachers to encourage cognitive development or analytical and critical thinking skills from the primary and secondary levels (Field Research, 2018). In the tertiary level, even if the IT curricula are updated, professors lack the basic knowledge to efficiently instruct students in critical IT skills.

Finally, education models are based on theoretical instruction, which firms consider to be archaic and inadequate to prepare individuals in IT skill (Field Research, 2018).

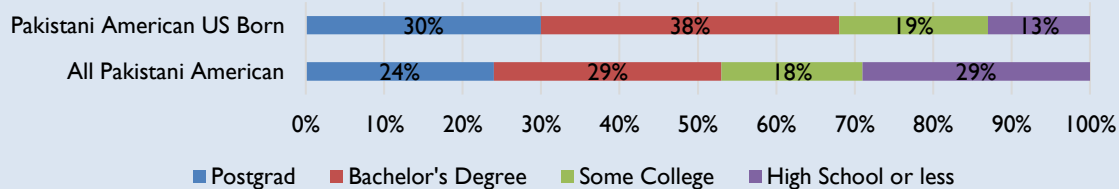
While brain drain lowers the availability of appropriate human capital, expats in the US have become a strategic asset for Pakistan’s offshore services industry; the great majority of IT firms participating in the GVC were funded by Pakistani Americans or returning expats, and currently, most management personnel are expats or US citizens. In the United States, Pakistanis are considered a well-educated segment of the population (Box 3); a far greater share of first and second generation Pakistani-Americans earned undergraduate degrees than the US population overall, and individuals in this population are more than twice as likely to hold advanced degrees (PWC, 2017).

Box 3. Demographics of Pakistani Americans

Pakistani Americans play a critical role in Pakistan’s offshore services industry. Several returnees have founded successful IT companies, while those still living and working in the US collaborate with Pakistani-based companies. These groups have developed strong ties with each other in the past 20 years.

In 2015, around half a million Pakistani immigrants and their children (the first and second generation) lived in the US. More importantly, their educational attainment levels are, on average, higher in the Pakistani diaspora than in the general US population, as is household income. Seven out of ten US born Pakistani Americans have at least a bachelor’s degree (Figure 11).

Figure 11. Educational Attainment of Pakistani American (2015)



As a result, nearly 32% of the Pakistani diaspora is employed in a professional or managerial occupation (1% higher than the general US population). These occupations include specialized fields (e.g. engineering, science, law, or education) as well as administrative and managerial jobs (e.g. finance, or human resources). Furthermore, they are entrepreneurial; the Pakistani diaspora in the US has established numerous, well-funded, and professionally managed organizations. As a result, households headed by a member of the Pakistani diaspora had a substantially higher median annual income than US households overall. The median annual income of Pakistani diaspora households was about US\$66,000 versus US\$56,516 for all US households.

Source: MPI (2015); PWC (2017)

Female Participation in the Sector

While Pakistan holds the last spot in the Economic Participation and Opportunity sub index of the Global Gender Gap Index 2016, the IT segment features a slightly lower share of female workers compared to developed economies such as the US or UK (Table 6). Considering female participation in the overall labor force (22%) and the global bias towards male professionals in technology fields, the finding on Pakistan’s female participation is somewhat remarkable (The

World Bank, 2018). This can partially be explained by the human capital structure of the Pakistan sector; in general, women who work in IT companies had access to higher-education degrees in Tier-I to Tier-II universities.

Table 6. Women in the IT Segment, Pakistan vs. Selected Countries

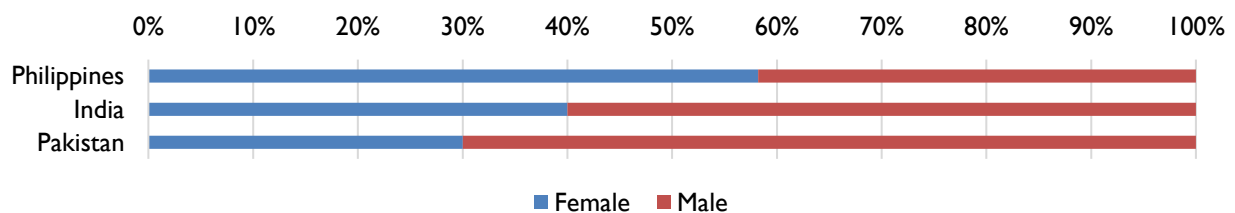
Country	Enrolled in IT College Studies	Working in the IT industry	Year
Pakistan	14%	15%	2016
India	45%	30%	2014
United States	22%	25%	2017
United Kingdom	18%	16%	2014
Brazil	15%	38%	2014

Source: Authors based on Field Research (2018); NASSCOM (2017b); Khalil et al. (2015).

Low participation of females in IT studies and IT employment is rooted in concerns for safety, mobility restrictions and traditional family roles (Field Research, 2018). Due to the 24/7 requirements of offshore services, many employers mentioned that not being able to work after 6 PM restrains job opportunities for women. One key challenge for women is simply the commute to work; first, traveling without the company of father or husband remains an issue. Second, the inadequate transportation system is of such significance that females may ignore better job opportunities and go for lesser value jobs just to avail transport facility provided by the organization (Faiza, 2013). The share of women enrolled in IT education is extremely low when compared to the ITO leader (India) where female participation in higher education IT studies accrues to 45% (Table 6).

The female share of Pakistan’s low-end BPO segment is higher at 25%. This figure is well below India and Philippines’ BPO industries, in which women account for 40% and 50-60% of total employment, respectively (Figure 12). Female employment is constrained by time zone issues; the US working hours are evening hours in Pakistan and females are reluctant to work late. While some companies have attempted to provide transportation services to women leaving work after 7 PM, most females are not allowed by parents or husbands to commute unaccompanied.

Figure 12. Share of Women Employed in the Low-end BPO Segment, Pakistan vs. World Leaders

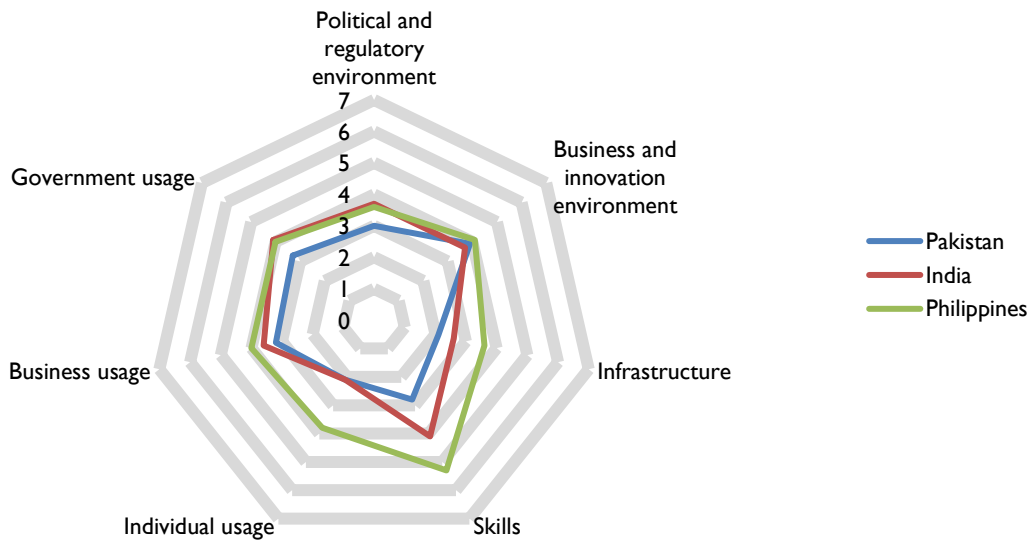


Source: Author based on Begum (2013); David (2015); Field Research (2018).

3.5 Advantages and Constraints³⁴

Pakistan has been ranked amongst the top fifty economies to relocate IT-BPO processes since 2011 and is the most cost-effective location in the world in 2017 (A.T.Kearney, 2011, 2014, 2016, 2017). Despite low labor costs and decent service quality as per compared to India and Philippines, its attractiveness as an offshore location is severely restricted by investor perceptions that the country’s security risk is too high. Infrastructure failures, administrative burdens, and low quality of education further constrain the country’s ability to expand and improve competitiveness in high value-added segments (Figure 13).

Figure 13. Pakistan and Competitors in the WEF Networked Readiness Index (2017)



Source: Authors based on WEF (2017). **Notes:** A detailed list of each country position in the world ranking is displayed in Table A-II, Annex II.

³⁴ Except where otherwise indicated, data from this section is based on information gathered during Field Research in August 2018.

Table 7. SWOT of Pakistan’s Offshore Services Industry

Strengths	Weaknesses
<ul style="list-style-type: none"> • Sizeable talent pool. • Satisfactory price-quality relationship. • Decent telecommunication infrastructure. • Favorable positioning in the freelance global market. 	<ul style="list-style-type: none"> • Low attractiveness to foreign investors and clients due to negative image and rigid visa regime. • Lack of clarity in the national offshore services strategy; inadequate public-private coordination • Regulatory barriers and poor business environment. • Inadequate specialized infrastructure (office space) • Severe mismatch between skillsets provided by the tertiary level and private sector needs. • Inadequate international marketing; lack of branding. • Lack of reliable relevant data to position the industry in the global market.
Opportunities	Threats
<ul style="list-style-type: none"> • Leverage Pakistani expats and Pakistani Americans involvement in the US IT industry. • Close political ties and existing trade agreements favor Pakistan in pursuance of tapping the growing Chinese market. 	<ul style="list-style-type: none"> • Increased negative perception of the country. • Reputation risk derived from Pakistani low-skilled freelancers providing poor quality work. • Digital transformation is requiring highly skilled workforces to accompany the automation and robotization processes.

Source: Authors based on Field Research (2018).

3.5.1 Advantages

Pakistan’s advantages in the offshore industry revolve around its large young-English-speaking talent pool and low labor costs. These strengths align to main location drivers within the offshore services GVC. The following sub-section expounds upon the strengths indicated in Table 7.

1. **Sizeable labor pool.** Pakistan is the world’s third largest English-speaking country after India (2nd) and US (1st). In Pakistan, around 49% of the population speak English as a second language, i.e. 94.3 million people (Kroulek, 2017). In addition, for customer support services, English pronunciation is relatively more neutral than in Sri-Lanka and India. The English advantage can facilitate Pakistan’s growth in the BPO segment. However, the quality of English language needs to be improved.
2. **Satisfactory price-quality relationship.** According to A.T. Kearney’s GSLI, Pakistan is the most financially attractive in the world for offshoring IT-BPO services (A.T.Kearney, 2017). Also, IT companies with presence in India and Pakistan point out that in very low-end solutions, the quality of Pakistan’s talent pool surpasses that of India. In the low-end BPO segment, operational costs are 60% lower than in the Philippines, the world’s customer support powerhouse. This edge is favored by the low competition for labor in Pakistan, due to the relative immaturity of the sector.
3. **Decent telecommunication infrastructure.** IT-BPO firms consider the telecommunication infrastructure adequate, with most stakeholders recognizing large advances in recent years. A few experts mentioned concerns on the speed of the internet broadband; it would not be as poor as to be regarded as a constraint.

- 4. Favorable positioning in the freelance global market.** Pakistan is ranked as the 4th most popular country for freelancing in the 2017 Online Labor Index elaborated by OII after India, Bangladesh and United States. Within the somewhat unique context of Pakistan's competitiveness due to its image perception, the positioning in freelancers' platforms provides Pakistan a platform to showcase the availability and quality of IT-BPO talent.

3.5.2 Constraints

While Pakistan's potential is apparent, upgrading trajectories are severely constrained by its weak security situation and policy uncertainty. By discouraging FDI and business visits to and from Pakistan, this poor perception impacts the nation's competitiveness and contributes to the underdevelopment of the IT and BPO sectors. In addition, to low employability rates discussed earlier, growth is further hindered by inconsistencies in the regulatory framework, business environment and inadequate physical infrastructure. Finally, international marketing activities, including reliable quantitative information, are absent. The following sub-section expands upon these challenges.

- 1. Low attractiveness to foreign investors and clients due to the country's negative image and high-risk perception.** This is the most widely-stated constraint facing the sector. Pakistan is generally perceived as a high-risk investment proposition, particularly by US firms, which are the largest IT services importers. In 2018, the US Department of State rated Pakistan with the Advisory Level 3, i.e. '*reconsider traveling*', pinpointing terrorism as the main reason. Similarly, the '*political stability and absence of violence/terrorism*' index from the World Bank ranks Pakistan in the 125th position in a total of 126 countries. According to industry stakeholders, potential buyers or investors in the US frequently decline to travel to Pakistan, impeding potential business and partnerships with local companies, as well as foreign investment.
- 2. Lack of clarity in the national offshore services strategy and inadequate public-private coordination.** While Pakistan's first Digital Policy was launched in 2018, this lacks the defined goals and strategies required to meet national objectives. This is compounded by a lack of leadership from the institutions empowered to promote IT services exports and attract FDI. In response, many government departments, at the federal and provincial level, have created their own IT-BPO strategies. This has resulted in redundant and overlapping initiatives spread among different public agencies with limited and short-term impact. Furthermore, while P@SHA and the Ministry of IT have made progress over certain issues, (e.g. income tax exception until 2025) there is considerable debate between the private and public sectors on how to best develop the industry and its enabling conditions. Underlying this is the low level of awareness about the offshore services GVC is, and its dynamics and benefits.
- 3. Ambiguous regulatory framework and poor business environment.** Excessive bureaucracy, high levels of corruption, and frequent and unpredictable regulatory changes creates uncertainty for investors (domestic and foreign alike). For IT firms, additional regulatory barriers and administrative burdens can be identified. The lack of a clear definition for IT products and services by the tax revenue office deters foreign investment, which requires transparent tax regimes, while locally, it opens up smaller, local companies

to harassment from tax enforcement authorities. Interviewees cite that this frequently leads to random charges and/or bribery, i.e. large sunk costs.

Bureaucratic requirements discourage registration of local companies, leading to high informality amongst small software companies and technology startups. Many of these companies can only receive international payments through private banks or Western Union; no globally recognized online payment platforms (e.g. PayPal) are licensed to operate in the country. This impacts freelancer credibility as quality services providers, adds administrative burdens of having to open a bank account, while at the same time reinforcing the high-risk perception held by potential foreign clients.

Finally, the visa regime, in addition to the security situation, further hinders foreign clients from visiting Pakistan; this is particularly troublesome for expanding the country's penetration into the US market.

- 4. Inadequate specialized infrastructure (office space).** Both in Lahore and Islamabad, local and foreign companies struggle to find office space aligned to international standards and requirements of the offshore services industry, e.g. 24/7 availability, IT-ready infrastructure, among others. The existing buildings do not address offshore services companies' requirements such as uninterrupted year around operations, quality bandwidth, reliable power and security, accessibility, expandability and parking space. Moreover, since the Special Economic Zones (SEZ) regime was not developed from an offshore services' industry perspective, the minimum size of an SEZ (20 hectares) is vastly larger than current demand from the IT industry. This constraint is even more important for small IT product-based companies and freelancers, who lack affordable IT plug-and-play spaces (e.g. co-work) to expand their business and/or provide more complex and sophisticated services. Finally, the number and size of technology business incubators is also very limited for Pakistan's potential.
- 5. Severe mismatch between skillsets provided by the tertiary level and private sector needs.** Except for Tier-I universities, tertiary education is failing to provide the students with the knowledge and technical skillsets needed by the IT industry. Producing globally employable graduates has been a challenge to Tier-II and Tier-III universities. As a result, the employability rate is very low: only 10% of IT graduates are considered employable by high-value added IT firms. Most relevant reasons behind this constraint include: (i) faculty members from Tier-II/III universities are not fully competent in coding skills nor in English-language; (ii) pedagogical know-how is inadequate to the industry needs (e.g. excessive theoretical instruction and low exposure to IT); (iii) quality assurance systems are absent.³⁵
- 6. Inadequate international marketing and lack of branding.** Pakistan has not developed a satisfactory international marketing strategy as to effectively position the country as an outsourcing/offshoring destination. While PSEB was formed the goal to promote the industry worldwide, the organization has failed to articulate and execute adequate initiatives towards FDI attraction and/or export promotion. PSEB has yet not engaged with renowned location advisory services' companies, such as Deloitte, KPMG, or

³⁵ Other aspects behind low quality of education include: poor socio-demographic conditions of the students

EY. Moreover, local companies avoid associating themselves with the Pakistan brand at international fairs organized by PSEB. Other institutions, such as Pakistan's Board of Investment (BOI) have no role on promoting the offshore services industry abroad.

- 7. Lack of reliable data to position the industry in the global market, e.g. number of IT graduates.** Pakistan's international positioning is also severely limited by the lack of accurate and official information regarding the number of foreign operations established, exports, employment, human capital qualifications, and number of IT graduates. Currently, national statistics of the pool of IT enrollees and graduates by field of specialty and level of educational attainment are not available.

4 Lessons for Pakistan's Upgrading in the Offshore Services Industry from Global Experiences

Economic upgrading is defined as actors moving to higher value activities in GVCs in order to increase the benefits from participating in global industries (Gereffi et al., 2005). In the offshore services GVC, four principal upgrading trajectories can be identified (Table 8).³⁶

Table 8. Selected Upgrading Trajectories in the Offshore Services GVC

Type	Diagram and Description
Upgrading within the BPO segment	<p>This encompasses the shift from basic customer support services to the provision high-end BPO services; it is a common trend for countries entering the GVC through the low-end BPO segment. High-end BPO activities rely on similar repetitive functions as with call centers, although as a whole, they draw on a slightly more educated labor force. Limited direct interaction facilitates growth of these functions as they do not heavily depend on language fluency. Training in high-end BPO functions is predominantly carried out by the private sector and on-the-job. Examples: South Africa is an important destination for BPO services currently employing 47,300 people and growing at 20% per year, which is twice the global growth rate of the industry, and three times faster than India and the Philippines. Currently, South Africa is actively working in expanding their BPO activities from low-end BPO to high-end BPO.</p>
Functional Upgrading to Broad Spectrum services	<p>This trajectory describes functional upgrading to offer all services in the ITO, BPO and KPO segments. Maintaining the provision of low value services while at the same time providing high valued services requires a large but versatile low-cost labor supply. In small countries, inflationary pressure on wages due to limited but skilled workforce encourages countries to upgrade into higher value services or lose their competitiveness in the industry to other lower cost countries. Examples: Costa Rica is the most illustrative case of upgrading towards Broad Spectrum services. While transactional services are still being present, higher value-added functions were added over time, and today these operations carry out not only low value-added functions, but also high value activities.</p>
Functional Upgrading through Vertical Specialization	<p>Companies offering some ITO, BPO and KPO services for a wide range of industries specialize and focus on key industries. This trajectory is closely correlated with leading productive industries in the host country. Examples: The Czech Republic, which entered into the offshore services industry through the establishment of BPO shared services activities, has quickly upgraded into R&D segments of vertical industries, particularly in the automotive, aerospace and IT areas.</p>

Source: Authors based on Fernandez Stark and Gereffi (2016).

³⁶ For more information about upgrading trajectories in the Offshore Services industry, please see Fernandez-Stark, K., P. Bamber and G. Gereffi (2011).

4.1 Case Studies: India and Uruguay

In analyzing different prospective paths for upgrading for Pakistan in the offshore services GVC, it is useful to look more in depth at specific examples from countries facing similar questions of how to develop the enabling conditions for the industry and add value to services exports. Two cases were selected for further examination:

- **India** offers a compelling display of growth via specialized infrastructure and tax incentives within the Software Technology Parks (STPs), coupled with investments in talent development to leverage its cost-competitive but qualified labor. These initiatives drove investments by domestic firms and MNCs, allowing India to become the leading supply market of both traditional offshore services and digital services to the Industry 4.0.
- **Uruguay** provides an example of entry into the offshore services GVC by capitalizing on a qualified IT market which needed to tap into foreign growth markets. Uruguay expanded from *software services* to *product development* and from ITO to high-end BPO. Initiatives aimed at upgrading were supported by a highly coordinated approach with public and private institutions supporting the IT industry and a national strategy focused on the entire offshore services industry.

Table 9. Performance in the Offshore Services GVC; Pakistan, India and Uruguay

Indicator	Pakistan	India	Uruguay
IT-BPO exports (US\$ millions, 2017)	655	52,278	177
Entry Year	Mid 2000	Early 1990	Late 1990
Entry Point	Mid ITO (Software Services)	Mid ITO (Software Services)	Mid ITO (Software Services)
Participation in Segments	Mid ITO (Software Services)	All	Mid ITO (Software Services); High-end BPO (e.g. F&A, Supply Chain Management)
Highest Value Activity (widespread only)	Intelligent process automation	Intelligent process automation	Intelligent process automation
Industry Composition	Domestic companies, SMEs predominantly	Domestically-owned third-party providers, foreign third-party providers, and GIC	GIC and shared services centers predominantly, except in ITO where domestic SMEs prevail
MNC Drivers	Cost and benefits of scale	Maturity, cost and availability of IT-skills, benefits of scale	Quality/skills, political/legal/economic stability; similar time zone (East Coast)
Business Associations	P@SHA: efficient body, focus on lobbying and advocacy	NASSCOM: strong body; independent funding; focus on the selling of services	ICT Chamber (500 members): forerunners in the economy; focus on lobbying and advocacy

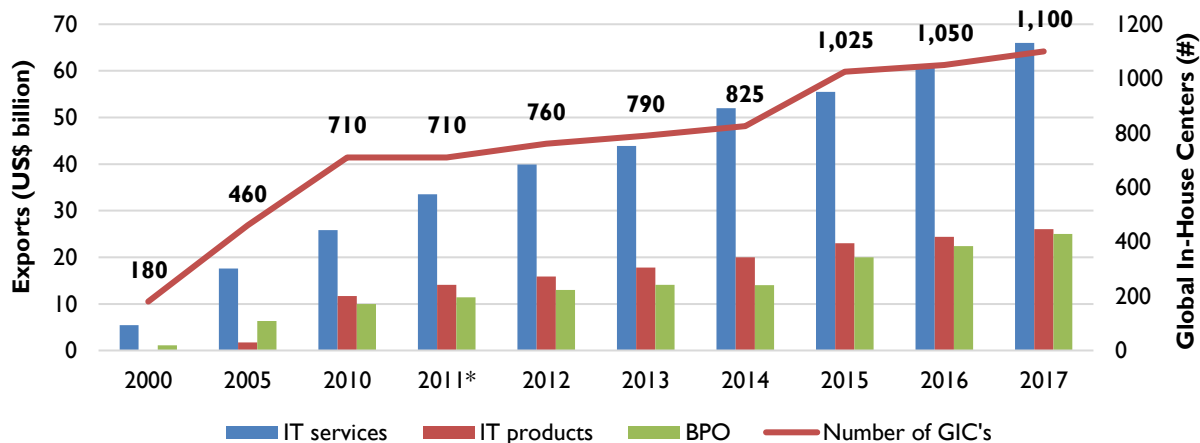
Source: Author based on ILO (2017); Uruguay XXI (2017b); World Bank (2017).

4.1.1 India

India is the leading global economic actor in the offshore services industry with a 55% share of the global IT services market. Low costs, strong technical and language skills, presence of premier educational and research institutions, historical concentration of high-tech firms, connections between locally born entrepreneurs and MNCs, as well as strong private association culminated in India becoming the largest exporter of IT in the world (Rao & Balasubrahmanya, 2017).

In 2017, offshore services totaled US\$116.8 billion, equivalent to 20% of foreign exchange reserves and 1.6 times more than in 2012 (NASSCOM, 2017a). IT services exports have been the major contributor; these were estimated to have been US\$66 billion during FY2017 (Figure 14); exports rose at a Compound Annual Growth Rate (CAGR) of almost 13% during 2009-2017. BPO follows, accounting for 22.2% of exports. The US has traditionally been the largest importer of Indian IT services exports, with 62% of exports in 2017. These services are concentrated in just a few end-markets; approximately 80% of offshore services exports from India is across four sectors: Banking, Finance Services and Insurance (BFSI), telecom, manufacturing and retail (IBEF, 2018).

Figure 14. Offshore Services Exports by Segment, 2000 – 2017



Source: Authors based on IBEF (2018).

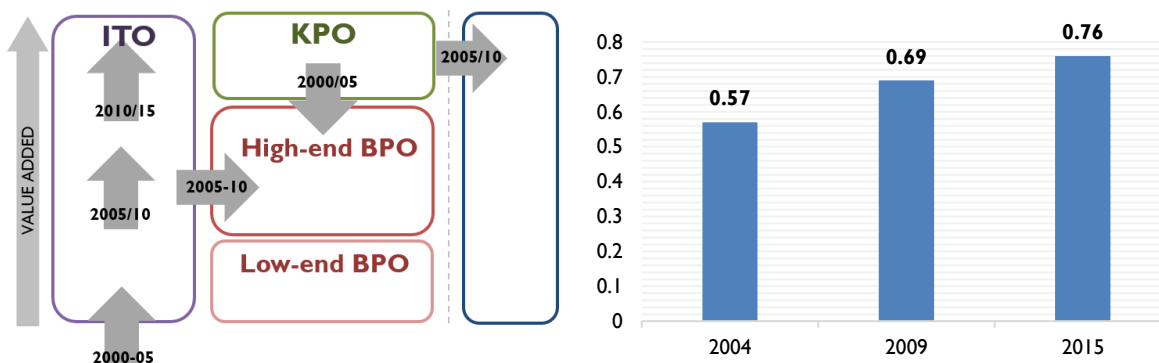
The Indian IT-BPO industry comprises over 15,000 firms. The industry exhibits a pyramidal structure with a handful of firms at the top. There were only 11 firms with an annual turnover greater than US\$1 billion in 2013 (less than 0.1%), but they accounted for over 40% of total export earnings, and provide employment opportunities to roughly 35-38% of the workforce (IBEF, 2018). While larger firms generally offer bundled end-to-end solutions that encompass the entire offshore services GVC, small and emerging players excel in niche services/verticals (Bhattacharjee & Chakrabarti, 2015).

Industry Evolution

The Indian offshore services industry has developed from small beginnings at the bottom of the value chain to a major player in all segments of the global industry (Rao & Balasubrahmanya, 2017). Behind the rapid evolution of the IT and BPO sectors is its first mover advantage gained through the early development of an export platform for software services. Figure 15 outlines the upgrading trajectories of the Indian industry from its initial stages in 2000 when its strengths lay only in the low-end ITO sector to its emergence as one of the leading global players across all

segments in late-2000s, and the most sophisticated technologies pertaining to the Industry 4.0 in recent years.³⁷

Figure 15. Upgrading Trajectories of Indian Offshore Services Industry (left); Ratio of Median Value Added to Sales (left)



Source: Authors (left); Rao and Balasubrahmanya (2017) (right).

With an abundant supply of technically skilled professionals (second only to the US), India could capitalize on the severe global manpower shortage of the IT boom in late 1990s; estimated to be over 1 million in the US alone. This, coupled with high spending to resolve the Y2K problem was a boon for Indian IT professionals (Bhattacharjee & Chakrabarti, 2015). By 2000, India's IT sector was already highly developed, while some activities within the BPO segment were just beginning to emerge (particularly call centers and financial activities). By 2006, a broadening and deepening of IT activities was combined with greater emphasis on higher value-added services in the financial and health care industries, amongst others.

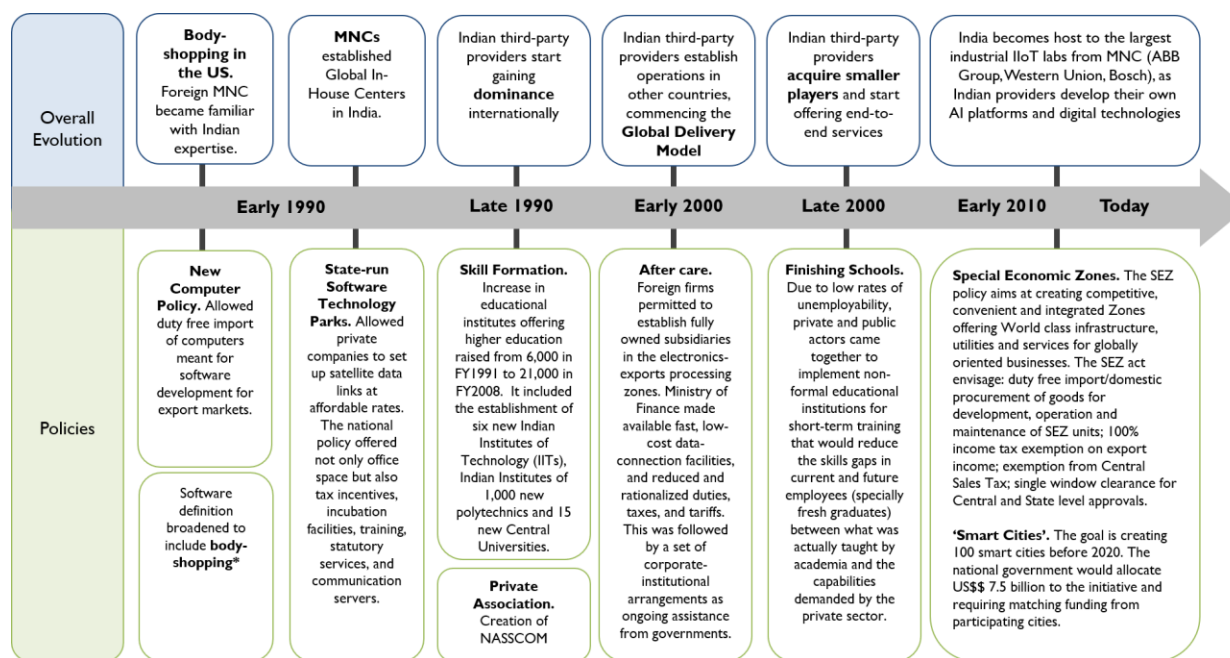
Driven by the availability of high-quality talent, synergies with existing traditional sourcing operations in the area and low operating costs, by 2017 India was now at the cutting edge of IT technology; it is host to some of the largest Internet of Things (IIoT) labs outside of home countries for several MNC. Firms such as ABB, Alibaba Group, and Western Union opened GIC performing digital functions, while GE, Bosch and SAP are ranked as five of the top ten industrial IoT employers in India (Everest Group, 2018b; Gupta, 2017). Bosch alone has 14,000 R&D associates in India, making it the company's largest R&D campus outside of Germany with 27% of its R&D employee count; the campus is focused on developing data mining and software solutions (Bosch, 2016).

Policies and Programs

The government has played a key role as a facilitator in the evolution of the offshore services industry in India. While the liberalization of the economy in 1980s was not intended to support the offshore services sector, it created the enabling conditions for services exports, e.g. improvement of the telecommunications infrastructure.

³⁷ TCS provides data processing and engineering support for Rolls Royce since the 2000s. More recently, Wipro supplied mining and construction equipment manufacturer, JCB, with an IoT solution to connect their global fleet, i.e. from the sensors to the cloud (Telematics Wire, 2016).

Figure 16. India's Offshore Services Industry: Evolution and Policies



Source: Authors based on Bhattacharjee and Chakrabarti (2015); Heeks (2010); IBEF (2018); Konrad Adenauer Stiftung (2015); NASSCOM (2011, 2012, 2017a); Rao and Balasubrahmanya (2017); Sahoo and Dash (2014).

Notes: (*) Indian software professionals were taken abroad to the clients' sites to execute short-term projects and lower-end jobs like coding and data conversion.

The most significant institutional intervention was the establishment of Software Technology Parks (STP) in 1988. Established in 39 locations, they provided ready-to-plug IT and telecommunication infrastructure, in addition to tax benefits, and satellite uplinks. Moreover, STPs provided support for related items such as import certifications and market analysis. The overall improved conditions for foreign direct investment encouraged many foreign firms to establish their businesses in India. The influx of multinational subsidiaries, in turn, resulted in rapid knowledge transfer, improving the availability of qualified human capital in the country.

Radical reforms continued through 1990s after a severe balance of payments (BOP) crisis which led to the abolition of industrial licensing, removal of entry barriers, exemption of corporate tax, opening up communication facilities, trade liberalization, devaluation of the rupee, and reduction in import duty on computers. These initiatives attracted multinationals which set up their captive centers in India. The growing presence of foreign firms benefited local companies, which acquired quality certifications and captured a wide range of skills beyond programming, such as quality assurance, project scheduling, among others.

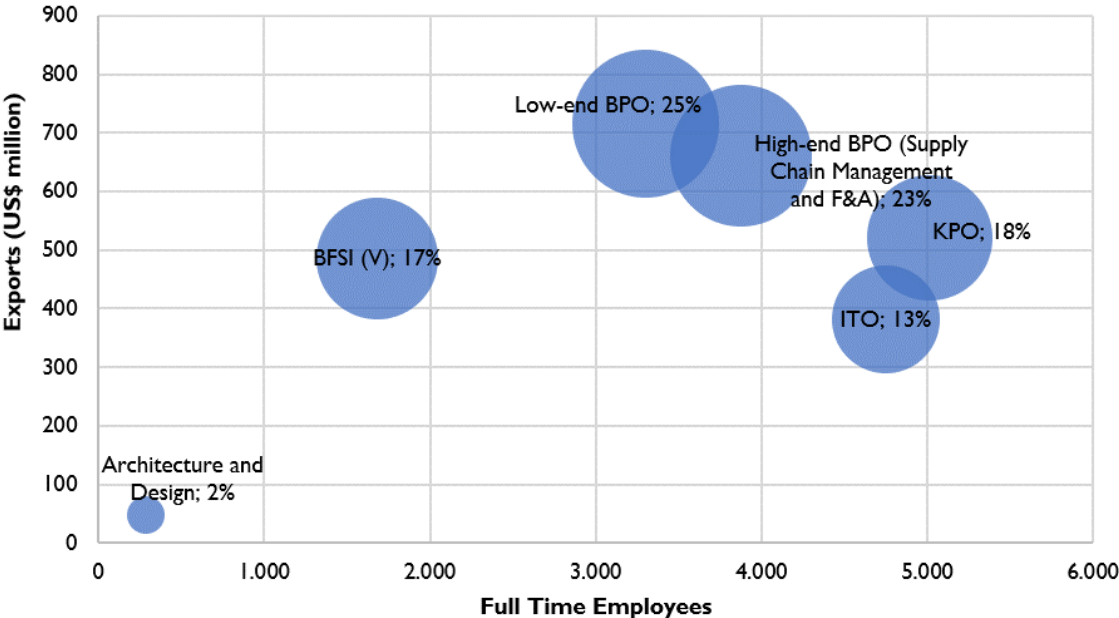
By the end of the 21st century, the Indian IT industry had firmly established its credibility in the world market. The leading Indian firms were quick to realize that demand for low-end value-added services had limited learning opportunities and value-added. As a result, supported incentives for skill development (Finishing Schools), public-private collaboration, and efforts by industry association NASSCOM, they diversified into various domains such as insurance, finance, customer support, among others. Finally, while the STP regime was terminated in 2011, a new Special Economic Zones scheme has taken its place, which offers similar incentives.

A key underlying element of India’s leadership is the tremendous depth of India’s educated labor pool. The number of IT-BPO professionals employed in all sectors in India grew more than four times during 2000 – 2007, with aggregate employment reaching 1.25 million in 2007 (Fernandez-Stark et al., 2011). By 2017 this number doubled, reaching 3.86 million FTE (NASSCOM, 2017a). One critical component of the human capital advantage was India’s brain gain, reverted form India’s brain drain. During the 2000s, professional and technical expats living in the US and the UK have been returning to India, driven by the rise in salaries, but particularly, enabled to do so by the cease of restrictions related to visas, investment and the purchase of property by Indian nationals who were citizens of other countries.

4.1.2 Uruguay

Uruguay’s began to export IT services in the early-1990s and gradually expanded its participation in the offshore services GVC. Led by local firms, ITO represents a key economic sector for the country. In 2017, exports from this segment alone totaled close to US\$380 million, making it the higher IT exporter per capita of Latin America and the Caribbean (Uruguay XXI, 2017b). Today, Uruguay has presence in most segments of the GVC, although with different degrees of participation (Figure 17).

Figure 17. Uruguay’s Offshore Services Exports and Employment, by Segment



Source: Authors based on (Uruguay XXI, 2017b). **Notes:** The size of the bubble indicates the share of each segment in the offshore services industry.

While the country has a small population (3.4 million), and only graduates about 100 computer science engineers per year, the overall population’s education level is very high. Moreover, Uruguay stands out as a privileged location in terms of political and economic stability, strong institutions (e.g. IP protection, Personal Data Protection) and safety.

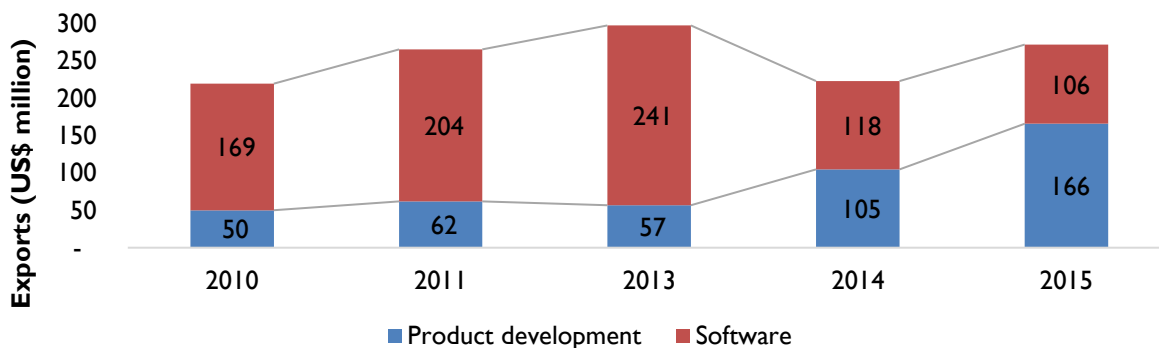
Industry Evolution

Uruguay's software industry began to develop in the 1980s, although computer science majors had been offered since 1968. Further development was enabled by four components: (i) qualified human resources; (ii) strong network of business leaders developing state-of-the-art technologies and competitive methodologies both at the regional and global level; (iii) construction of alliances and cooperation networks with large international companies headquartered in the US; (iv) strong ITC infrastructure (González, 2009).

Today, the industry includes more than 350 IT companies providing horizontal and vertical product development, intelligent process automation, and IT services (Uruguay XXI, 2017b). The arrival of Indian lead firm TCS in 2002 introduced new competition, forcing domestic firms to become more competitive and reinforcing its ability to provide high-end services, as well as product development. This investment was followed by many others, particularly from US-based tech firms establishing software development centers in Montevideo. Examples include NetSuite, Verifone, Bull, IBM, and Microsoft, among others (González, 2009).

Supported by specific policies, Uruguay was able to economically upgrade both within the ITO segment and the entire offshore services GVC. As showed in Figure 18, Uruguay's *product development* exports gradually surpassed the *software services* category, going from 22% to 60% of IT total exports in the 2010 - 2015 period.

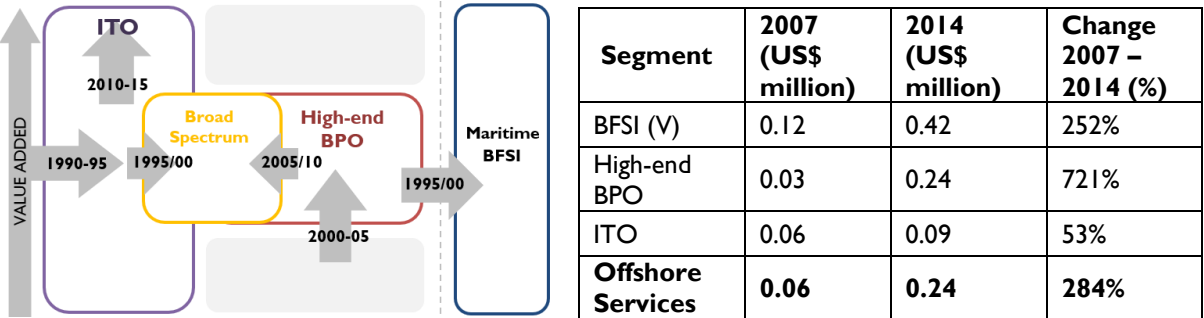
Figure 18. IT Services Exports from Uruguay: Product Development vs. Software Services



Source: Authors based on Couto (Forthcoming).

In addition to the growth of *product development* exports, the inflow of FDI prompted Uruguay's upgrading in the value chain to position itself as a preferred location for a wide range of services in the industry. By the early 2000s, Uruguay began to expand its presence as a regional F&A shared services provider, logistics hub and financial services center for MNC such as BASF, Roche, and Ricoh. The country has also developed specialized industry-specific software for the BFSI, maritime and livestock (traceability system) verticals. FDI and local development led to significant growth in exports per employee, which tripled between 2007 and 2014, evidencing economic upgrading throughout all segments of the offshore services industry (Figure 19).

Figure 19. Upgrading Trajectories of Uruguay’s Offshore Services Industry (left); Exports per Employee (right)



Source: Authors based on Couto (Forthcoming); Uruguay XXI (2017b)

Policies and Programs

Uruguay has maintained favorable, stable and reliable regulatory frameworks for FDI and offshore services exports since late-1980s. While the most significant growth of the industry was experienced before the government became actively involved with the industry (1999), the state provided the enabling conditions for its early development decades before. These include the Free Trade Zones (FTZ) regime, created in 1987 to promote both goods and services exports. Any firm under the FTZ is exempt from all corporative taxes—except social security—and any other tax to be created in the future (Uruguay XXI, 2017b).³⁸ FTZs have had a significant impact on the development of the industry, accounting for 50% of offshore services exports by 2014 (Uruguay XXI, 2017b). Private operators of these zones were the first stakeholders to promote Uruguay as an offshore services location in the early-2000s, successfully attracting captive centers and centers of excellence of international third-party services providers.

While the IT services industry benefited from FTZ largely, the state had a specific agenda to promote software exports. The active intervention of the government commenced in 1999, when the software industry was declared one of national interest, and a plan with long-term objectives to make Uruguay a technological hub was established. During the 2000s, the state supported the IT services industry through the development of efficient public telecommunication infrastructure and specific tax treatment (VAT and income tax exemption for exports). These policies were largely a consequence of the lobbying capacity of the Uruguayan Chamber of IT companies (CUTI).

In the second half of the 2000s, in dialogue with CUTI, Uruguay’s government recognized the IT services industry as one of five key economic growth engines. This resulted in the creation of new supporting legislation and institutions, including the Intellectual Property (IP) Protection Law and the Agency for Research and Innovation (ANII). The IP protection law was approved in 2003, providing owners of computer software the exclusive right to authorize its reproduction, distribution, transformation and communication to the public. ANII was created in 2006 as an

³⁸ Benefits: income tax exemption; dividends paid to shareholders domiciled abroad are also exempt from paying taxes in the country; foreign staff may opt between making social security contributions in Uruguay or in their country of origin; foreign sales and purchases of goods and services are not taxed by VAT, neither are sales and services provided within the free zone; IRAE does not apply either when sales destined for the national territory do not exceed 5% of the total sales in goods in transit or deposited in the free trade zone (Uruguay XXI, 2017b).

entity to promote research and implementation of knowledge to the country's economy; it provides funds for research projects, postgrad scholarships, and innovative projects.

In March 2012, the country developed a national strategy entirely focused on the offshore services industry: The Global Services Program (GSP).³⁹ The GSP was financed by the Inter-American Development Bank (IADB) and the Uruguayan Government for a total of US\$13 billion (Uruguay XXI, 2017b). The GSP is an ongoing project, aimed at increasing FDI, exports and employment in the offshore services industry. The program is run by the parastatal National Trade and Investment Promotion Agency (Uruguay XXI) through an Implementation Unit attached to the Executive Directorate of this organization. Engagement with the private sector (e.g. CUTI and the Shared Services Association), as well as facilitation services to articulate new business associations in higher end segments (e.g. architecture and engineering) are critical features of the GSP. Through public-private cooperation, the GSP was able to complete the following achievements:

- Collection and publication of quantitative and qualitative reliable data on the industry;
- Participation in more than 50 international offshore services fairs and events;
- Organization and financing of guided visits for more than 100 potential foreign investors;
- Facilitation of the residencies and visa procedures for foreign investors and Computer Science Engineers;
- Investment of US\$2 million in more than 120 training programs (over 3,500 individuals) developed by offshore services companies to expand their business or upgrade in the value chain. This support—named 'Specific Demand Finishing Schools'—provides firms the possibility of implementing tailored training programs with subsidies of up to 70% of the direct costs. According to GIC established in Uruguay the 'Specific Demand Finishing Schools' program is one key component of the country's value proposition for FDI attraction and after-care. The instrument is well-known for its flexibility, agility, and compliance.

Within the GSP, special funding was assigned for the IT services industry (PROTIC). The initiative allows to co-finance up to 70% of the total cost of export business plans, with a maximum support of US\$20,000 per company per year. Covered activities include commercial visits to foreign clients, participation in events abroad, reverse missions (bringing clients or potential clients to the companies' premises in Uruguay), consultancies and acquisition of databases. In the 2012 – 2016 period, PROTIC enabled more than a dozen companies to implement their business plans in the US, which in turn enabled them to reach new clients and open subsidiaries in San Francisco and New York (Uruguay XXI, 2017a).

4.2 Lessons Learned for Pakistan

India and Uruguay present different value propositions in terms of size of talent pool and cost-arbitrage. These countries are also significantly different when comparing its business environment. Nonetheless, both countries have managed to position themselves in an increasingly competitive GVC by supporting the private sector and facilitating the enabling conditions to enhance the economic benefits of chain participation. In both cases, valuable lessons exist for Pakistan if it is going to prioritize its expansion in the IT industry and entry into the BPO segment to a more significant degree.

³⁹ The GSP was the first national strategy for the offshore services industry in Latin America and the Caribbean.

- 1. Establishment of specialized infrastructure and tax treatment.** Third-party providers and MNC in the offshore services industry, in general, have come to expect Technology Parks or Special Economic Zones (SEZ) benefits as a necessary condition for potential consideration. Both India and Uruguay have established strong SEZ with world-class infrastructure and competitive fiscal terms to support both foreign and local firms alike. Benefits in both countries include tax holidays, capital investment promotion policies, and 100% foreign equity ownership. In addition, these provide consulting and training services, implementation of internet infrastructure, data centers, incubation services, PMC services, systems integration and installation, and operations and maintenance of application networks, among many others. Overall, India's STP and Uruguay's FTZ have helped to support investor confidence in operating in unfamiliar business environments, and overcome constraints associated with operating in developing countries.
- 2. Skill development is a critical element in driving economic upgrading and growth and private sector should lead.** While at different scale, both India and Uruguay have developed programs to develop human capital for the industry, illustrating the importance of skilled and employable professionals for the industry. The offshore services industry is highly dynamic and education systems often cannot respond in a timely manner to the changing requirements of the companies. Hence, policies towards skill development and economic upgrading should be driven by the needs of the private sector, which should be highly involved in skill development. In addition, instruments to facilitate training within companies should avoid excessive bureaucracy and be as agile as possible.
- 3. Strong industry coordination and public-private dialogue facilitated articulation of industry growth strategy and skill development strategies.** India's offshore services sector is well organized through NASSCOM, while Uruguay's IT sector builds upon the efforts of the Uruguayan IT Chamber (CUTI). Continuous dialogue with the government—namely, Ministries of IT and Finance—have had tremendous impact on the development of effective and sustainable skill development strategies, e.g. *Finishing Schools* in India, and *Demand Specific Finishing Schools* in Uruguay. These have also been critical for national branding initiatives and consistent messaging; this is very relevant for offshore services, as per the value proposition of the country should be consistent across all stakeholders.
- 4. FDI is critical to demonstrate credibility as well as to upgrade, especially in economies with little or negative visibility in the offshore services industry.** Solid and prosperous entry in the offshore services GVC usually happens after an international third-party establishes in one country, indicating the importance of the demonstration effect for other investors. As services (and human skills) are intangible, and production and consumption happen simultaneously, location choices of MNC largely depend on the experience of other global companies.
- 5. After care is a key factor for economic upgrading.** Both India and Uruguay have demonstrated that companies are more prone to establish value-added operations in countries that focus on improving the overall business climate for an MNC, such as reducing bureaucratic hurdles, easing migration restrictions and guaranteeing property rights.

5 Recommended Upgrading Trajectories for Pakistan

Pakistan recently entered the offshore services GVC. Compared to other developing countries, its entry as a reliable offshore services location has been slow. Under these circumstances, the most pressing issue for Pakistan is to solidify its position in traditional offshore services segments such as IT and BPO. After consolidating both industries and gaining global recognition as a qualified and trustworthy competitor in these segments, Pakistan can pursue upgrading into more sophisticated processes.

Successful experiences in Pakistan are built on its sizeable talent pool, cost arbitrage and strong business linkages with Pakistani-Americans living in the US. These elements are the most relevant components of Pakistan's value proposition relative to competing nations across the globe. As such, they suggest a promising positioning of the country in the offshore services GVC. Three upgrading trajectories in the short- to long-term are recommended for Pakistan's advancement in the offshore services GVC: (1) Process upgrading to increase participation in the BPO segment; (2) Product upgrading to develop worldwide recognition as a qualified IT provider; and (3) Functional upgrading into specific verticals to leverage existent competitive advantages.

Short-term: Process upgrading to increase participation in the BPO segment. By the early 2000s, connectivity deficiencies and security concerns battered Pakistan's competitiveness as a BPO provider. Major improvements in internet infrastructure in the last decade have led to a conducive business environment for BPO operations. Recovery is evidenced by the upgrading experience of TRG and recent expansion of customer support operations in large ITO firms (e.g. Systems Limited). With a large youth cohort (nearly a third of the country's total population) Pakistan is ranked as the third largest English-speaking population in the world. Its attractiveness as a platform for unbundling BPO tasks is supported by low labor costs, estimated at 60% of those in the Philippines (Field Research, 2018). Accordingly, Pakistan offers the most basic conditions to compete in the BPO segment. While continuous growth in leading BPO locations suggest that job destruction is unlikely in the next three to four decades, automation will most definitely change skill and educational requirements for this segment.⁴⁰ With an adequate set of policies in place—ranging from skill development strategies to FDI attraction and business environment improvements—Pakistan can attain process upgrading and increase its participation in the BPO segment in the short-term.

Medium-term: Product upgrading to develop worldwide recognition as a qualified IT provider. Despite sustained growth, Pakistan IT exports and freelance activity remain concentrated in rudimentary services, with 90% of revenues deriving from low value-added sectors of the global market. Despite this, development of highly sophisticated solutions is on the rise, with some companies offering artificial intelligence platforms and geoscience management for vertical industries in the US. Qualified diaspora in developed economies provide Pakistan with a major opportunity to make foreign markets aware of its talent quality and cost arbitrage. By revisiting tertiary education shortfalls, collecting accurate data on the industry and ensuring adequate and affordable 24/7 office space is available, Pakistan can leverage its organic development and expect to become a cost-effective and qualified hub for higher value-added IT processes.

Long-term: Functional upgrading into specific verticals. Once Pakistan attains a solid position in the ITO and BPO segments, it will be easier to transition from horizontal to specialized

⁴⁰ See Section 2.1. for further information on this topic.

solutions, i.e. supplying IT and BPO services to vertical/sophisticated industries. This opportunity finds its roots in the process of knowledge accumulation driven by the spillover effect of the segment employees. To illustrate: companies such as NETSOL Technologies, S&P Global and MTBC provide adequate training to their employees as a means of correcting skill deficiencies; this training is associated with the introduction and dissemination of knowledge and new technologies to the country. In addition, it can be expected that IT-BPO companies specialized in certain verticals increase the demand for specific skilled workers and send signals about the need and opportunities for specific skills to educational institutions. In the long-term, Pakistan is likely to be able to develop expertise in verticals in which the country is already participating, including BFSI, Healthcare and Energy, as well as emerging sectors such as Gaming and Security. Existing competitive advantages in other local industries and can also be leveraged to develop specialized solutions; at this stage, private associations and policymakers are responsible for exploring the areas in which the country's knowledge and experience can be leveraged.

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Annex I. Tables

Table A I. A.T. Kearney Offshore Services Location Index, Selected Countries (2017)

Country	2017 Rank	2016 Rank	2014 Rank	2011 Rank	Index Ranking 2017		
					Financial Attractiveness	People Skills and Availability	Business Environment
India	1	1	1	1	1,14	3,3	2,63
China	2	2	2	2	1,26	2,37	2,69
Malaysia	3	3	3	3	1,72	2,92	1,47
Indonesia	4	5	5	5	1,2	3,25	1,53
Brazil	5	4	8	12	1,27	2,65	2,02
Vietnam	6	11	12	8	1,22	3,31	1,39
Philippines	7	7	7	9	1,17	3,13	1,57
Thailand	8	6	6	7	1,43	3,06	1,38
Sri Lanka	11	14	16	21	1,22	3,42	1,07
Egypt	14	16	10	4	0,99	3,37	1,26
Bangladesh	21	22	26	NA	0,8	3,34	1,23
Morocco	27	34	34	37	1,29	2,9	1,1
Pakistan	30	28	25	28	0,63	3,35	1,3

Source: Authors based on A.T.Kearney (2011, 2014, 2016, 2017). **Notes:** ^(a) The Global Services Location Index (GSLI) evaluates 55 countries against 38 measurements across three major categories: financial attractiveness, people skills and availability, and business environment. Financial factors constitute 40% of the total weight in the published Index. The two remaining categories – people skills and availability and business environment—constitute 60% of the total weight (A.T.Kearney, 2017).

Table A 2. Networked Readiness Index, Selected Countries

Indicator	Pakistan	India	Philippines
Political and regulatory environment			
Effectiveness of law-making bodies	95	50	83
Laws relating to ICT	117	23	81
Judicial Independence	82	64	76
Efficiency of legal system in settling disputes	107	42	87
Efficiency of legal systems in challenging regulations	101	39	80
Intellectual property protection	112	50	17
Software piracy rate, % software installed	96	53	67
No. Procedures to enforce a contract	128	128	69
No. Days to enforce a contract	125	137	116
Business and innovation environment			
Availability of latest technologies	79	108	78
Venture capital availability	78	13	39
Total tax rate, % profits	49	123	92
No. Days to start a business	97	114	114
No. Procedures to start a business	114	133	138
Intensity of local competition	98	101	56
Tertiary education gross enrolment rate, %	115	89	73
Quality of management schools	70	55	40
Government procurement of advanced technologies	52	26	59
Infrastructure			
Electricity production, kwh/capita	111	98	103
Mobile network coverage, % population	125	111	67
Internet bandwidth, kb/s per user	115	116	79
Secure Internet servers/million pop.	123	105	96
Skills			
Quality of education system	75	43	31
Quality of math & science education	89	63	67
Secondary education gross enrolment rate, %	124	103	78
Adult literacy rate, %	106	95	41

Source: Authors based on WEF (2017).

Pakistan in the Medical Device Global Value Chain

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Prepared by
Danny Hamrick and Penny Bamber

Duke Global Value Chains Center,
Duke University

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Acronyms

ADOZONA	<i>Asociación Dominicana de Zonas Francas</i> (Dominican Association for Free Trade Zones)
AMMI	Association of Malaysian Medical Industries
ATC	Apprentice Training Center, Pakistan
CAFTA-DR	Central American Free Trade Agreement
CARIFORUM	Forum of the Caribbean Group of African, Caribbean and Pacific States
CMC	Community Manufacturing Center
CNC	Computer Numeric Control
CNZFE	<i>Consejo Nacional de Zonas Francas de Exportación</i> (National Council of Export Processing Zones)
EAP	East-Asia Pacific
EGFSN	Expert Group on Future Skills Needs
E-O	Ethylene-Oxide
EPZs	Export Processing Zones
EU-15	European Union
FDA	Food and Drug Administration, United States
GVC	Global Value Chains
HAI	Hospital Acquired Infections
ILO	International Labor Organization
IMDRF	International Medical Device Regulators Forum
M&As	Mergers and Acquisitions
MDA	Medical Device Act (Malaysia)
MFN	Most Favored Nation
MIDA	Malaysia Industrial Development Authority
MIDC	Metal Industries Development Center, Pakistan
MMDA	Malaysia Medical Device Association
MNCs	Multinational Corporations
MRI	Magnetic Resonance Imaging
NB	Notifying Bodies
PSQCA	Pakistan Standards and Quality Control Authority
R&D	Research and Product Development
SCCI	Sialkot Chamber of Commerce and Industry
SIMAP	Surgical Instruments Manufacturers Association of Pakistan
SIMTEL	Sialkot Material Testing Laboratory
SMEs	Small and Medium Sized Enterprises
T&A	Textiles and Apparel
TDAP	Trade Development Authority of Pakistan
TEVTA	Technical Education and Vocational Training Authority, Pakistan
UID	Unique Identification
UK	United Kingdom
US	United States of America
WHO	World Health Organization

I Introduction

Pakistan is a long-established actor in the medical devices global value chain (GVC), a multi-billion global dollar industry covering a wide spectrum of products from inexpensive, single use items such as bandages and dressings, to high-cost, state of the art capital equipment, such as magnetic resonance imaging (MRI) machines. For years, Sialkot, Pakistan has been a traditional global cluster for export-oriented contract manufacturing of precision metal instruments used in general surgery. Success to date has been based on decades of production experience passed down generation to generation, combined with low-cost labor supply. However, changing dynamics in the global medical device industry mean that past drivers of competitive advantage are becoming less relevant. Pakistan has seen its medical devices exports plateau in recent years as new products and competitors have entered the market. In order to sustain its participation in the industry, Pakistan needs to adopt a specific growth strategy based on improved efficiencies, entry into new markets and diversification of production.

Since the turn of the century, the global medical devices industry has experienced considerable growth, reaching US\$360B in 2017, as populations have expanded and aged, diseases spread and health care coverage increased. This growth has created new opportunities but it has also been accompanied by significant changes in the industry that have important implications for Pakistan's sustained participation. First, technological advancements in surgical techniques and production capabilities have become to shift the demand away from traditional surgical instruments to new, smaller and smarter tools that reduce patient risk and recovery time. Second, high health care costs and regulatory requirements have led to the restructuring of the value chain around fewer, larger and more diversified firms; this has created considerable barriers for entry in established markets. Third, in response to these pressures, lead firms are consolidating production in select locations with strong capabilities in a diverse range of products, from surgical instruments to highly regulated implantable devices. Opportunities for growth still exist in emerging markets, where healthcare expenditure is increasing, however, this window will be limited as lead firms seek to gain market share in these growth regions. As a result, as has occurred in multiple globalizing industries, small, less innovative firms struggle to maintain their positions in key markets and are often pushed down the chain into low-margin contract manufacturing activities.

While Pakistan's exports have grown steadily along with global industry trade in the past decade to reach US\$355M in 2016, Pakistan remains a small-scale exporter globally of surgical instruments and recent years show a notable slowdown as new products and competitors have entered the market and internal human capital deficiencies and inefficient production practices have stifled the industry. In order to sustain its position in the industry, Pakistan needs to adopt a specific growth strategy that engages both public and private sector actors towards common goals. Specifically, Pakistan should upgrade production processes to increase productivity, diversify its product portfolio and strengthen ties with emerging markets. The country's past success in textiles and apparel also offer an opportunity for the country to become a more significant player in the medical textiles industry. Policies supporting these upgrading trajectories will need to capitalize on strengths of the industry, including its reputation as a low-cost supplier and existing geographical concentration of firms while also addressing human capital, institutionalization, and production challenges.

Numerous reports have documented Pakistan's production of precision metal surgical instruments over the past two decades. However, these reports fail to consider the broader forces that are changing the medical devices industry as a whole, which will have important implications for Pakistan's continued participation in the industry. This report therefore seeks to situate Pakistan's

production of surgical instruments into the broader medical devices GVC. This GVC framework will allow policymakers to better understand how the global medical device industry is evolving, assess Pakistan's current position in the chain and identify opportunities for economic upgrading. Research on Pakistan is aided by field research conducted in September 2018. In total, 15 interviews with key stakeholders across three cities (Sialkot, Lahore, and Karachi) were completed. Private sector actors of varying sizes accounted for the majority of interviews (73%) and 85% of all participants were located in Sialkot. Interviews were further aided by firm level data based on Pakistan Custom's Authority data provided by the World Bank.

The report is structured as follows: It first provides an overview of the medical devices GVC to present a clear understanding of the scope of the industry, how markets are structured and how changing distribution of demand and supply destinations and lead firm organization alter structural dynamics in the chain. It then analyzes the domestic industry within Pakistan, first detailing the country's position in the chain as well as recent trends and the internal organization of the industry. After assessing the advantages and constraints observed in Pakistan, it looks to the Dominican Republic and Malaysia for comparative case studies, detailing the lessons learned for Pakistan. The report concludes by outlining potential upgrading strategies to enhance the country's competitiveness.

2 The Medical Device Global Value Chain

Key Takeaways

- The global medical device industry is a US\$360B industry and covers a wide spectrum of products from inexpensive bandages, to technology-intensive hearing aids and high-cost items such as magnetic resonance imaging (MRI) machines. Surgical/Medical instruments, the largest segment, represents 28% of exports.
- A few select locations have been prioritized by device companies, particularly for lower cost products in disposables and surgical instruments; these sites are now shifting into higher value orthopedics and implantables products.
- The use of hand-held precision instruments for general surgery has dominated the healthcare market for decades, in recent years the emergence of new, less invasive surgical techniques has begun to drive demand for a new set of tools.

2.1 The Global Medical Device Industry

Surgical/Medical instruments are part of a broader global medical devices industry. Covering a wide spectrum of products from inexpensive bandages, to technology-intensive hearing aids and high-cost items such as magnetic resonance imaging (MRI) machines, the medical devices sector is a strong, global growth industry.¹ The global market reached an estimated US\$360B in 2017 (BMI Research,

¹ These include "all instruments, appliances and materials that are designed for diagnostic and/or therapeutic purposes to monitor, treat, prevent or alleviate disease, injuries or handicap and that do not strictly achieve their action by pharmacological, immunological or metabolic means" (WHO, 2017).

2018a), while trade in 2016 at US\$203B (UN Comtrade, 2018).² Surgical instruments represent an important share of global medical device industry trade, accounting for approximately 27-30% over the past two decades and US\$56B in 2016 (UN Comtrade, 2018).

Advances in science and technology, surgical techniques, an aging global population and increased access to more advanced medical care around the world, continue to drive demand in the industry and foster the development of new products. Developed country markets are mature, with low but steady growth rates, but they still remain the most valuable accounting for over three-quarters of the global market share (Frost & Sullivan, 2017). Recently, however, developing countries have emerged as key growth opportunities thanks to rising incomes, aging demographics, and government increases in per capita healthcare expenditure, particularly an expansion of healthcare beyond major cities (BMI Research, 2018a; CFRA, 2018).

The production of these devices is concentrated in a relatively small number of companies. Lead firms with a global presence account for more than half of the world's market share. At the same time, nonetheless, faced with rising health care costs, governments and health care organizations have begun to apply coordinated procurement and reimbursement³ models to gain leverage with suppliers (BD, 2018; Boston Scientific, 2018; Medtronic, 2018). As a result, the medical devices sector has begun to focus on global production networks to improve economic efficiencies, and harness qualified human capital abroad.

This offshoring of production provides important opportunities for developing countries with available skilled labor to leverage cost arbitrage and a favorable location to participate in this lucrative sector. Numerous countries from Latin America (Brazil, Costa Rica, Dominican Republic, Mexico) and Asia (China, India, Malaysia, Singapore, Taiwan) have developed industrial policies to attract this global expansion, targeting both foreign direct investment and domestic firms alike (Bamber & Frederick, 2018; BMI Research, 2018a; Field Research, 2018b; World Bank, 2011).

The following sections present the medical devices GVC, discuss the global geographic distribution of demand and supply, examine the leading firms in the sector and the manner in which the chain is governed through public and private standards as well as provide an overview of differing human capital needs in different parts of the chain. By analyzing these global dynamics, these sections provide a “blue print” for Pakistan policy makers as the country develops its strategic plan for future growth.

Three major trends have shaped the global medical devices industry in general, and the instruments sector specifically in recent years: (1) demand has been growing for minimally invasive surgical instruments; (2) shifting regulatory environment; and (3) rise of select offshore locations. Each is discussed below.

² The products included in this measure are detailed in Table A- 1 of the Appendix. Trade data was analyzed for the period 2006-2016. 2016 was the latest available comprehensive data at the time of publication. 2017 trade data was incomplete and therefore misleading.

³ Reimbursement procedures, whereby health insurance organizations agree to finance particular procedures, can act as a barrier to entry for new products. Due to their high prices, many medical devices are beyond the reach of individual patients if they are not covered by their health insurance. Insurers can require additional proof of the effectiveness of a device beyond that required by the regulating agency before they agree to finance it.

Growth in demand for minimally invasive surgical instruments. While the use of hand-held precision instruments for general surgery has dominated the healthcare market for decades, in recent years the emergence of new, less invasive surgical techniques has begun to drive demand for a new set of tools. Minimally invasive or ‘keyhole’ surgery has grown in popularity in advanced healthcare markets thanks to the reduction in recovery time and hospital stays, and overall reduced risk. Large surgical instrument manufacturers have invested considerably in bringing new laparoscopic and endoscopic devices to market, training surgeons and encouraging a shift to these new tools. This tendency has combined with the demand for single-use instruments as health care providers seek to manage per-patient costs and reduce potential liability from hospital-acquired infections.

Increasingly strict regulatory environment. The regulatory environment is changing globally due to changes in the European Union (EU-15), the withdrawal of the United Kingdom (UK) from the EU-15, the adoption of new frameworks by emerging markets, as well as a revision of the requirements of the Food and Drug Administration (FDA) in the United States. Regulators maintain that these changes are designed to improve the safety and efficacy of products on the market, as well as to stimulate innovation. However, these changes – such as the new European Union requirements for re-registration of all products – raise costs and uncertainty for manufacturers of medical devices around the world. These changes will be particularly challenging for small and medium sized enterprises (SMEs) to withstand and supportive policies must be considered.

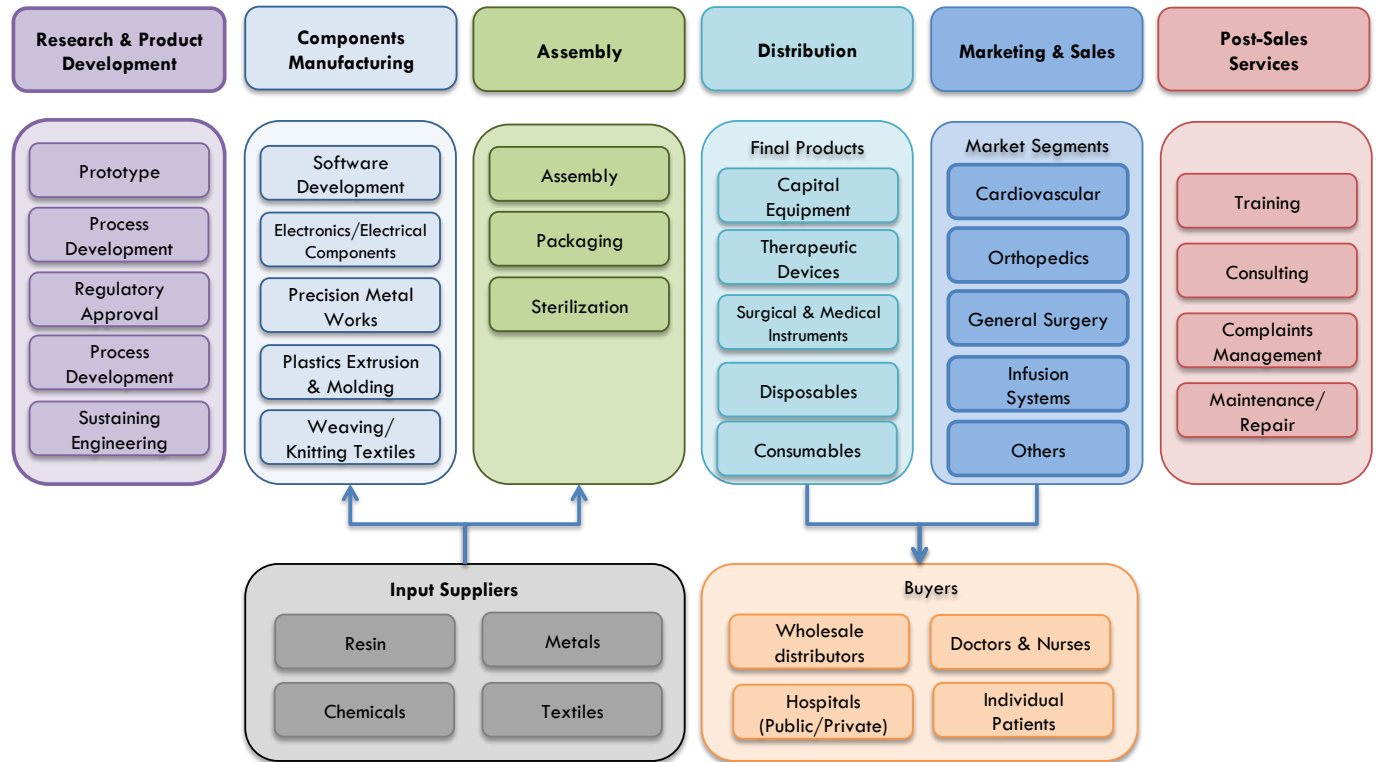
Consolidation of select offshore production locations. Albeit slower than other manufacturing industries (Brocca et al., 2017), medical devices producers have launched offshore production strategies to help reduce their costs and access new markets. Overall, a few select locations have been prioritized by device companies, particularly for lower cost products in disposables and surgical instruments; these include Ireland, Mexico, Singapore, Costa Rica, Dominican Republic and Malaysia. ‘Medtech’ has become a prioritized sector in these countries and clusters of foreign and local firms have emerged. These countries are steadily consolidating their share of, and ranking in, global exports (see Table 3) favored for their combination of capable workforce, geographic location for access to market, supportive export policies, and oversight in intellectual property protection (Bamber & Frederick, 2018; Bamber & Gereffi, 2013; BMI Research, 2018a; Giblin & Ryan, 2012). While these sites began in lower cost product segments, the fastest growth segment over the past decade are in higher value orthopedics and implantables (i.e. therapeutics; see Table 4).

2.2 The Medical Devices Global Value Chain

First, an overview of the broader medical devices GVC is provided followed by more specific stages involved in the development of medical and surgical instruments in particular, such as precision metal works. Each stage of the chain is discussed, in addition to detailing the key product and market segments included in this industry. Breaking down the value chain to this level of detail allows policy makers to more accurately map Pakistan’s current and potential opportunities in this global industry as a whole, rather than taking a monoscopic approach focused solely on surgical instruments. Due to the growing overlap in ownership, production, distribution and buyer behavior across the range of products in the medical devices sector, understanding trends and changes in the surgical and medical instruments sector is best understood by analyzing them in their broader context.

This report utilizes the medical devices GVC defined by Bamber and Gereffi (2013) to provide the broader context of the industry (see Figure 1).

Figure 1. Medical Devices Global Value Chain



Source: Authors based on Bamber and Gereffi (2013)

Note: For simplicity and relevance for Pakistan categories such as respiratory devices are not displayed.

The **highest value segment** of the chain is **research and product development (R&D)**.

During this stage, new products are conceptualized, prototypes are produced and tested and potential manufacturing capabilities are assessed. Following initial concept tests, the product is then registered for regulatory approval in the desired market(s). This can be a lengthy process, depending on the market's regulatory approach, the risk category of the device and clinical trials required. Generally, inputs and production processes must be validated to obtain regulatory approval. At this stage, both a firm's internal production capacity and the availability of potential vendors can influence production decisions. The initial product price is determined and potential for reimbursement is assessed. Once the device enters production, a team of engineers continues to improve upon the production process (*sustaining engineering*). These engineers work in close contact with the product development teams. Lead firms often acquire new products through mergers and acquisitions (M&As) rather than undertaking the product development process internally (Simoens, 2009). This provides an opportunity for smaller firms to enter the market. In recent years, R&D in the medical and surgical instruments category has focused on the development of minimally invasive devices.

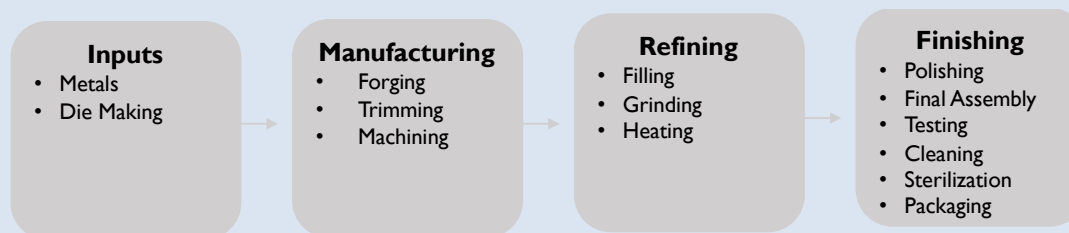
The **production segments, components manufacturing and assembly, are typically the lowest value-added segments** of the chain and are comprised of several different functions

depending on the final product. Box 1 details the production stages of precision metal instruments. Finally, once final assembly is complete, the product must be labeled, packaged and sterilized before distribution. Labeling and inserts are important parts of the production process, since incorrect information regarding use attached to a medical device can have fatal consequences. Sterilization takes place using one of several methods: E-beam (electrons are accelerated through the product); ethylene-oxide (E-O) (product is sterilized by gas); and gamma ray sterilization are amongst the most commonly used. While gamma ray sterilization is required for dense products, such as those containing liquids, most other products can either undergo e-beam or E-O sterilization. However, due to high costs of validation, usually one method is selected for regulatory approval per product. Sterilization in production locations allows for direct sales shipments.

Box 1. Production of Precision Metal Medical and Surgical Instruments

Precision metal medical and surgical instruments are used in a variety of procedures. While several instruments exist, the production process is similar for all of these products (see Figure 2).

Figure 2. Production Stages for Precision Metals



Source: Authors.

Raw materials: Consist primarily of metal inputs; the specific metal used varies by buyers' needs. The most common metal used is stainless steel but other materials such as titanium and tungsten carbide may also be used. Within stainless steel, magnetic and non-magnetic steel categories are used depending on the specific instrument being produced. Quality of inputs is an important consideration and buyers may specify the precise origin of metal inputs and the grade of the metal to be used.

Manufacturing: This is labor intensive and involves a series of complex steps, several of which can be geographically separated: First, a die is made for the instrument, followed by *forging* when hot metal is placed into the die-casting and struck to forge the shape needed. This can be done mechanically or manually depending on the firm's level of sophistication; mechanical processes allow for higher volumes and reduced waste. The instrument is then trimmed and machined to achieve the desired shape. Maintaining a constant temperature of the forge ensures better quality by reducing stress and softening the product for further processing. Refining then occurs where joints and grooves are fashioned and the desired edges produced. The instrument is then re-heated to harden the metal. Throughout production, a constant temperature must be maintained (*annealing*) to avoid brittleness and guarantee quality.

Finishing: Polishing, cleaning and packaging of the instrument. Tests are performed to insure against environmental and chemical corrosion and devices are cleaned using an ultrasonic cleaner to remove dust particles.

Sources: Field Research (2018a); Liaqat (2013)

Distribution, Marketing and Sales: Medical devices producers may distribute through wholesale distributors, such as Cardinal Health, or directly to their end clients via internal distribution centers

or catalogues. End clients may be hospital or clinic administrators, those responsible for direct patient care such as doctors, nurses and specialists, and through retail directly to the patient themselves. Distribution channels depend on the type and value of particular products. Lower-value products tend to be distributed through wholesale distributors, while high-value products are likely to be sold directly to hospital administrators. Products might also be sold as *integrated solutions*, which combine medical devices, training, consulting and other post purchase services. Sales channels for medical and surgical instruments vary by type; disposables are often sold in surgical kits packaged with items such as surgical drapes while reusable instruments such as forceps and retractors are sold through direct orders (Field Research, 2017).

In the face of rising health care costs, buyers are improving their negotiating positions by establishing purchasing groups, moving individual doctors' practices under the umbrella of hospital administrations to benefit from economies of scale, introducing tendering processes and reducing their overall number of suppliers (Medtronic, 2018; Seligman, 2012). Increased competition to become selected suppliers means that medical devices manufacturers spend significantly on direct marketing and building relationships with clients. As early as 2010, it was estimated that in Europe, 56% of the cost base for a product is spent on marketing and sales (Frost & Sullivan, 2010).

Finished products: Surgical and medical instruments are one of a number of product categories in the medical devices sector. For this report, the following categories are used: (1) Consumables;⁴ (2) Disposables; (3) Surgical and Medical instruments; (4) Therapeutic Devices; (5) Capital Equipment; and (6) Other Devices (Bamber & Gereffi, 2013; Sturgeon et al., 2015). These are detailed in Table I.⁵

⁴ Consumables can also be considered a medical supply rather than device; nonetheless, they are becoming increasingly sophisticated and potential substitutes for medical devices including sutures and thus are included in the analysis.

⁵ Detailed definitions of each of these product categories by trade codes are available in Table A-1. For the purposes of this study, "medical devices" are limited to those products that are designated strictly for use in dental, medical, surgical or veterinary practices. Medical and surgical furniture, such as hospital beds, were not included in this study.

Table I. Medical Devices Categories based on Use, Characteristics and Production Expertise

Product Category	Examples	Characteristics	Production Capabilities/Medical Expertise
<i>Consumables</i>	Bandages and dressings	Highly cost driven	Compliance with cleanroom standards; generally, not subject to regulatory controls/standards
<i>Disposables</i>	Plastic syringes, catheters and needles, sutures	Single-use products; highly cost driven	Compliance with specific medical devices standards
<i>Surgical and medical instruments</i>	Forceps, medical scissors and dental drills, as well as specialized minimally invasive surgical instruments	Multi-use products sterilized between uses; single-use versions of the same instruments; cost-driven	Compliance with specific medical devices standards
<i>Therapeutic devices</i>	Hearing aids, pacemakers and prosthetics	Implantable and non-implantable devices to help people manage physical illness or disability; quality and skill driven	their prolonged use inside the body, the production of implantable devices requires considerable expertise, particularly with respect to bio-compatibility
<i>Capital equipment</i>	Ranges from infusion pumps and blood pressure monitors to considerably large investments such as MRI equipment or computed tomography	Single-purchase equipment used repeatedly over a number of years; large, long-term investments	Medical and electronics expertise
<i>Other Devices</i>	Breathing devices, oxygen therapy devices, gas masks, massage equipment	Multi-use products for single users; single-use products;	Compliance with specific medical devices standards

Source: Authors.

Each of these product categories represents a wide range of products. The surgical and medical instruments category, for example, represents thousands of distinct devices (Box 2). Variation among products is common depending on specific use and material used in production. Instruments are further classified by their use, which is often determined by the quality of inputs and the quality of production; these classifications include:

- **Surgical Operation Room Quality** - this is the highest quality of instruments using the best grade steel input for forging and with high expectations for quality shaping and grinding.
- **General medical use** - these instruments are reusable instruments but have a slightly lower quality than operation room grade
- **Single use instruments**⁶- these use lower quality steel inputs and are designed for single use. This category is growing in popularity in developed markets because they eliminate the need for sterilization and remove risk of contamination across patients (Field Research, 2018a).

⁶ Defined by the FDA as “intended for use on one patient during a single procedure . . . and is not intended to be reprocessed (cleaned, disinfected/sterilized) and used on another patient (FDA, 2015).”

Box 2. The Shifting Nature of Surgical and Medical Instruments

Traditionally, this product segment has been considered mature with little product differentiation beyond branding and cost. Well-established products include forceps, retractors, surgical scissors, needle holders and scalpels, measuring instruments amongst others. Over the past two decades, however, two major trends have begun to shift the dynamics of this segment.

First, notable technological and medical advances have made surgeries easier and faster to perform, improved outcomes and reduced both surgical and post-op complications. These include advances in powered devices, minimally invasive instruments and surgical robotics. This has been driven by significant R&D activity; globally, close to 60,000 patents have been filed in the past ten years for endoscopic devices alone. Although adoption has been uneven, applications of these tools cover most major fields, including neurosurgery, cardiovascular, orthopedic, plastic and reconstructive surgery.

Second, demand has grown for single-use surgical instruments to manage hospital acquired infections (HAI) resulting from improper or inadequate sterilization of multi-use devices, and to increase responsiveness to pricing requirements from healthcare insurers (Freedonia, 2016). Some growth estimates suggest that demand for single-use products is expanding at twice the rate of reusable products.

These trends vary by market. The shift to minimally invasive instruments has been particularly important in high-income countries (which account for the bulk of medical devices spending), while middle- and low-income countries have been slower to shift. Between 2010 and 2015, there was a notable increase of minimally invasive instruments for surgical procedures in the EU for the most common surgeries, including laparoscopic appendectomies and hysterectomies.

Although lower-income countries face challenges in sterilization of reusable instruments, the demand for these instruments continues to be stronger than for single-use versions as healthcare providers seek to contain costs in the face of small budgets. North America leads demand for single-use instruments with an estimated 33% of the market in 2018, followed by Europe with 26%.

Sources: (BCC Research, 2014; Eurostat, 2017; WIPO, 2018). **Note:** Search parameters for WIPO database were A61B, endoscope & endoscopic, AD: 2007-2018.

End market segments are generally divided according to the body system they are used to treat. These segments include cardiovascular health, orthopedics, respiratory issues, anesthesia, neurology and spinal health, renal health, urology and reproductive health, hematology, dentistry, ophthalmology, biomaterials and tissue generation, as well as specific treatment types, such as oncology, diabetes management and advanced wound treatment. Cardiovascular and orthopedics have been the two leading market segments for most of the past decade (Frost & Sullivan, 2017; Markets and Markets, 2011).

While large firms today have become highly diversified in the end markets they serve, due to the level of expertise and innovation required in the production of each device, smaller and medium size manufacturers tend to specialize in one or more **specific end market** (Field Research, 2017; Simoens, 2009). Each of these end markets may require all, or a subset of, the product categories described above. For example, in the treatment of cardiovascular conditions, gloves and catheters may be used for a transfusion (disposable), a pacemaker for cardiac rhythm management (therapeutic), surgical instruments such as clamps and forceps during heart surgery (surgical instruments) and a patient monitor during recovery (capital equipment).

Finally, **post sales services or post-market services** include training on equipment and consulting, account management for the supply of accessories, maintenance and repairs as well as regulatory requirements such as *adverse events or complaints handling* (Ghemawat, 2007; WHO, 2017). As embedded software and sensors grow in their importance in the industry, post sales analytics and corresponding services are becoming increasingly important differentiators amongst firms (Frost & Sullivan, 2017).

2.3 Global Trade in the Medical Devices Global Value Chain⁷

Global trade in medical devices has expanded considerably since 2000 in response to growing populations, increased access to healthcare and efforts to increase production efficiencies. Between 2002-2016, trade more than doubled, and growth remained robust – albeit, slowing – following the global economic crisis in 2008. Trade is generally in final products as many companies operate vertically integrated production sites.⁸

Demand is highest amongst high-income groups but it is growing fastest amongst upper middle and lower middle-income group countries. The EU-15, led by Germany, remains the strongest source of both demand and supply, yet, its shares of the global markets have declined since 2006. China has steadily gained market share; indeed, Chinese growth rates in demand and supply have outstripped all other countries since 2002. On the supply side, in absolute terms, export value has grown in almost all locations. Fewer than 5 of the leading 50 exporters in 2016 have experienced a decline in exports since 2006 (e.g. UK, Indonesia, and Sweden). Growth rates, however, vary across countries as several production locations have consolidated their position within the value chain (e.g. Mexico, Singapore, Ireland), and new sources of demand have emerged in response to increased spending on healthcare (e.g. East Asia & Pacific, South Asia and Latin America and the Caribbean).

This section analyses these major global trends to provide a broader context for Pakistan's potential growth trajectories, in addition to analyzing the evolution of the surgical/medical instrument segment.

2.3.1 Global Demand

Global demand is driven by high-income countries, which accounted for 81% of all medical devices imports in 2016. Middle-income countries, however, are emerging as new markets. In 2002, these absorbed just 12% of imports; by 2016, these had reached a combined 19% (Table 2), representing approximately US\$39B in healthcare imports.

⁷ Global trade analysis is based on the following six product categories: Disposables, Instruments, Therapeutics, Capital Equipment, Consumables and Respiratory Devices. The details for each of these categories can be found in Table A-1 in the Appendix.

⁸ The capital equipment segment is a notable exception as many of the components are sourced from specialized suppliers within the electronics GVC. Although there is considerable flow in raw materials across borders, due to their application in multiple sectors basic trade statistics cannot isolate these.

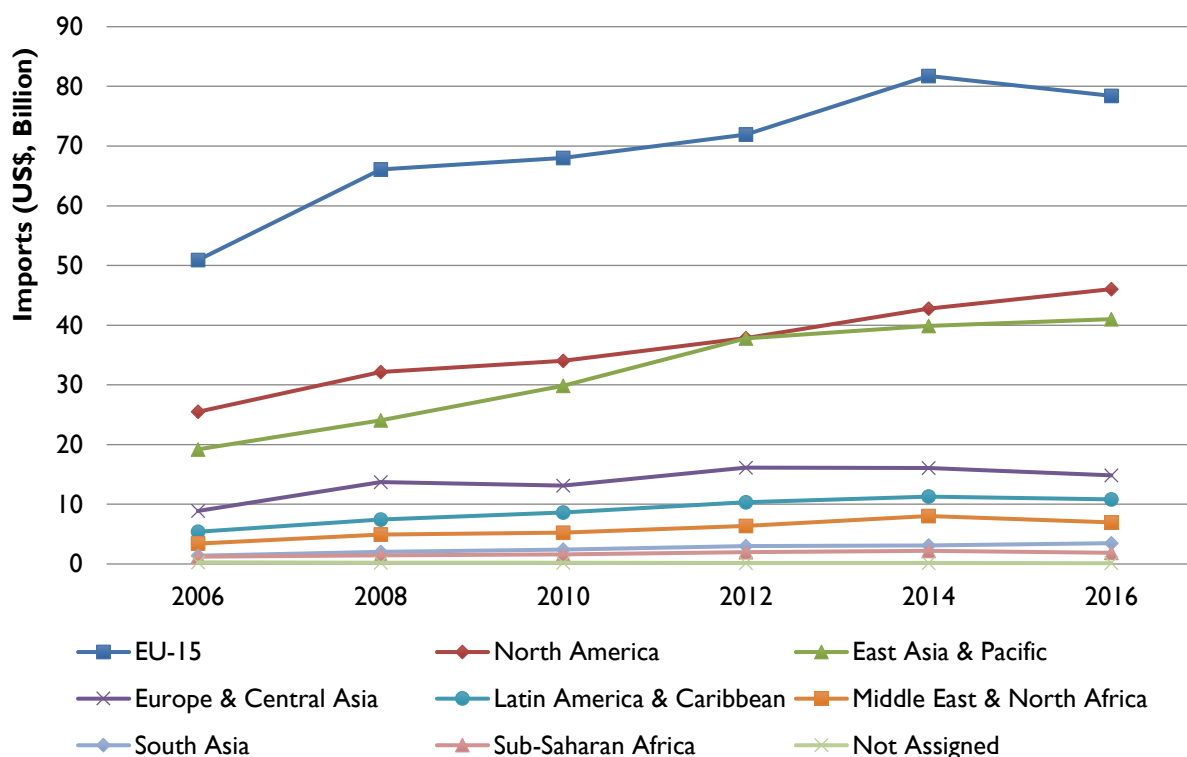
Table 2. Global Medical Devices Imports, by Income Level Group 2002-2016

Income Group	Share of Imports (%)								Growth Rates	
	2002	2004	2006	2008	2010	2012	2014	2016	2002-2016	2006-2016
High Income	87	87	85	83	82	80	80	81	203	66
Upper Middle Income	10	10	11	13	14	16	15	15	382	133
Lower Middle	2	3	3	3	4	4	4	4	454	130
Low Income	0	0	0	0	0	0	0	0	262	81
World	100	100	100	100	100	100	100	100	227	75

Source: UN Comtrade (2018) Based on HS-2002 product categories defined in Table A-1; all exporters; downloaded 27/08/2018. **Note:** Income group level based on World Bank classifications (See World Bank, 2017).

With a large population, and high healthcare expenditure, the EU-15 leads the demand for global imports of medical devices (Figure 3). EU-15 demand is dominated by the top five importers (Germany, Netherlands, Belgium, France, and the UK). North America and East-Asia Pacific (EAP) follow, with similar market shares (23% and 20% respectively in 2016). North American demand is led by the US, while EAP demand is more diversified amongst several countries (e.g. China (30%), Japan (25%), Australia (10%) Rep. of Korea (7%), Singapore (7%). Nonetheless, the fastest growing markets globally are Asian; EAP and South Asia grew at 114% and 153% over the past decade (compared to global 75%). Low health care spending, however, in several countries in South Asia (BMI Research, 2018a), including Pakistan and Bangladesh, underscores the uneven demand across the region.

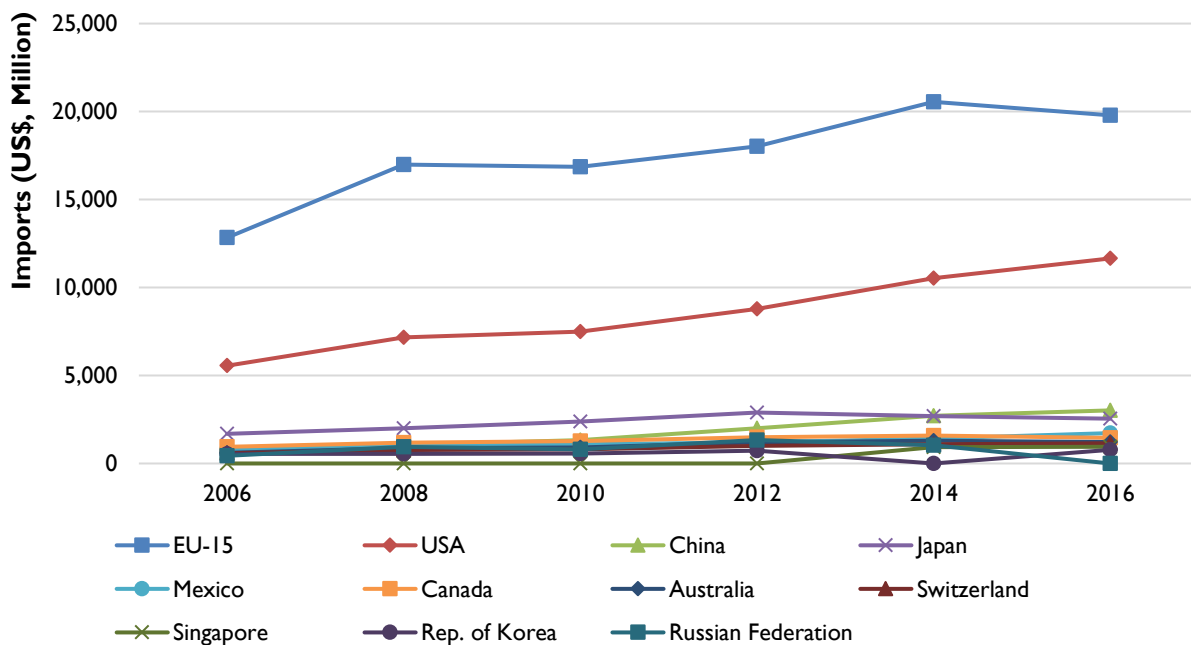
Figure 3. Imports of Medical Devices by Geographic Region (US\$, Billion), 2006-2016



Source: UN Comtrade (2018). Based on HS-2002 product categories defined in Table A-1; all exporters; downloaded 27/08/2018.

In 2016, surgical/medical instruments category accounted for the largest share of trade by value (28%), followed by therapeutics (25%) and capital equipment (21%) (see Table 3). The category has grown at a slightly higher than the average rate of 81% (2006-2016). The mature, low value and low weight and general use characteristics of these products makes them highly tradable. While the EU-15, led by Germany, accounts for the strongest share of demand for instruments (35%), this has declined by approximately 6% over the past decade. The UK represents just 10% of EU-15 demand and 3.6% of global demand, valued at just under US\$2B in 2016. Of the leading importers, China is by far the highest growth market, growing at 365% (2006-2016), followed by Mexico at 117% (Figure 4). All leading markets experienced considerable growth in absolute terms; the slow redistribution of market share is thus indicative of the rising demand for healthcare products in emerging markets rather than a decline in demand in traditional markets.

Figure 4. Top Ten Global Surgical/Medical Instruments Importers (US\$, Million), 2006-2016



Source: UN Comtrade (2018). Based on HS2002: 90184, 90185, 90189, Retrieved 7/27/18

2.3.2 Global Supply

The industry is dominated by mature manufacturing locations in the US and EU-15; these two origins accounted for close to two-thirds of all exports in four of the six product categories analyzed, and over half in the two remaining product segments (Table 3). Once a strong third contributor, Japan's share of global supply has declined; a leading exporter in 2002 in all categories, by 2016, it was only a top five exporter in the more specialized capital equipment product segment. Within the EU-15, Germany is the most important exporter, growing at 204% between 2006-2016, almost three times the rate of the global average.

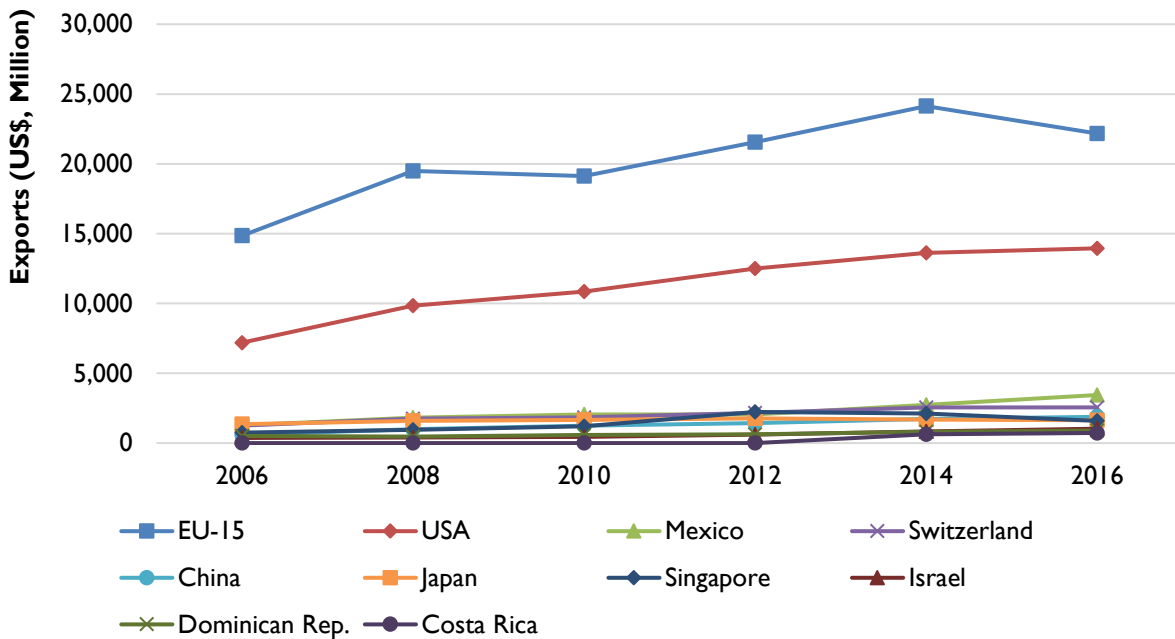
Table 3. Top Five Global Exporters by Product Category, 2016

Exporter	Disposables		Capital Equipment		Therapeutics		Instruments		Consumables		Other	
	Value	Share (%)	Value	Share (%)	Value	Share (%)	Value	Share (%)	Value	Share (%)	Value	Share (%)
World	34,944	17.2	41,704	20.5	51,375	25.2	56,074	27.5	7,275	3.6	12,240	6.0
EU-15	15,734	45.0	17,807	42.7	27,969	54.4	22,176	39.5	3,608	50%	3,533	28.9
USA	7,359	21.1	9,372	22.5	9,308	18.1	13,951	24.9	709	10%	2,733	22.3
China	1,989	5.7	3,129	7.5	1,387	2.7	1,879	--	1,295	18%	2,733	22
Switzerland	--	--	--	--	6,110	11.9	2,555	4.6	--	--	--	--
Mexico	2,889	8.3	--	--	--	--	3,443	6.1	--	--	--	--
Japan	--	--	3,624	8.7	--	--	--	--	--	--	--	--
Singapore	--	--	--	--	1,633	3.2	--	--	--	--	838	6.8
Rep. of Korea	--	--	1,190	--	--	--	--	--	--	--	--	--
Costa Rica	1,142	--	--	--	--	--	--	--	--	--	--	--
Australia	--	--	--	--	--	--	--	--	--	--	672	5.5
Czechia	--	--	--	--	--	--	--	--	306	4%	--	--
Top Five	29,112	80.0	35,122	81.4	46,407	90.3	44,004	75.1	5,918	81	10,509	86
EU-15+US	23,092	66.1	27,179	65.2	37,277	72.6	36,126	64.4	4,317	59	6,266	51
HS02 Codes	90183*		90181*, 90182*, 9022, 841920		9021*		90184*, 90185*, 90189*		300590, 300510		9019, 9020	

Source: UN Comtrade (2018). Based on HS-2002 product categories defined in Table A-1; all exporters; downloaded 27/08/2018.

Surgical and medical instruments, regionally, is led by the EU-15 and the North America, although two key countries, the US (US\$13.9B) and Germany (US\$7.7B) dominate supply, accounting for 53.2% of exports in 2016 (Figure 5). While a large share of this output is manufactured in these countries, firms do also undertake final branding, labeling, repackaging and sterilizing of products produced in other locations. The EU-15, however, has steadily lost close to 10% of the market share since 2006; France, Sweden, Spain and the UK have all seen their exports of these instruments decline in absolute terms during this period.

Figure 5. Top Ten Exporters Surgical/Medical Instruments, by Year 2006-2016



Source: UN Comtrade (2018). Based on HS2002: 90184, 90185, 90189, Retrieved 7/27/18

Several emerging sites have joined mature manufacturing locations and steadily consolidated their positions within the medical devices value chain. These include China, Mexico, Singapore, Republic of Korea, Costa Rica and Malaysia. Newcomers China, Malaysia and Costa Rica, in particular, have grown very fast - three to four times (227%, 300%, 296% respectively) the global average over the last decade. These locations generally entered global trade through one product category and have either gained export share in that category, diversified into multiple categories or both (see Table 4). The fastest growing product category for the majority of these countries today is the therapeutics segment. Surgical/Medical instruments, nonetheless, is a key product category for these locations; Mexico, China, Singapore, Dominican Republic and Costa Rica have all joined the top ten global exporters in this category since 2002. With the exception of China, with few local lead firms of their own, exports of these countries are dominated by multinational corporations (MNCs) and the strengthening of these exporters is illustrative of the industry's general strategy to protect its intellectual property and quality by offshoring to a select number of strategic locations.

Table 4. Growth of Selected Offshore Production Locations

Country	Total Exports, 2016		Leading Product Category, 2016			Fastest Growth Product Category, 2016	
	Value (US\$ millions)	Growth Rate 2006-2016 (%)	Category	Share (%)	Growth Rate 2006-2016 (%)	Category	Growth Rate 2006-2016 (%)
China	12,411,200,713	227%	Capital Equipment	25%	245	Therapeutics	361
Ireland	11,254,566,441	123%	Therapeutics	48%	92	Consumables	625
Mexico	8,822,991,749	120%	Surgical/Medical Instruments	39%	170	Therapeutics	228
Singapore	5,773,677,403	164%	Therapeutics	28%	168	Other	1,124
Rep. of Korea	2,603,829,215	180%	Capital Equipment	48%	162	Therapeutics	664
Costa Rica	2,507,955,659	296%	Disposables	46%	151	Capital Equipment	9,744
Israel	2,069,763,000	77%	Surgical/Medical Instruments	50%	179	Therapeutics	1,460
Malaysia	1,843,212,496	301%	Surgical/Medical Instruments	36%	262	Therapeutics	852
Dominican Republic	1,060,869,130	85%	Surgical/Medical Instruments	85%	72	Therapeutics	9,251

Source: UN Comtrade (2018). Based on HS-2002 product categories defined in Table A-1; all exporters; downloaded 27/08/2018.

2.4 Lead Firms and Governance

The global medical devices industry is highly consolidated and dominated by a small number of MNCs. Traditionally, these firms focused on leadership in niche markets, but this has changed over the past decade in response to increased buyer power. Increasingly larger buyers -- including public health programs,⁹ consolidated hospital networks and insurers' and group purchasing organizations -- seek lower prices, and fewer, but larger, vendors to cope with rising healthcare costs.¹⁰ As a result, lead firms have developed capabilities to serve a broad range of market segments, from cardiovascular and orthopedics to diabetes management, and product categories, such as minimally invasive instruments and diagnostics and imaging equipment as well as provide global coverage. Over the past decade, there were 300 M&A completed valued at over US\$100M in the industry.¹¹ With large R&D and acquisition budgets and regulatory offices, these lead firms play a major role in

⁹ For example, in China, regulations require public hospitals to utilize centralized provincial procurement systems (BMI Research, 2018b).

¹⁰ Many of these programs limit the number of vendors which can participate in their procurement systems. Vendors with the greatest breadth of products therefore benefit (Medtronic, 2018).

¹¹ Medtronic, Stryker and Boston Scientific have been amongst the most active acquirers during this period, collectively acquiring some 80 firms. Medtronic has also been the highest spender with close to US\$50B in acquisitions (Zephyr, 2018).

shaping the evolution of the global industry. Table 5 highlights the top 10 global firms in the sector by revenue.

Table 5. Top Ten Global Firms in the Medical Devices Industry, by Revenue 2017

Firm (HQ)	Primary Specialties	Revenue (US\$ Billion, 2017)	Employment (2017)
Medtronic (Ireland/USA)	Cardiovascular, Neuromodulation, Diabetes, and Surgical Technologies.	29.71	102,688
Johnson & Johnson (USA)	Surgery, Orthopedics, Cardiovascular	26.6	134,000
Abbott Laboratories (USA)	Branded Generic Drugs; Medical Devices; Diagnostic Assays; Nutritional Products	20.85	99,000
GE Healthcare (USA)	Medical Imaging; diagnostics	19.1	52,000
Danaher Corporation (USA)	Environmental & Applied Solutions, Life Sciences, Diagnostics, and Dental	16.88	67,000
Siemens Healthineers (Germany)	Medical Imaging; diagnostics	13.8	45,000 (2016)
Cardinal Health (USA)	Medical, Surgical, Cardiovascular	13.5	49,800
Becton, Dickinson and Company (USA)	Medical Devices, Instrument Systems, and Reagents	12.48	41,900
Phillips Healthcare (Netherlands)	Personal Health; Diagnostics and Treatment; Connected Care & Health Informatics; HealthTech; Legacy Items	12.3	71,000
Stryker Corporation (USA)	Ortho, Medical & Surgical, Neuro	11.33	33,000

Source: Company Websites, One Source, Hoovers.

The **surgical instruments segment** is more fragmented than other product segments, with a number of smaller, independent producers participating in the industry (BCC Research, 2014). Nonetheless, four of the top ten lead firms are important players in this segment, with their instruments divisions generating multi-billion dollar revenue in 2017: Medtronic (US\$5.5B), Stryker (US\$5.5B), BD (US\$3.5B) and Boston Scientific (US\$3.4B).¹² These firms are pushing a strategy to shift surgeons towards the minimally invasive procedures, for which they have been developing new tools over the past decade and which now account for a considerable share of revenue. Medtronic

¹² Based on annual reports. Medtronic is a leading player in surgical instruments; its Minimally Invasive Therapies division earned US\$5.5B in 2017 (Medtronic, 2018). Stryker's Medical and Surgical instruments net US\$5.58B in 2017; around US\$1.6B in endoscopic tools (Stryker, 2018).

refer to this as their ‘open-to-minimally invasive strategy’ (Medtronic, 2018), that is, gaining a reputation in open surgery tools as a means to shift surgeons towards less invasive ones. This includes training surgeons to use their instruments; surgeons tend to favor products they were trained on. The growth strategies of these lead firms include a keen focus on emerging markets in general, and Asia-Pacific in specific (BD, 2018; Boston Scientific, 2018; Medtronic, 2018). This marks a potentially important threat to independent, traditional tools manufacturers in the region.

The medical devices GVC is typically highly vertically integrated to protect important investments in intellectual property creation, contract manufacturing is growing (Brocca et al., 2017), particularly in the production of mature precision metal surgical and medical instruments, as well as in precision metal implantable devices. Contract manufacturing in these product segments occurs across the globe with major clusters found in Germany, Hungary, Malaysia, Pakistan and Poland. Quality assurance is typically the most important concern in this outsourcing, followed by cost. Regulations generally place the burden of quality and supplier compliance for any part of the manufacturing process on the branded firm (Bos, 2018; McHugh et al., 2012; Sethuraman, 2018).¹³ Rigid and sophisticated qualifications thus generally apply to ensure quality and suppliers comply with regulatory demands (Weber et al., 2010). However, unlike other medical device products where suppliers are locked in for long time periods by these regulations (Fennelly & Cormican, 2006), switching costs for mature products like traditional surgical instruments, are relatively low as equivalence is easily illustrated and regulatory oversight is lower (Brocca et al., 2017).

In addition to quality concerns and liability, the large scale of the lead firms means that vendor and contractor decisions are primarily made within the corporate headquarters. Raw material contracts are negotiated for global supply due to leverage for large orders, quality assurance and guarantees for on-time delivery; although supplying less demanding emerging markets opens up avenues for contract manufacturers to source locally. Although global production facilities or contract manufacturers may be required or allowed to provide supplier recommendations regarding major inputs, they typically only have autonomy over non-essential inputs, such as maintenance and repairs supplies. Furthermore, all decisions regarding the global distribution of the firm supply chain, such as the location of the production of different product lines and activities, are made at the corporate level.

Lead firms have generally limited production to a handful of locations over which they have significant oversight. Further, due to their dominance in the market, the investment decisions of large lead firms have resulted in notable trends in the emergence of new offshore locations – including in Galway (Ireland), Baja California (Mexico), Singapore, Santo Domingo (Dominican Republic) and Penang (Malaysia). These locations are generally prized for progressive skills development capabilities, geographic and regulatory proximity to key markets, intellectual property protection, and increasingly cost. Global production facilities must compete based on cost, quality and proven capabilities to drive growth and upgrading (Brocca et al., 2017; Fennelly & Cormican, 2006). Most firms begin their new locations with a few, existing products in low risk categories, ramping up as sites improve their capabilities (Bamber & Gereffi, 2013).

¹³ As private label production increases in this sector, regulators are acknowledging that the final brand may not be engaged in the design, development or manufacture of the product and are thus adapting regulations focused on the final company placing the product on the market (MHRA, 2017).

2.4.1 Regulation and Public and Private Standards

The medical devices sector is governed by a combination of public and private standards that are closely related and are designed principally to ensure a safe, quality product for the health of the patient using the device. Failure of a medical device can have severe and fatal consequences. Regulatory controls vary by the type of device, but may include technical documentation, clinical trials and testing of the biocompatibility of materials, among others. In addition to regulatory controls, criteria laid out by public and private healthcare insurers regarding which devices are eligible for reimbursement can also affect which products survive from the prototype stage to market (BMI Research, 2018b; Medtronic, 2018). These insurers can often require more rigorous clinical evidence of effectiveness than required by regulatory controls (Lin et al., 2010).

Generally, medical devices are categorized by perceived risk to the patient and whether the new device is subject to general controls (basic), special controls (more specific), or requires clinical trials. Globally, the majority of surgical instruments fall under either general controls or special controls. Traditional instruments dedicated to open medical and surgical procedures have typically been classified as low risk products (i.e. Class I); classification approaches for minimally invasive instruments diverge, with some regulatory agencies applying additional scrutiny (BMI Research, 2018b; Sethuraman, 2018).

Due to their significant market shares, the standards set by the US, the EU-15 and to a lesser extent, Japan, have to date controlled the development and commercialization of new products in this sector (see Table 9). While varying in design and application, the regulatory requirements of these have generally been considered the global gold standard, and many other countries will fast-track devices with FDA, CE or Japanese approval. Of the three, with slightly less rigorous requirements and faster approval times,¹⁴ devices have often been first launched in Europe and the European CE Mark has thus been considered the basic requirement for entry into many emerging markets without their own regulatory frameworks (Medtronic, 2018; Puri et al., 2011).

Recent developments, however, may shift this status quo. These include:

- 1. More emerging markets are adopting medical device regulatory frameworks of their own (BMI Research, 2018b; Boston Scientific, 2018; WHO, 2017; Wong & Tong, 2018).** The guidelines developed by the World Health Organization's (WHO) Global Harmonization Task Force (GHTF) between 1993 and 2012 have provided the foundations for many of these new regulatory systems. By 2016, over half of WHO member states (113/194) had established some regulatory system. There has been considerable activity in the Asia-Pacific region, Singapore (2007/2010),¹⁵ India (2017/2018), and Malaysia (2012/2018), have all rolled out new programs, while the ASEAN group have all agreed to the ASEAN Medical Device Directives (2015) largely aligned with GHTF (Sethuraman, 2018). While these countries have followed the approach taken by the GHTF founding members, they are increasingly beginning to develop their own regulation from the ground up. Africa and the Middle East are the least regulated regions (WHO, 2017).

¹⁴ In the EU, Notifying Bodies or (NB) are used to approve new medical devices for sale in their member states. Each medical device manufacturer may choose the NB to evaluate their device, leading to competition between NBs for evaluations.

¹⁵ Singapore's regulatory agency has even found itself in the forefront in having to roll out regulations for products not yet regulated by the FDA/ EU-15 (Sethuraman, 2018).

- 2. The new Medical Device Regulation entered into force in the EU-15 in 2017 replacing the existing Medical Devices Directives.** This creates standardized, and higher requirements on all EU member states in allocating the European CE mark (see Box 3 for further information). Traceability through Unique Identification (UID) numbers and centralized registration is a central change, and all devices must be listed in EUDAMED, a new centralized database. Industry response is that this will significantly increase the burden for compliance in Europe and drive innovation towards the US (Boston Scientific, 2018; Lowe, 2017; Medtronic, 2018). This is further complicated by the pending withdrawal of the UK from the EU-15 in 2019 and whether or not a deal is reached. A “no deal” exit will result in all devices with CE marks provided by UK Notifying Bodies having to reapply or contract with a EU-15 member state NB (European Commission, 2018).
- 3. In 2018, the FDA announced that it will also reform the requirements for the approval of medical devices in the US.** The goals include streamlining processes, to encourage manufacturers to develop safer products to replace existing devices, and to require cyber security measures for vulnerable devices (“Inside FDA’s new plan to bolster medical device safety,” 2018). The US will also be requiring UID.

Despite these changes, both regional and international initiatives continue to work towards standardizing national and industry medical device regulations and requirements, removing barriers to entry and ensuring new innovative, life enhancing and saving technologies can reach patients in need. These include the International Medical Device Regulators Forum (IMDRF), which is made up of the EU, the US, Australia, Brazil, Canada, China, Japan, Russia, Singapore, South Korea, and the WHO. The Asian Harmonization Working Party has been working towards harmonizing requirements for the growing Asian market, specifically and emerging markets in general¹⁶. Initiatives are primarily focused on information sharing and the development of regulatory capabilities.

¹⁶ As Asia-Pacific emerges an alternative market, its regulatory frameworks are now more important for firms. The general tendency in the region has been to lower the regulatory requirements for low risk devices helping to increase access and lower costs, increase those for high risk devices and, at the same time, establish fast track channels for innovative devices with high potential market demand (Field Research, 2018b). Table A- 5 in the Appendix presents the key changes in medical devices regulation in the region.

Box 3. New Medical Devices Regulation in Europe

In May 2017, the new Medical Devices Regulation entered into force in the EU-15 replacing the existing Medical Devices Directives with a three-year phase in period. The goal of the regulation is to strengthen the safety of medical devices in the regional market and update existing legislation from the 1990s allowing it to be more responsive to forthcoming challenges in the sector. All devices, even existing ones on the market, will be required to comply with the new legislation by 2020, requiring all products to be re-registered affecting every company operating in the medical devices sector in Europe.

Changes include increasing safety and efficacy requirements; the creation of a EU-wide database EUDAMED containing all medical devices approved by the region's notifying bodies intended to increase transparency; new traceability mechanisms; financial mechanisms for protecting the consumer from defective devices. An important part of this is presenting a standardized set of requirements for all EU-member countries.

The legislation also introduces new equivalence requirements for avoiding lengthy medical trials; in this case, a second device manufacture must have significant supporting documentation of equivalence – essentially a contract with a competitor on access to their data. This is anticipated that it will slow down the release of new products on the market, and potentially make the launching of new products in Europe more onerous than that in the US. The ultimate result is that the EU-15 may be replaced as the launch point for many products.

To remain in the market, firms will need to allocate both financial and human resources to achieving European compliance. Allowances have been made for SMEs to help reduce the additional costs of compliance.

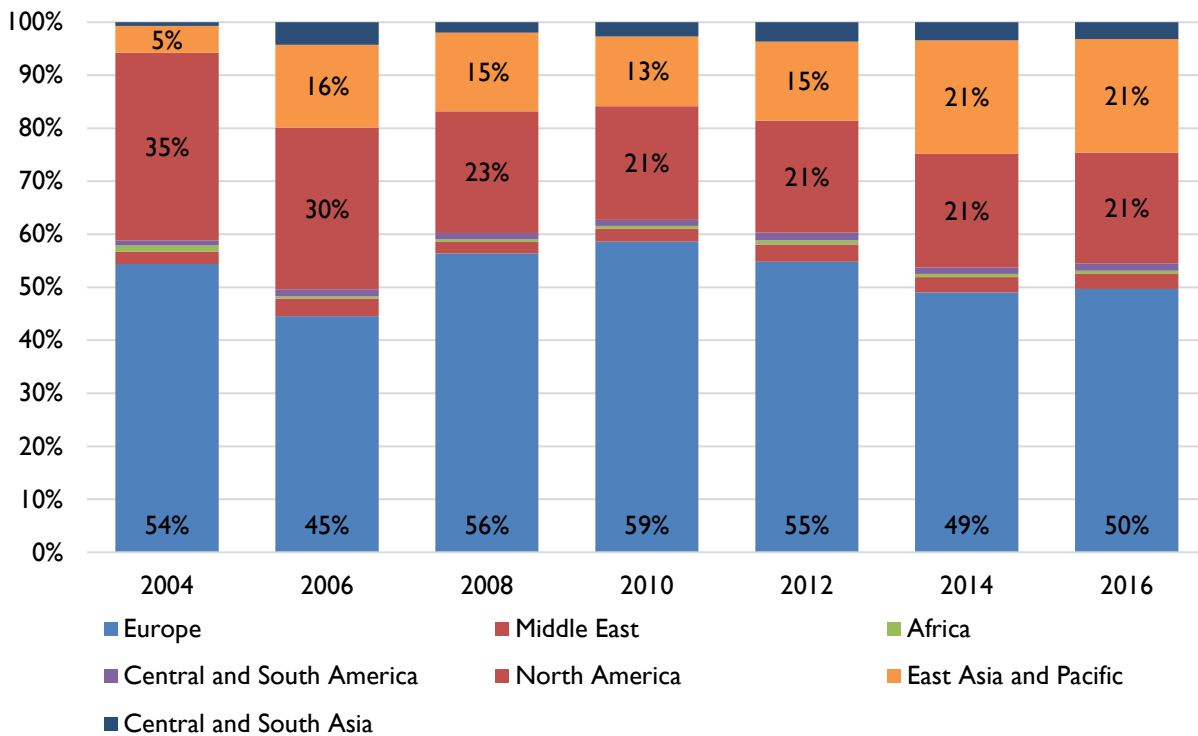
Source: Lowe (2017); Monitor (2017).

2.4.1.1 Private Standards

The primary private standard is the ISO standard for medical device manufacturing, ISO 13485 Medical Devices, Quality Management Systems.¹⁷ Launched in 2003, certifications in this standard grew globally at a CAGR of 26% to 29,585 by 2016. The evolution of certification by region over the past decade further illustrates the growing importance of the Asia Pacific region in global manufacturing, as the region's capabilities have grown and awareness has spread regarding the need for certification. East Asia & Pacific and Central and South Asia have outpaced established sites during this period; accounting for just over 5% of certifications in 2004, the region held an equal share of certifications as the US by 2016 (Figure 6).

¹⁷ There are several additional standards regarding supporting activities such as cleanrooms, sterilization (ISO 11135-1 Ethylene-Oxide Sterilization and ISO 11137-1-2- Radiation Sterilization).

Figure 6. ISO 13485 Certification, by Region 2004-2016



Source: ISO, 2018

These private quality standards have begun to overlap with public standards as harmonization efforts continue. In particular, ISO 13485 is increasingly being used by regulatory agencies as a proxy for quality audits (BMI Research, 2018b; Sethuraman, 2018). This is due to its proximity to regulatory requirements of multiple countries; in addition to US and EU, its supports firms for compliance with Australia, Canada and Taiwan, and is comparatively similar to Japanese requirements (Bos, 2018). The 2016 revision of the standard further increases alignment with both FDA and pending EU MDR regulations for good manufacturing practices (Bos, 2018; FDA, 2012). ISO 13485:2016, raises the requirements for suppliers and contract manufacturers, increasing the likelihood of unscheduled audits from regulatory agencies (Bos, 2018).

2.5 Human Capital, Workforce Development and Gender

Globally, the workforce is small, estimated at 1.5-2M in total (UNIDO, 2016). Leading exporters such as the US, Germany and China employ 308,000 (BLS, 2018), 178,000 (Eurostat, 2015) and 409,500 workers respectively; Mexico is one of the world's leading offshore production locations by workforce size with 116,000 (INEGI, 2018), with others such as Malaysia and Singapore are much smaller by comparison with approximately 31,000 and 14,800 workers respectively (AMMI, 2016). Table 6 provides a comparative perspective illustrating employment growth between 2008-2015.

Table 6. Employment in Medical Devices Sector, Select Leading Countries 2008-2015

Country	Employment		Share of Global Employment		Growth Rate
	2012	2015	2012	2015	2012-2015
World	1,667,468	1,776,018			7%
EU-15*	428,238	437,240	26%	25%	2%
Germany	184,354	197,974	11%	11%	7%
China*	365,465	409,457	22%	23%	12%
USA	358,713	325,067	22%	18%	-9%
Mexico	98,661	111,796	6%	6%	13%
Japan*	90,363	90,363	5%	5%	0%
Brazil	50,626	58,221	3%	3%	15%
India*	46,559	50,835	3%	3%	9%
Korea*	5,707	37,601	0%	2%	--
Switzerland	22,528	23,860	1%	1%	6%
Turkey	18,425	22,242	1%	1%	21%
Malaysia	14,372	19,594	1%	1%	36%
Vietnam	14,190	17,721	1%	1%	25%
Poland	14,455	17,096	1%	1%	18%
Costa Rica	11,882	16,290	1%	1%	37%
Hungary	11,593	13,616	1%	1%	17%
Czechia	12,770	12,962	1%	1%	2%
Singapore	9,844	11,422	1%	1%	16%
Other Countries	93,077	100,635	6%	6%	8%

Note: ^a based on 90/97 countries with reported employment in ISIC 2660 Irradiation/ electromedical equipment and 3250 Medical and dental instruments and supplies /total. ^b EU-28 total sourced from EUROSTAT, 2018. Individual European countries listed from UNIDO INDSTAT ISIC Rev 4. 4 digits.

Source: UNIDO (2016); Eurostat (2018)

While small, the global workforce is growing as demand for medical devices continues to rise around the world, increasing some 58% between 2008-2015. Growth has been modest (<10%) in more mature production locations during this period,¹⁸ with the exception of Germany, where employment grew by 20%. Non-traditional manufacturing hubs such as Singapore, Brazil, and Malaysia grew the fastest, with their sector workforces each growing by over 50% in the same period,¹⁹ as medical devices firms have expanded into new destinations to lower costs, tapped into contract manufacturing operations and access new markets (Brocca et al., 2017). Even Mexico's large medical devices workforce grew an additional 24% between 2010-2015. This growth offers developing countries a small, yet important opportunity for job creation.

Keeping up with this growing demand is challenging, however, as the workforce typically consists of skilled and semi-skilled labor. Consequently, support by an adequate set of education and training institutions is needed. Due to the fatal consequences of human error and the potential for liability suits, the quality of the human capital involved in production of medical devices is essential to business success. Indeed, human capital has been identified in certain cases as the single most important factor driving site selection in the medical devices manufacturing sector (Field Research, 2012; Kimelberg & Nicoll, 2012). Thus, remaining competitive and upgrading in the medical devices

¹⁸ The US workforce contracted by 1% during this period.












¹⁹ Malaysia growth rate measured for 2009-2015, as 2008 data not available. This was approximately 70%.

industry requires the availability of an appropriately qualified workforce for each stage (Bamber & Gereffi, 2013; Gereffi et al., 2011).

The experience and skill level of the workforce differs depending on the stage of the value chain (Table 7) (Gereffi et al., 2011). Understanding the human capital needs for these different segments of the value chain is important for assessing feasible growth trajectories for Pakistan's medical instruments sector and the human capital development policies that must be put in place to support that upgrading. Lower-value segments of the chain such as components manufacturing and assembly require a large number of semi-skilled labor and technicians performing labor-intensive operations, while higher-value segments of the chain such as R&D require a more specialized workforce, including researchers and product designers with industry experience, venture capitalists and a large number of engineers. The majority of the roles in the industry are in production together with a handful of bottleneck positions. Using the US medtech labor force as an example, the leading occupations are production (52%), office & administrative (13%) and engineering (8%). Healthcare practitioners and life sciences professionals (e.g. chemical and biology technicians) account for just 2.2% of roles in the industry.

Approximately one third of manufacturing roles require either a two-year degree, technical or vocational training plus experience in addition to up to two years of on the job training, while the remaining two-thirds require a minimum of high school and a few months to a year of on the job training (BLS, 2018; O*Net OnLine, 2018). Germany has similar requirements for its workforce, with the industry association also citing current high demand for regulatory professionals in response to the major shifts in global regulation in the sector (BVMed, 2018). Overall, the dependence on primarily high school and technical education makes the industry well suited for growth in developing countries.

Table 7. Select Job Profiles in the Production Segment of the Medical Devices GVC

Position	Job Description	Formal Education Requirements	Training/ Experience	Skill Level
Components Production & Assembly				
Grinding, Polishing, Buffing Equipment Operators	Grind, sand, polish using hand-held electrical tools or machines following basic instructions to provide final product according to set specifications.	High school diploma/ technical education	Min: On the job training Max: 1 years Experience	
Molding, Coremaking, and Casting Machine Operators	Set up, operate, or tend metal or plastic molding, casting, or coremaking machines to mold or cast metal or thermoplastic parts or products.	High school diploma/ technical education	On the job training for up to 1-2 years	
Machinists	Operate machine tools to produce precision parts and instruments	Technical education	On the job training	
Assemblers	Assemble components of medical devices into final products	High school diploma/ technical education	Experience: Need of speed and accuracy skills	
Packaging Equipment Operators	Operate or tend machines to prepare industrial or consumer products for storage or shipment.	High school diploma/ technical education	Experience: Need of speed and accuracy skills; understanding of traceability systems	
Transportation and Material Moving Occupations	Physically move materials or operate industrial trucks or tractors equipped to move materials around a warehouse, storage yard, factory, construction site, or similar location.	High school diploma/ technical education	Experience; on the job training	
Line Leaders & Production Flow Supervisors	Supervisory roles; oversee the pace of the work and ensure stoppages are minimized, monitor production levels, train new workers, and manage constant problem solving.	Technical education/ Bachelor's degree	Management skills	
Quality Control	Maintain final quality prior to distribution of product, monitored by buyers.	Technical education	Knowledge of quality systems	
Industrial Engineers/ Engineers	Design, develop, test, and evaluate integrated systems for managing industrial production processes, including human work factors, quality control, inventory control, logistics and material flow, cost analysis, and production coordination. Other engineering roles can include mechanical, chemical, biochemical and electrical/electronic depending on the product mix.	Bachelor's Degree	Management skills	
Microbiologists	Investigate the growth, structure, development, and other characteristics of microscopic organisms, such as bacteria, algae, or fungi..	Bachelor's degree	Specialized knowledge in microbiology	
Regulatory Compliance Officer	Undertakes audits of products to ensure they meet regulatory compliance of target markets.	Bachelor's Degree	Specialized knowledge in regulations of specific markets	

Source: Authors based on BLS (2018); O*Net OnLine (2018) and extensive firm interviews.

Furthermore, unlike other sectors such as textiles and apparel and electronics which are highly feminized (Bamber & Staritz, 2016), the medical devices GVC is characterized by greater gender equity in overall employment numbers and lower variation as product composition changes. Many of the leading exporters of these products have similar shares of male and female employment. In

2015, 47% of the US workforce was female (BLS, 2018); in China, 50% (UNIDO, 2016), while in Mexico, the share was slightly higher with 59% (INEGI, 2018). The female share of the workforce tends to be higher in production as compared to the overall manufacturing sectors (US: 27%; China: 40%; Mexico: 35% (INEGI, 2018), although with a lower share of senior management and ownership roles.

3 Pakistan in the Medical Device Global Value Chain

Key Takeaways

- Pakistan's historic position as a surgical instrument producer is insufficient to maintain participation in a changing global medical device industry.
- Pakistan is a small player in the medical device GVC with exports totalling US\$355M in 2016; 98% of exports are in surgical/medical instruments.
- The industry is comprised mainly of micro-small firms that rely on historic production methods. Only 85 firms reported exports above US\$1M in 2016. These firms account for over 60% of exports.
- Pakistan has several organizations and institutions to support the industry but there is overlap in activities and all focus almost exclusively on surgical instruments.
- The industry is struggling to retain a skilled workforce and invest in needed

Pakistan is a small, niche actor in the medical devices GVC with US\$355M exports in 2016 (0.1% of industry exports) (UN Comtrade, 2018). The country's participation in the medical device GVC is centered on precision metal instruments and is concentrated primarily in one city, Sialkot. The nation has a long history in the production of these devices, dating back to the 1940s. Following local demand by missionary hospitals in the 1920s, Pakistan began exporting during World War II and currently exports to 110 nations globally (PCA, 2018).²⁰ The combination of a historical supplier of precision metals and its low-cost labor supply have contributed to its current participation in the chain. However, the changing dynamics of the global industry – including in the mature surgical instruments niche - mean that these past drivers of competitive advantage are becoming less relevant. Pakistan has seen its medical devices exports plateau in recent years as new competitors and products have entered the market. In order to sustain its position in the industry, Pakistan needs to upgrade its processes to increase productivity, diversify its products portfolio and strengthen the industry's ties with emerging markets. The country's past success in textiles and apparel also offer an opportunity for the country to become a more significant player in the medical textiles industry. This section discusses Pakistan's participation in the medical device value chain and current trade dynamics as well as the internal industrial organization of the industry. The country's strengths and weaknesses as a participant in the medical devices GVC are also examined to determine the viability of growth.

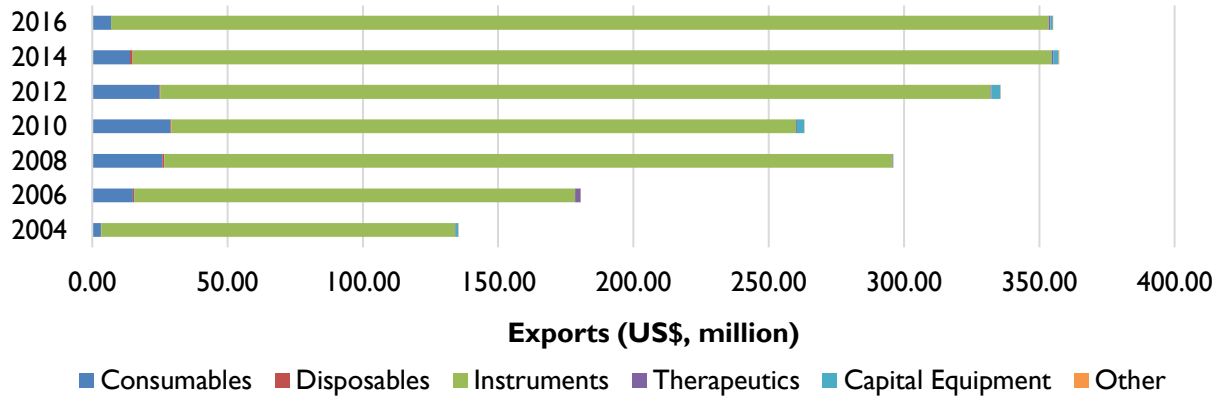
3.1 Pakistan's Current Participation in the Medical Device Global Value Chain

Pakistan's exports in the medical device GVC are primarily concentrated in precision metal instruments (Figure 7). Metal Instruments account for close to 98% of Pakistan's medical device

²⁰ Firm level data is based on Pakistan Custom's Authority data provided by the World Bank.

exports in 2016 while consumables (e.g. bandages) account for just 2% (UN Comtrade, 2018). Exports of medical devices have consistently grown over the last decade, increasing 97% since 2006, outpacing the global average of 75% (UN Comtrade, 2018).

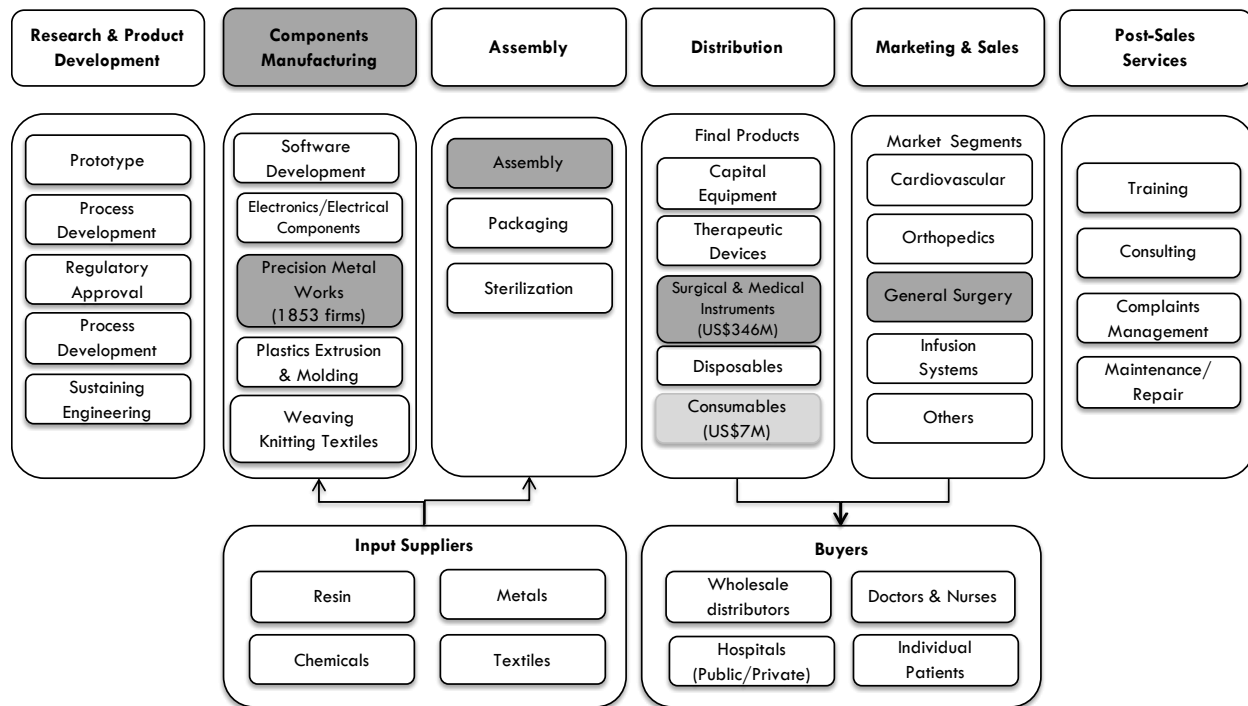
Figure 7. Pakistan Export by Medical Device Sector, 2004-2016



Source: UN Comtrade (2018). Based on HS-2002 product categories defined in Table A-1; Pakistan exports; downloaded 27/08/2018.

Analysis of exporter firm data indicates that exports have plateaued between US\$350-380M between 2014 and 2017 (PCA, 2018). Following steady growth, the industry began stalling in 2014 as more nations entered the precision metal instrument product category and Pakistan found its niche threatened. Further, as buyers in established markets shifted more towards single use instruments, buyers exerted downward pressure on prices, further squeezing producers and stalling industry growth.

Figure 8. Pakistan in the Medical Devices Global Value Chain



Source: Authors using PCA, 2018 data

Pakistan’s involvement in the medical device is concentrated in the Components Manufacturing and the Assembly segments; most products are sent on to other destinations for final packaging and branding (Figure 8). Using both domestic and imported steel (PSDF, 2016), production occurs primarily in Sialkot (PCA, 2018). This is an almost exclusively export-oriented sector, with over 95% of production exported, to over 100 markets. In the 2016/2017 fiscal year, 1,853 firms reported exports. Despite the size of the population, domestic demand is low as a result of very low healthcare expenditure (BMI Research, 2018a).²¹ As a result, even micro-firms in the industry focus on export-oriented activities.

Virtually all activity is focused on the production of precision metal instruments with little activity occurring in other product segments; instruments account for 98% of all sector exports. The top 20 medical device exporters (by value) participate exclusively in instruments (PCA, 2018). These devices are primarily mature surgical instruments classified as Class I (FDA), however, a small number of firms are also producing more advanced endoscopic instruments and accessories (FDA, 2018b). Finally, in addition to the medical sector, these products are destined to dental, veterinary and manicure/pedicure industries which have similar needs for metal products (SIMAP, 2018), although with varying regulatory requirements.

Components manufacturing. All manufacturing processes, from die casting to final components is undertaken in Pakistan, although due to the complexity of the process (Box 1; see section 2.2) only the largest firms perform all activities, with smaller firms sub-contracting different stages to

²¹ Pakistan has the lowest per capita healthcare expenditure of the Asia-Pacific region and its large rural population further complicates the profitability of the domestic market. Pakistan’s medical device sales per capita are US\$4.1 compared to a global average of US\$50 and an average of US\$39.9 in the Asia-Pacific region (BMI, 2018).

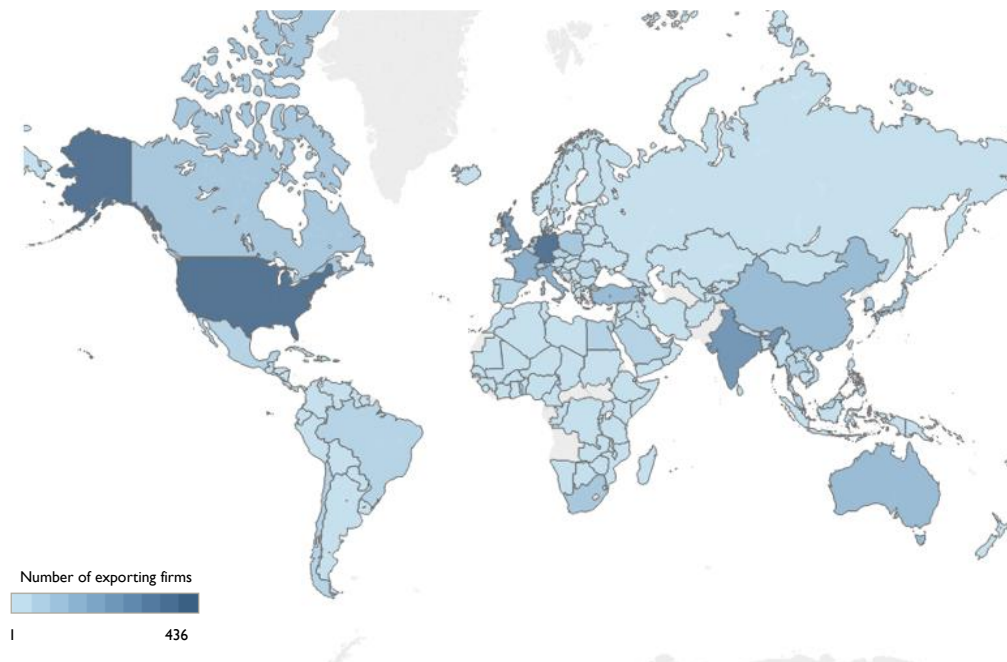
more specialized vendors in the country (Chaudhry, 2010, 2011; Field Research, 2018a). For example, most firms subcontract heat treatment and hardening process locally, with one firm undertaking approximately 90% of national orders (Field Research, 2018a).

Assembly. Assembly, packaging and sterilization activities are undertaken, although to varying degrees. Assembly and final packaging for export is limited primarily to larger firms, which provide final products for their buyers. Local sterilization is very limited, with most only using ultrasonic cleaning. Products are sterilized when they reach their final destination, before use by the end consumer. Single use or disposable instruments are an exception to this rule; these products undergo a more extensive cleaning and sterilization process prior to packaging. However, even these devices are often exported to other markets for final sterilization and packaging before being sent to the end consumer (Field Research, 2018a).

3.1.1 Pakistan’s Medical Device Exports

Pakistan exports medical instruments across the globe, reaching 107 nations in 2017 (PCA, 2018). Despite this wide scope in export destinations, total exports are concentrated among a small group of nations, including the US, the UK, and Germany. Further, firm size is closely related to export destinations with larger firms being most active in established markets. Market penetration into lower value export destinations is low; approximately half of these destinations is served by five or fewer Pakistani firms (FY2016/2017), while 19 nations imported medical devices from just one Pakistani firm (Figure 9). Firms exporting to new markets are often smaller in size, reflecting a limited focus on market diversification in the country (PCA, 2018).

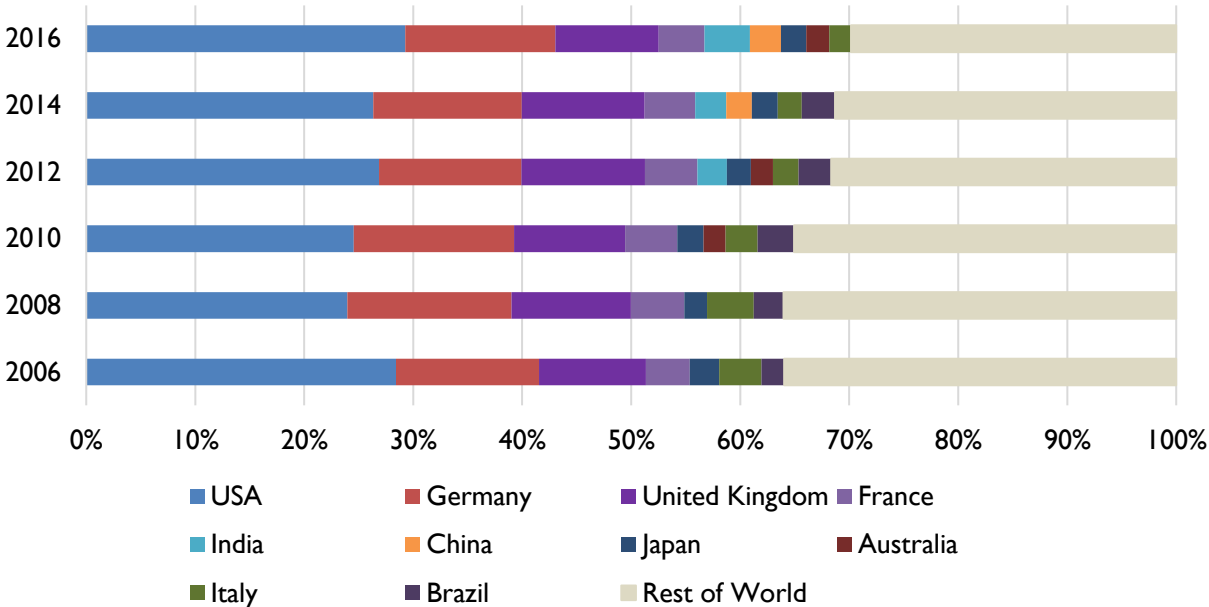
Figure 9. Pakistan's Medical Device Exports (US\$) by Exporters per Destination, 2016/2017



Source: PCA, 2018

While select markets remain the most important export destinations for Pakistan, recent shifts to regional and developing markets suggest this strong dependence on select markets may be changing (Figure 10). Traditional export markets remain key export destinations. However, new actors are rising in prominence. The US, Germany and the UK are the largest export markets for Pakistan; In 2016, the US accounted for 29% of exports while Germany and the UK accounted for 14% and 9% respectively. The share of total exports among these nations remained relatively stable over the past decade, with export value increasing to US\$101.5M in 2016 for the US, a 164% increase between 2004-2016. Germany grew 148% during the same period while the UK rose 242% (UN Comtrade, 2018).

Figure 10. Pakistan’s Medical Devices Export Destinations (% of total exports), 2006-2016



Source: UN Comtrade (2018). Based on HS2002: 90184, 90185, 90189, Retrieved 7/27/18

While the traditional export destinations remain stable buyers for Pakistan, the emergence of trade partners in regional markets and developing economies suggest future growth markets. For example, exports to India have grown significantly in the last decade. Prior to 2012, no surgical instrument exports were reported to India from Pakistan but by 2016, it accounted 4% of total exports, US\$14.5M. Similarly, China, with no Pakistani imports prior to 2014, accounted for 3% of total surgical instrument exports from Pakistan in 2016 (UN Comtrade, 2018). These new markets are growing faster than the country’s traditional partners; from 2014-2017, the growth rate of exports to China was 69% and India 19% compared to 4% in the US and an overall export growth rate of 3% (PCA, 2018).

Pronounced differences exist in market orientation based on firm size. Exports from larger firms are overwhelmingly represented in US–destined exports, while smaller firms are seen serving the

EU market. Of the leading export firms²² from 2014-2017, 96% exported to the US while 81% exported to Germany and 70% to the UK. Nearly half of the exports of the largest exporters (>US\$5M) were destined to the US in 2016 (PCA, 2018). Smaller firms focused more on EU and smaller regional markets where regulations have been less stringent and lower economies of scale are required. Export destinations for smaller firms are also less concentrated, with the top three markets comprising 31% of all exports for firms under US\$500K (Table 8).

3.2 Industry Organization

The medical instruments cluster in Pakistan consists of a few medium sized firms and several micro and small, family owned firms. The majority of firms are small with minimal participation in the GVC. In the 2016/2017 fiscal year, only 11 firms reported exports greater than US\$5M while 74 reported exports above US\$1M. These firms account for nearly 60% of exports (Table 8). Two thirds of firms had exports above US\$10,000 but less than US\$100,000 for the same year (PCA, 2018).

Medium firms are able to meet stringent regulations of international buyers and meet larger volume demand. They also have invested in new technologies and have machinery onsite. These firms tend to be structured and employ outside workers, using modern machinery, compared to smaller firms which are frequently family operations with multigenerational histories in the industry. Some of the largest firms, such as QSA Surgical have sophisticated operations due to their historic partnership with global firms in the 1990s (Field Research, 2018a; Nadvi, 1999).

Nonetheless, even smaller firms are well established with annual exports. 61% of firms exporting in 2016/2017 also registered exports in the previous two years and these firms account for 94% of all exports. The average exports for firms in FY2016-2017 was US\$251K; however, the median exports that same year was just US\$50,250, illustrating the prevalence of small exporters (PCA, 2018).

Table 8. Firm Characteristics, 2016-2017

Firm Size by export value (US\$)	Number of Firms (% of firms)	Share of Exports	Key Markets (% of exports)
Exports Over US\$5M	11 (<1%)	22%	United States (48%) United Kingdom (12%) Germany (10%)
Firms Between US\$1M<x<US\$5M	74 (3%)	37%	United States (30%) Germany (17%) United Kingdom (8%)
Firms Between US\$500K<x<US\$1M	134 (7%)	11%	United States (26%) Germany (13%) United Kingdom (11%)
Exports Under US\$500K	1686 (90%)	29%	Germany (12%) United States (11%) United Kingdom (8%)

Source: PCA, 2018

²² Leading export firm is defined as being one of the top 20 exporters by value for any one year during the three-year period between 2014 and 2017. In total, 27 firms meet this threshold.

Due to their role as small contract manufacturers and with a limited domestic market, firms in Pakistan's medical device sector are largely captive to global lead firms and buyers. Power in the chain is concentrated among large global brands and these brands often partner with larger firms in Pakistan who can meet both quality and quantity expectations for export destinations. Even these firms, however, have limited power and often must comply with buyer demands in terms of inputs and production specification. Further, producers report facing downward pressure on prices from many buyers with unit prices declining over the last few years as buyers capitalize on a competitive local market (Field Research, 2018a). This is further exacerbated by an expanding global supply of producers.

Despite efforts to improve the quality and reputation of surgical instruments in Pakistan, the nation remains a supplier of unbranded instruments. Instead, products are exported abroad for final branding, limiting the value that Pakistan receives from GVC participation. While the cost of Pakistani surgical instruments is considered to be very competitive, for a variety of reasons such as perceived lower quality, many firms are unable to directly market their product. As a result, intermediaries, frequently in Tuttlingen, Germany buy and sell Pakistani products at a high markup. One firm reported that once exported, distributors sold instruments produced in Pakistan at over 100 times the price they paid to Pakistani firms. The price markup was attributed to marketing and branding which was largely absent among domestic producers (Field Research, 2018a).

Currently, there are no global firms operating in Pakistan. This is due not only to quality concerns, but difficulties doing business in the country. Previously, Becton, Dickinson and Company had operations in Lahore, but closed its facility in 2016. As a result, the industry lacks the MNC presence seen in major offshore production locations. This has limited Pakistan's potential to boost upgrading into other product segments beyond its historical position as a precision metals supplier as has happened in other countries in the industry.

Beyond firms, several public and private institutions, most based out of Sialkot, provide support to the industry, albeit limited (see Table 9). The most prominent institution is the industry association, Surgical Instruments Manufacturers Association of Pakistan (SIMAP); SIMAP works to help promote the industry domestically and internationally. In addition to providing a list of members, which serves as a potential sourcing directory, it promotes trade and the industry abroad and handles trade disputes among members. It recently opened a Community Manufacturing Center (CMC) to help small producers overcome major productivity challenges (see Box 4 for more detail). Finally, it provides the final quality control of all exports produced in Sialkot, via its Sialkot Material Testing Laboratory (SIMTEL) established in 2001; SIMTEL ensures the correct steel is used and the instrument meets minimum specification (Field Research, 2018).

In addition, the Sialkot Chamber of Commerce and Industry (SCCI) also supports the industry by serving as a liaison between government and businesses, as well as promoting the local industry. In order to export, firms must be affiliated and registered with at least one of these bodies with most firms registering with both SIMAP and SCCI (SCCI, 2016). Additionally, the Metal Industries Development Center (MIDC) supports producers via training programs that focus on quality control. It also has a history as a monitor of quality within the nation though it is not currently functioning in this capacity.

Table 9. Key Industry Stakeholders in the Medical Device GVC

Actor	Description	Role
Surgical Instruments Manufacturers Association of Pakistan (SIMAP)	Industry Association founded in 1958 to promote the industry; in 2018, SIMAP had 3,600 members	Promotes industry domestically, operates training programs and oversees quality among members
Sialkot Chamber of Commerce and Industry (SCCI)	Established in 1982, the Chamber represents export-oriented industries in Sialkot; 2241 medical devices members	Serves as a liaison between members and the government relating to business issues
Metal Industries Development Center (MIDC)	Center charged with helping promote quality control in the surgical instruments industry	Oversees community manufacturing center and provides training as needed
Trade Development Authority of Pakistan (TDAP)	Government authority that oversees global trade and export promotion	Helps promote exports of all industries, including surgical instruments
Pakistan Standards and Quality Control Authority (PSQCA)	Pakistani Authority that oversees standards in the country	Certifies firms ISO 13485 in Pakistan and communicated international standards to local actors
Technical Education and Vocational Training Authority (TEVTA)	Punjab regional workforce development body	Develops and administers a curriculum to train workers in surgical instrument field
Institute for Surgical Technology	Institute to help train workers in the surgical instruments sector	Provides training on activities critical for the surgical instruments sector such as die making, heating, and machining
Sialkot Material Testing Laboratory (SIMTEL)	SIMAP ran laboratory that test metal composition of instruments	Performs chemical analysis of metals for all exported instruments to ensure it meets industry standards and provide analysis to consumer

Source: Authors.

3.3 Upgrading and Industry Evolution in Pakistan’s Medical Device Global Value Chain

Pakistan has been an exporter of surgical instruments since the 1940s. It solidified its place as a global cluster for metal instruments manufacturing but has since made only modest advancements in the introduction of mechanized processes, the manufacture of other products categories or upgrading into new stages of the value chain.

Key progress is beginning in several areas of the industry: (1) improved access to technology for small firms, (2) process upgrading through increased certification, and (3) entry of high performing firms into more complex products within the surgical instrument category, as well as in therapeutics.

Strides have been made to increase access to new technology among smaller firms. Most notable of these is the Metal Industries Development Center (MIDC) and other community manufacturing centers (CMC) that help smaller firms gain access to machinery and technology (Box 4).

Box 4. Community Manufacturing Centers

A key development to assist micro and small firms producing surgical instruments in Pakistan is the use of CMCs. The growing global requirements for production using higher technologies, coupled with limited ability of firms to access the finance needed to invest in capital technologies the region has led to the creation of CMCs to empower firms. CMCs are community centers where firms can access the necessary machinery for production, allowing them to accept larger and more sophisticated orders. These facilities help firms to overcome funding challenges while encouraging the growth of the local cluster.

Several CMCs are active in Sialkot. Notably, the MIDC operates a CMC at its facilities where machines are available for firm use as well as for training. These machines cover many production processes and include advanced technology, including computer numeric control (CNC) machines for large volume or technical orders. In September 2018, SIMAP opened a new CMC facility to provide members an additional resource to meet the needs of global buyers and remain competitive.

Source: Field Research (2018)

Along with increased access to technology, process upgrading is occurring as more firms earn internationally recognized certifications. 421 local firms held ISO 13845 certifications for medical devices in 2016, a required threshold for exporting to developed markets (ISO, 2017). The number has grown consistently over the last decade increasing 205% since 2006 (ISO, 2017). The increase in ISO certification indicates a growing number of firms see value in meeting global standards and show potential for GVC participation.

Finally, with over 70 years of experience in the industry, Pakistan is tentatively expanding into new product categories of the medical device GVC and related supplies. Several firms export medical textiles and disposables while some firms are moving into more sophisticated surgical instruments, such as laparoscopic and endoscopic devices. The rise in specialty instruments is the result of two factors: established participation in the industry allowing firms to expand into new, more sophisticated production; and the formation of specialized sub-clusters within Sialkot. Villages around Sialkot often focus on select subsectors of the industry, allowing for specialized knowledge creation and the development of advantages allowing firms in these areas to operate in niche production. Finally, some large firms are entering into implantable devices based on their long history in the industry, entering into a higher value product segment. While limited to a few firms, with low exports, the move to implantable devices demonstrates some product upgrading is occurring.

3.4 Human Capital

Human capital in Pakistan's medical device sector is primarily semi-skilled workers who perform various production tasks for surgical instrument manufacturing. Entry into the workforce requires basic education, below completion of high school, and development of metalworking skills. With a few notable exceptions, most of the estimated 150,000 of workers received initial training at home with family members training young workers on basic skills, additional skills are then learned at the job site. Capacity building for surgical instruments is a lengthy process. Historically the primary transfer of knowledge occurred among family members and began at a young age. This model, known as the *shagirdi* system, centered on skilled workers imparting knowledge on the craft among younger workers for up to ten years (Ilias, 2006). Training occurred within the factories and most entering the workforce had low levels of formal education.

In the 1990s, pressure from the International Labor Organization (ILO) and others to stop child labor spurred a move away from this traditional training model and human capital development has become increasingly institutionalized. Most notably, actors such as the Technical Education and Vocational Training Authority's (TEVTA) Apprentice training center (ATC) and curriculum from the MIDC have helped to formalize education, a crucial step to ensuring long term growth.

Despite this important step forward, the industry faces several challenges regarding human capital, primarily the shortage of skilled labor. Recruitment to the sector is challenged by concerns of the dangers of factory work, particularly in the polishing segment of production. Instead, young workers are entering into service sector jobs that are seen as more prestigious and safer. TEVTA mentions that many training facilities on their campuses remain inactive due to lack of demand. The result is a shrinking supply of labor for factories.

A second constraint to securing skilled labor is the shift towards global labor norms for the sector. This shift moves the organization of work away from traditional, family centric models towards factory models. Firms following global norms more frequently enforce minimum age regulations and also require minimum levels of education and training prior to beginning production (Field Research, 2018a).

Finally, social and cultural norms often limit employment opportunities to males (Field Research, 2018a). Overall, even though global employment in the industry is generally balanced between men and women, gender employment trends in Pakistan deviates as a result of cultural norms. The workforce is overwhelmingly male, a departure from other nations active in the GVC. At most, females comprise less than 5% of the workforce with many firms reporting no female workers (Field Research, 2018a). Furthermore, female participation is limited to select careers, such as packing, engineering and administration.

Several reasons are cited for the lack of female participation. First, female participation in the workforce in Pakistan is generally low, particularly in more culturally conservative cities such as Sialkot; females comprise only 25% of the labor force, even among women with high levels of education (Tanaka & Muzones, 2016). The social norm is for females to only enter into acceptable service-sector professions and because males are considered the primary breadwinners, employers should give priority to male applicants (Tanaka & Muzones, 2016). Second, the perceived danger of the factory work involved in surgical instrument production discourages female participation on the production line. Finally, when firms did introduce females into production lines, issues among male workers made such a shift difficult to sustain. As a result of these challenges, the industry in Sialkot will likely remain male dominated for the foreseeable future.

3.5 Advantages and Constraints

Pakistan's potential in the Medical Devices GVC in general, and the surgical/medical instruments product segment, in particular, depends on a set of structural strengths and weaknesses, elaborated in Table 10. These strengths allow for strategic opportunities that should be capitalized on. At the same time, the threats presented below must be addressed for the country to improve its position in the industry.

Table 10. SWOT of Pakistani Medical Device Industry

Strengths	Weaknesses
<ul style="list-style-type: none"> • Low cost labor • Wide range of instruments • Institutionalized capacity building • Geographically concentrated production 	<ul style="list-style-type: none"> • Low levels of industry coordination • Poor integration with global lead firms • Low productivity • Limited certification among firms • Quality Concerns
Opportunities	Threats
<ul style="list-style-type: none"> • Increased mechanization can boost productivity • Growing demand from emerging markets – particularly China • Upgrading into minimally invasive production • Expansion of medical textile and disposable activities • Several related industries with growing demand 	<ul style="list-style-type: none"> • Shift towards minimally invasive surgery • Increased regulatory compliance requirements in existing markets • Political uncertainty

Source: Authors

3.5.1 Advantages

Pakistan’s advantages in the medical device industry revolve around its capabilities to produce a wide range of instruments and its low-cost labor force. It also benefits from its established history in the industry as a niche supplier of precision metal instruments. Finally, the high level of customization helps distinguish it amongst competitors. The following sub-section expands upon these strengths.

1. **Low Cost Supplier.** Low cost is the main factor driving Pakistan’s competitiveness. Stakeholders often state that it is the cheapest producer globally of surgical instruments, making it attractive to many buyers. Low cost of production is closely tied to labor costs in the country. Pakistani per capita yearly earnings across various industries, including medical devices, is US\$1,870 (Lopez-Acevedo & Robertson, 2016). This is much lower than other Asia Pacific nations, such as Vietnam whose annual per capita manufacturing earnings are US\$3,340 or Malaysia’s per capita earnings of US\$8,030 (UNIDO, 2016).²³ Pakistan’s low-cost reputation is also tied to the small, cottage organization of the industry. However, it is important to note that the industry is stigmatized by a perception of child labor as a contributor to low costs.
2. **Wide Range of Instruments.** Pakistan is able to produce over 10,000 types of instruments, covering a large portion of the surgical instruments market (Chaudhry, 2011). Beyond the surgical instrument sector, these products are also used in the veterinary, dental and beauty sectors. As a result, the capability to cater to a wide product line attracts buyers from multiple industries.
3. **Institutionalized Capacity Building.** Pakistan has decades of experience in surgical instrument manufacturing. Recent efforts such as the MIDC and TEVTA’s ATC have begun

²³ Wage figures come from various sources and variation in data collection and analysis methods may skew reported wages.

to capture the lessons of this traditional family-based apprenticeship and formalized training to create a clear path for a better prepared and more sophisticated workforce.

- 4. Geographically concentrated production.** Sialkot is a strongly formed surgical instrument production hub. Virtually all participation in the medical device sector is located here, allowing for easier transfer of knowledge and institutionalization. At the same time, the emergence of sub-clusters around Sialkot focused on instruments for select specializations, such as optometry or neuroscience helps to strengthen the industry by allowing for pockets of specialized knowledge.

3.5.2 Constraints

Nonetheless, there are multiple challenges to Pakistan's potential to upgrade and grow in the sector; some of these have become particularly pronounced in recent years. A lack of integration with global lead firms combined perceptions of low-quality, impact the nation's competitiveness. Additionally, low productivity and lack of coordination undermine overall sector competitiveness while limited certification among firms and low levels of contract enforcement create issues for industry actors. Combined, these constraints have undermined the country's ability to develop a national brand and reputation.

- 1. Low levels of industry coordination.** Despite being an established cluster with an active industry association, the industry is not coordinated to optimize competitiveness. Contracts are often not enforced at the local level creating an absence of trust and stakeholder frequently cite poaching of clients as a problem. Further, despite compulsory membership, many producers cite that industry assistance offered by SIMAP privileges a narrow set of firms with limited impact on the majority of firms. As a result, actors do not work towards common goals within the industry.
- 2. Lack of integration with global lead firms.** Pakistan is not closely aligned with the global medical device firms. Prior to the 2000s some firms did form joint ventures with global firms, but these partnerships have since dissolved. As global firms increase their market share, this significantly impacts the country's potential to upgrade. Furthermore, Pakistan is often ranked low on measures of business-friendly policy environments. Pakistan currently ranks 147th out of 190 in the World Bank's Doing Business ranking, with scores consistently below the regional average (World Bank, 2018a). As seen in section 4.1 below, both Malaysia and the Dominican Republic have been able to attract investments by lead firms to help spur industry growth. Political uncertainty also presents a threat to attracting global firms.
- 3. Low productivity.** Productivity as a major constraint, with limited uptake of mechanization. Frequent electrical shortages and the inability to invest in modern machinery reduces the ability of producers to improve production processes and increase productivity. Access to equipment is further constrained by high import duties; some stakeholders cited import duties of up to 120% for select machinery.
- 4. Limited certification among firms.** Few firms in Pakistan have the certifications needed to export to key markets. Only 148 firms have FDA approval for export to the US; further, only 1/4 of firms have ISO 13485 certifications, a requirement for export to most markets

(ISO, 2017). It is crucial to help more firms earn the requisite certifications to participate in the global market.

- 5. Quality concerns.** Pakistan's surgical instrument industry suffers from an image of lower quality products in the global market. As a result, buyers often prefer to source from other clusters. SIMAP does provide some quality control, but checks are often limited to verifying the type of metals used in production. No established quality control beyond this occurs by a third party prior to export.

4 Lessons for Pakistan's Upgrading in Medical Device from Global Experiences

For Pakistan to successfully establish a position for itself as an integrated player in the medical devices GVC, it needs to upgrade its current operations. By adopting new technologies, producing a new product or engaging in an entirely new set of activities, upgrading can also allow actors in the GVC to capture more value from their participation (Humphrey & Schmitz, 2002). These upgrading trajectories are frequently not only led by country governments, but also by firms. Table II summarizes the critical upgrading trajectories that have typically been pursued by countries in the medical devices GVC. While Pakistan has already successfully entered the value chain establishing itself as a player in the cost-driven, mature surgical instruments segment, unpacking each of these global upgrading trajectories is important to understand how the country's current participation in the chain can contribute to future growth potential.

Table II. Upgrading Trajectories in the Medical Devices Global Value Chain

<p>ENTRY INTO THE VALUE CHAIN</p>	<p>There are several paths to entry into this GVC: (a) host country to MNC subsidiaries (e.g. Dominican Republic), (b) through local suppliers becoming contract manufacturers to foreign firms (e.g. Pakistan, Malaysia), or (c) local firms entering directly into regional or global market (e.g. China). These pathways share a common characteristic; countries typically enter with one or two product lines and ramp up to meet productivity and market requirements over a fixed period of time. In (a) and (b), the transfer of a new product to a production facility can take up to 24 months. For the first 12 months, the facility must produce “as is;” no modifications can be made to the production process.</p>
<p>PROCESS UPGRADING</p>	<p>Production can be shifted from manual to mechanized or automated assembly, barcodes can be introduced to track inventory and output (e.g. identifiers for traceability) and the plant layout can be improved to facilitate improved productivity. Plants may adopt certification processes such as Six Sigma and lean manufacturing to improve just-in-time delivery, and reduce down time. Obtaining ISO 13485:2016 certification helps firms to align their operations and quality standards with a growing number of global markets, including US, EU, Japan, Australia, and Taiwan.</p>
<p>PRODUCT UPGRADING</p>	<p>Product upgrading can take place within one product family, e.g. from simple catheters to complex IV tubing, or it may involve moving into production of a new and more complex product family, e.g. from a Class I to a Class II or III devices, with considerably more regulatory and production complexity & increased need for quality control due to the life sustaining nature of the product. For example, as precision machining capabilities of US contract manufacturers in the surgical instrument segment grew, firms moved to metal implantable devices. These draw on the same manufacturing capabilities; however, they are subject to stricter regulatory controls.</p>
<p>FUNCTIONAL UPGRADING OEM TO OBM</p>	<p>A supplier develops capabilities in the product segment by manufacturing under contract for a lead firm brand. Over time, the firm identifies new opportunities to sell direct to market, hiring marketing and sales teams. This step requires not only establishing the firm’s new brand but also regulatory compliance in the market. This upgrading trajectory can bring a supplier into direct competition with its initial buyer. An alternative path is for the supplier to purchase or license the brand from their buyer. It also requires firms to establish numerous post-sales services, such as “complaints handling” which is critical for regulatory compliance.</p>
<p>VERTICAL INTEGRATION AND BACKWARD AND FORWARD LINKAGES</p>	<p>Developing forward and backward linkages helps to reduce the time and cost of inventory in transit. By vertically integrating production sites, facilities can avoid lost time caused by unforeseen delays in the logistics pipeline, such as port strikes, weather delays, as well as allowing the firm to adjust production specifications quickly during early manufacturing stages. For example, the addition of labeling and packaging operations, along with sterilization facilities can help to shift into direct distribution. Costa Rica used this latter strategy to diversify its end markets.</p>
<p>CHAIN/ INTERSECTORAL UPGRADING</p>	<p>Using the capabilities developed in one sector to move into a new sector. For example, the Dominican Republic, a major textile and apparel exporter to the US in the 1990s, saw its market share begin to drop as sourcing shifted to Asia. Local and foreign firms tapped into the skills of workers in this segment to move into medical textiles, producing surgical drapes, slings and wraps amongst others, as well as sutures. By 2016, medical textiles generated 12% of the country’s exports.</p>
<p>GEOGRAPHIC END MARKET UPGRADING</p>	<p>Entering into new higher value or volume end market segments, resulting in increased returns for the firm. For example, the FDA regulations make the US market a particularly complex one to enter; however, the country also accounts for approximately 40% of global market share making it an attractive target market. As regulations change, countries can also seek to “downgrade” to serve regional developing markets that might have lower regulatory requirements but high volumes. This downgrading move can simultaneously drive functional upgrading as distribution center capabilities are developed locally.</p>

Source: Authors.

4.1 Case Studies

In analyzing different prospective paths for upgrading for Pakistan in the medical devices GVC, it is useful to look more in depth at specific examples from countries facing similar questions of how to add value to their domestic sectors. Two cases were selected for further examination:

- **Dominican Republic** offers a compelling display of growth via programs to strengthen the attractiveness of its export processing zones (EPZs), coupled with investments in workforce development to leverage its cost-competitive labor force. These initiatives drove investments by foreign and domestic firms, allowing the Dominican Republic to diversify its product mix and enter new markets.
- **Malaysia** provides an example of strong entry into the medical device GVC by capitalizing on lessons from other industries. Following a long history of supplying latex surgical gloves, Malaysia expanded into a variety of medical device products. Initiatives aimed at diversification were supported by a highly coordinated approach with several institutions supporting the industry.

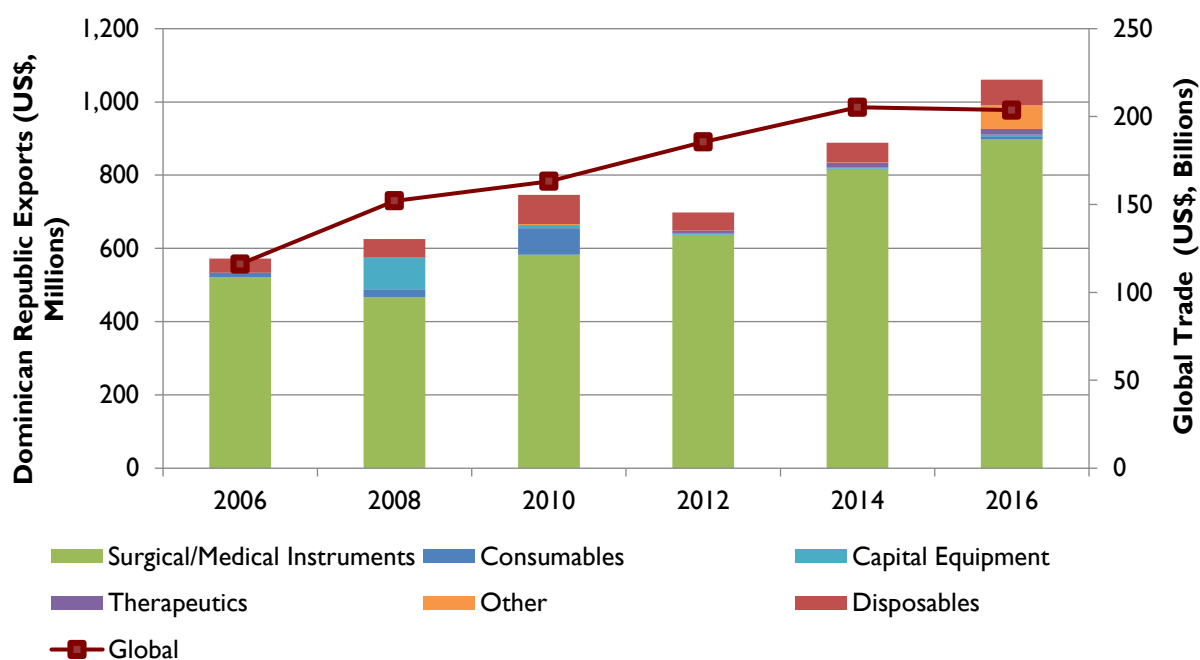
4.1.1 Dominican Republic

Over the past decade, the medical devices sector in the Dominican Republic has grown in importance to become one of the leading exports, worth over US\$1B in 2016, 0.5% of the global medical device market and 12% of national export basket (UN Comtrade, 2018).²⁴ Furthermore, exports have grown faster (85%) than the global average (75%) over the past decade (Figure 11). Insertion in the medical devices GVC marks a departure from the country's previous dependence on the comparatively volatile textile and apparel (T&A) industry. Medical devices production is one of the most advanced manufacturing industries in the country; while firms generally export devices in the surgical instruments product category, output covers a wide range of devices from sutures to ostomy bags and IV sets as well as parts for capital equipment. Activities primarily focus on labor-intensive assembly and packaging, with the more established firms carrying out sustaining engineering to support productivity improvements. Sectoral employment doubled between 2006-2016, reaching approximately 20,000. The majority of workers hold permanent contracts with access to social security and health care benefits.²⁵

²⁴ Based on an estimated US\$8.7B in exports (UN Comtrade, 2018).

²⁵ Export, employment and investment information in this project proposal is based on data published by the Dominican Republic *Consejo Nacional de Zonas Francas de Exportación (CNZFE)*.

Figure 11. Dominican Republic Exports in the Medical Devices GVC, 2006-2016



Source: UN Comtrade (2018). Based on HS-2002 product categories defined in Table A-1; DR exports; downloaded 27/08/2018.

This sector is exclusively export-oriented and driving this growth has been significant investment, from MNCs as well as a few domestic exporters. The Dominican Republic began exporting medical devices with the opening of Abbott’s plant in the late 1990s. However, the most significant growth has occurred since 2008 following considerable inflows of FDI. 72% of the sector’s US\$1.1B accumulated investment has entered since 2008 while the number of firms in the sector grew by 50% (CNZFE, 2003-2016). Larger plants are mostly controlled by North American divisions of global firms²⁶ and are part of large-scale, global networks with multiple production locations, including in Ireland, Mexico, and Malaysia. These include several lead firms such as Baxter, B.Braun, Becton, Dickinson and Company, and Medtronic. There are also numerous smaller niche firms, such as Oscar (US, cardiovascular) and Remington Medical (Canada, disposables). Investments have been very stable over time; during the past twenty years, there has only been one major closure. These almost exclusively foreign operations have leveraged the country’s relatively low-cost labor force and geographic proximity to assembly low value products for the U.S. market. Exports are concentrated on the US, which accounted for approximately 90% in 2016.

The country’s successful insertion into the medical devices GVC has been enhanced via three key upgrading trajectories: (1) product upgrading; (2) market diversification; and (3) inter-sectoral upgrading. Each of these trajectories is examined in further detail below:

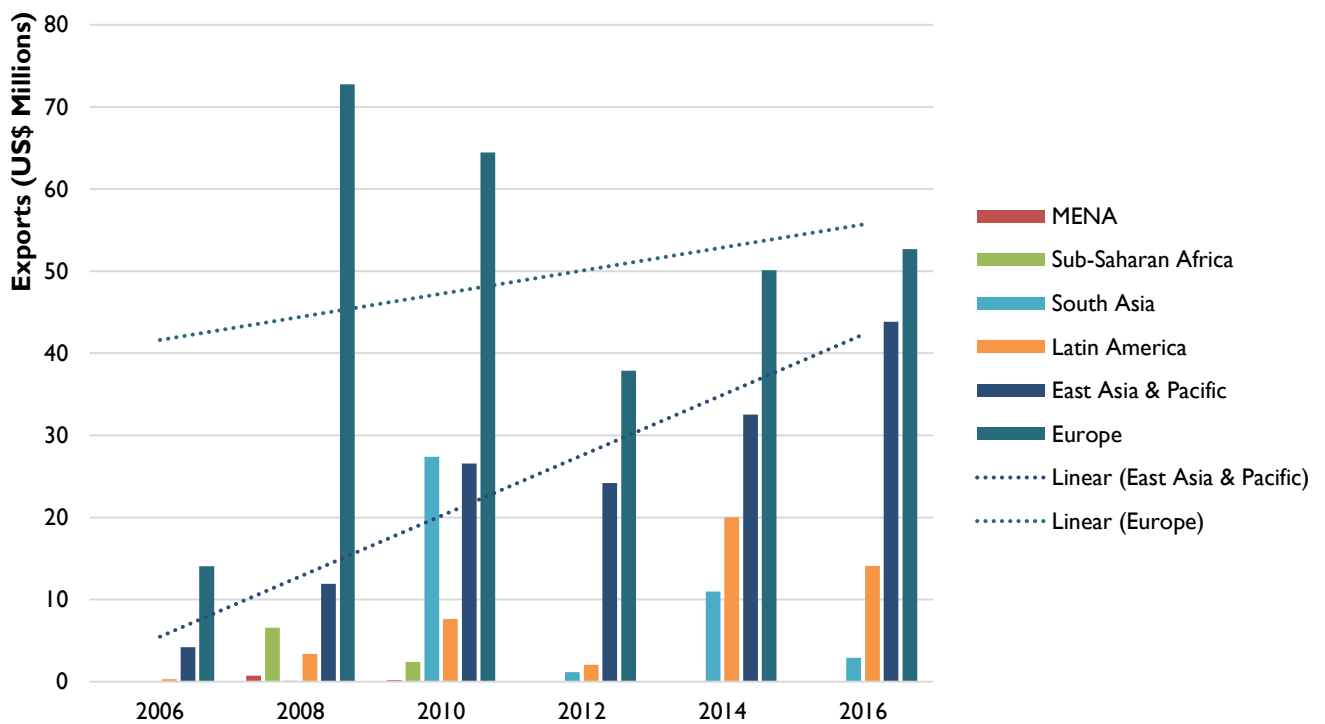
1. **Product Upgrading.** While the country’s exports are classified primarily in the surgical instrument category (HS02-901890), this obscures considerable product diversification. Firms generally started assembling one product and now produce multiple product families

²⁶ Exceptions include B. Braun, which is Germany by origin and Medtronic, which is now headquartered in Ireland. Nonetheless, the operations in the region are driven by the US divisions of these firms.

in their operations. The number of products registered with the FDA for manufacture grew close to 20% between 2017 and 2018 alone to 726 (FDA, 2018a). These products are typically high volume and the Dominican Republic plants are the exclusive global providers. Generally, the MNC operations in Dominican Republic are oriented towards lower risk products (Class I and Class II), but upgrading into new product categories has also increased in recent years as local capabilities have grown. Medtronic, in particular, notably increased the number of Class II products (FDA, 2018a) and the product segment with the highest growth rate over the past decade has been therapeutics (+9,000%).

- 2. Market Diversification.** The US remains the country’s primary market accounting for the majority of exports (~90%). However, growth to new destinations has outpaced that to the US (114%; 2006-2016); these fast-growing locations include regional neighbors, Mexico and Colombia (LAC: 4,250%), European markets (274%; Germany, Belgium, Netherlands and Italy) and five key Asian markets (1,014%; China, Singapore, New Zealand, China Hong Kong, and Malaysia). Figure 12 shows the evolution of exports to select regions. Notably, East Asia & Pacific, led by China, Singapore and New Zealand, has become a major new growth destination for the country.

Figure 12. Dominican Republic Medical Device Exports, Select Regions 2006-2016



Source: UN Comtrade (2018). UN Comtrade (2018). Based on HS-2002 product categories defined in Table A-1; DR exports; downloaded 27/08/2018. Regional groupings based on World Bank classifications World Bank (2018b). Exports to the US excluded from graph for illustrative purposes. MENA: Middle East and North Africa.

- 3. Inter-sectoral Upgrading.** In addition to expanding notably in medical instruments in recent years, Dominican Republic has seen a rise in medical textiles exports, leveraging the country’s considerable past experience in T&A (Burgaud & Farole, 2011). These include surgical gowns, bandages, straps, drapes and disposable medical bedding (FDA, 2018a). By

2016, the country was the third largest supplier of surgical drapes and towels to the US behind Mexico and China (US\$64M) (USITC, 2018). A small number of local and foreign investors export these, including lead firms in the segment, Cardinal Health and Ecolab (FDA, 2018a). This product segment typically has lower unit value prices, however, regulatory, quality and technical barriers to entry are lower.

Programs and Policies

Efforts in the Dominican Republic to support sector-specific growth are relatively incipient. Rather, the industry took root in the country organically, leveraging the country's cost-competitive labor; organized export processing zones (EPZ) with attractive fiscal incentives (World Bank, 2016); and the island's proximity to the US. EPZs in the Dominican Republic were established first for the T&A sector, however, they are not restricted; both foreign and domestic investors from any sector can take advantage of the host of fiscal incentives offered (World Bank, 2016). These include income tax holiday for 15 years (extendable), duty free imports of inputs and capital equipment and no local, land or other taxes, amongst others.²⁷ Initial efforts took advantage of the country's proximity to Puerto Rico, a former US manufacturing hub. During the 1990s, the Dominican Republic was used as a twin plant location for Puerto Rico operations, but as special tax provisions for Puerto Rican manufacturing were phased out, companies opted to concentrate production to their Dominican Republic plants (Marti, 2016). In recent years, however, as a result of its growing contributions to exports, employment and industrialization, the medical devices industry has been identified as a strategic sector for growth. In 2016, a Medical Devices cluster was formed as part of country efforts to develop an explicit strategy for upgrading.

Product Upgrading. While growth has been primarily organic, the success of existing firms has provided a strong demonstration effect for new investors. The commitment of these firms to long-term growth, in part, can be attributed to a strong supporting environment provided by a number of key stakeholders combined with a capable, cost-competitive workforce.

- **Strong institutional support from EPZ organizations.** The Dominican Republic is one of the world pioneers in the use of EPZs to promote inclusion in the global economy (Burgaud & Farole, 2011). Its first EPZs were launched in the 1960s and 1970s. The main institutions supporting these zones include the *Asociación Dominicana de Zonas Francas* (ADOZONA), an industry association representing all firms in the EPZs, and the *Consejo Nacional de Zonas Francas de Exportación* (CNZFE), a council which reports directly to the President's Office. These two organizations, along with the primarily privately-owned industrial parks, collaborate extensively in promoting investment, coordinating industry stakeholders and providing investors with extensive after-care services to facilitate their operations in country. In addition, CNZFE and ADOZONA have been instrumental in supporting the creation of the new Medical Devices Cluster. Other initiatives carried out by CNZFE include match-making events and certification support to help integrate local supporting firms such as packaging suppliers into the value chain (World Bank, 2016).
- **Workforce Development initiatives.** Much of the growth over the past decade has relied on the pools of available human capital with high school degrees, combined with a small

²⁷ These incentives, however, are on par with those of other regional locations such as Costa Rica, and thus are considered a necessary, but not sufficient condition for attracting firms to the industry (Field Research, 2017).

group of engineering and technical personnel and experienced management staff. Today, with over 15 years in the industry, an important share of senior management at the MNC plants is local.²⁸ Three key initiatives have helped streamline the supply of human capital to support industry needs:

- **Formal channels for EPZ operator employment.** Each industrial park operator maintains a list of approximately 200 qualified applicants for operator positions from which member firms are obligated to hire and salaries are consistent across firms. Park operators thus essentially serve as recruiters for their tenants.
- **Engagement by technical institutions to train operational staff.** While many companies run in-house training programs, a new Medical Devices Operator Program has been created by the national technical institution, INFOTEP,²⁹ in collaboration with human resources managers from medical devices firms. This 60-hour course focuses on issues of working in a cleanroom, documentation, working for an MNC, as well as technical skills such as materials handling. In 2017, approximately 150 students graduated from this course with very high initial placement rates in the industry.
- **Support to increase supply of highly qualified staff through allocation of scholarships and development of electives at the tertiary level.** Relevant subject areas for the medical devices industry are now eligible for graduate degree study abroad scholarships under a government-funded program (Ministerio de la Presidencia de la Republica Dominicana, 2017). In addition, in 2018, four new elective courses were developed at INTEC (*Instituto Tecnológico*) in collaboration with the new medical devices cluster for undergraduate engineering students., Firms provide employees to serve on the teaching staff. While these are new initiatives, these efforts have helped to signal to investing firms that the country is proactively managing human capital development for future upgrading needs, encouraging long term planning.

Market Diversification. The most relevant efforts towards market diversification have been transversal, focused on the country's inclusion in trade agreements with the US and the EU as part of broader regional blocs and ensuring lower tariff access to other markets. Although the medical devices sector varies in its reliance on preferential or free trade agreements (FTA) to provide tariff free enter into markets (Bamber & Frederick, 2018),³⁰ firms value the investment and business environment fostered as a result of having these agreements in place. This is particularly important for smaller companies with a limited global production portfolio. There was a notable increase in smaller operations investing around the time of the signing of the FTAs with the US (Central America FTA-Dominican Republic (2006)) and Europe (CARIFORUM-EU³¹ Economic Partnership, 2012) (Bamber & Frederick, 2018). These less globalized firms have a lower capacity to manage the risk associated with foreign investments, and thus tend to favor locations with additional institutional protection. Other efforts towards market diversification include participation in promotional activities such as the large industry trade fairs in the US and Germany and improving

²⁸ These managers have generally worked in the large MNC operations such as Baxter and Hospira.

²⁹ All firms in the country are required by law to contribute 1% of salaries into a common skills development fund; 35% of this fund is earmarked for training in the EPZs.

³⁰ Most favored nation (MFN) tariffs for many of these products are 0% in major markets including the US, EU, and China (WITS, 2018).

³¹ Forum of the Caribbean Group of African, Caribbean and Pacific States (CARIFORUM).

logistics. The country has two ports near Santo Domingo, providing redundancy for shipping operations; piloted single window customs operations; and launched a new logistics cluster (July 2017) improving support for a diverse number of shipping operations.

One notable, recent sector-specific initiative, however, is the attraction of third-party medical device sterilizer, Cosmed Group, that announced it will open operations in the same park as B.Braun, Becton, Dickinson and Company, Cardinal Health and Oscar (CZNF, 2018). This will support exports directly to market.

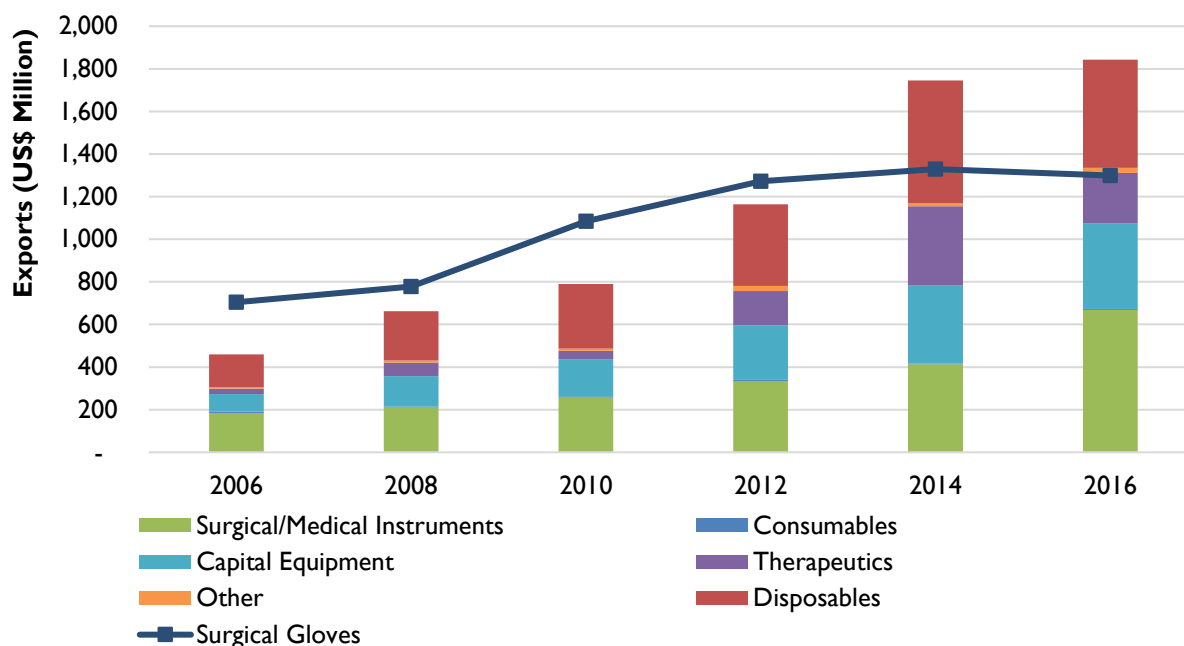
Intersectoral Upgrading. The decline of the apparel sector, which saw exports decrease by 50%, and employment to shrink from 120,000 to 44,000 between 2003 and 2016, put pressure on policymakers to identify new sources of export revenue generation and employment. This helped spur the creation of the medical devices cluster to help guide industry growth. However, there was no explicit policy for leveraging the capabilities honed in the T&A sector to drive medical textiles growth. This was rather opportunistic, facilitated by the geographic co-location of numerous T&A firms in the same EPZs as medical devices firms.³² When the former shut down, certain medical device firms saw an opportunity to hire the talented workforce with years of fabrication experience and leverage these for the medical textiles sector. Rather than have to teach operators how to sew, they only had to teach the specifics of the medical device products and how to operate under regulated conditions.

4.1.2 Malaysia: Leveraging Experiences in Related Industries

Malaysia is a growing producer of medical devices, exporting US\$1.8B in 2016, representing 1.1% of total global exports (AMMI, 2016; UN Comtrade, 2018), growing considerably faster than the Dominican Republic (85%) at 301% since 2006. Malaysia had its most notable growth in therapeutics, capital equipment and surgical instruments growing 852%, 383%, and 262% respectively between 2006 and 2016. This is compared to the more established medical supplies sector, surgical gloves, that grew only 85% in the same timeframe (Figure 13).

³² Park policy of maintaining a supply of qualified operators for all firms in their parks may have contributed to this labor mobility.

Figure 13. Malaysia's Medical Device Exports (US\$) by segment, 2006-2016



Source: UN Comtrade (2018). Based on HS-2002 product categories defined in Table A-1; Malaysia exports; downloaded 27/08/2018.

The industry is largely export-oriented with growth attributable to expansions in multiple product segments. Building on an established history and reputation in the rubber industry, several decades ago, Malaysia first leveraged its industry knowledge to transition into medical supplies, focusing on latex gloves. As Malaysia solidified its place as a global supplier of latex surgical gloves, it has also expanded into medical devices product categories. While surgical gloves, and more recent catheters comprises the bulk of medical-related exports (63%), other category exports are growing. These include surgical and dental instruments, orthopedic implants, and electro-mechanical devices, among others (AMMI, 2016; MITI, n.d.).

Malaysia's participation in the medical device industry is driven by 190 firms that can be divided into three categories (Table 12). The first group consists of local producers oriented primarily towards the domestic market. A second, growing body of firms function as contract manufacturers in the country, supplying global firms and exporters located in Malaysia. These firms are especially important for the country as they have the size needed to effectively enter into global markets, with the ability to secure the necessary technology and certifications to be competitive. Finally, a smaller group of firms are MNCs with facilities in the country and domestic exporters. Many of these firms are located in two major medical device clusters one located in the northern province of Penang and another in the central province of Selangor (Joshi, 2013) The clustering of firms in specific areas further aids in the transfer of knowledge and growth of the industry.

Table 12. Malaysian Medical Device Firms by Type

Firm Type	Number of firms	Key Features
Local SMEs	~109 firms	<ul style="list-style-type: none"> • Focus on Domestic Market • Often lack international certifications • Not integrated into the GVC
Local Larger firms	~47 firms	<ul style="list-style-type: none"> • Focus domestic and international • Each have >150 employees and >US\$6M in revenue • Often partner with MNCs to enter the GVC • Fully compliant with local and international standards
Multinational firms	~26 firms	<ul style="list-style-type: none"> • Primarily focuses on export • Account for highest percentage of export revenue • Fully compliant with local and international standards

Source: World Bank 2011; AMMI 2016

The medical devices industry in Malaysia is coordinated by several actors. Two industry associations, the Association of Malaysian Medical Industries (AMMI) and the Malaysia Medical Device Association (MMDA) both represent medical device firms in the nation. AMMI, consists of 67 firms who account for half of all medical device exports in Malaysia. Members include several local and international firms, such as 3M, Becton, Dickinson and Company, Boston Scientific, B. Braun, Johnson & Johnson, Terumo, among others (AMMI, 2016). MMDA, in contrast to the outwardly focus AMMI works to promote local operators and manufacturers who primarily serve the domestic market. Beyond industry associations, the government has aided the growth of the industry most recently by naming medical devices as a key sector in the Eleventh Malaysia Plan (RMK-11), established in 2016 and providing a strategic growth plan through 2020 (MITI, n.d.)

Malaysia's growth can be divided into two key trajectories: (1) Inter-sectoral Upgrading from medical supplies, primarily latex gloves, to medical devices; and (2) Product Upgrading through diversification into new medical devices segments such as therapeutics and capital equipment. Each of these upgrading paths is examined in further detail below:

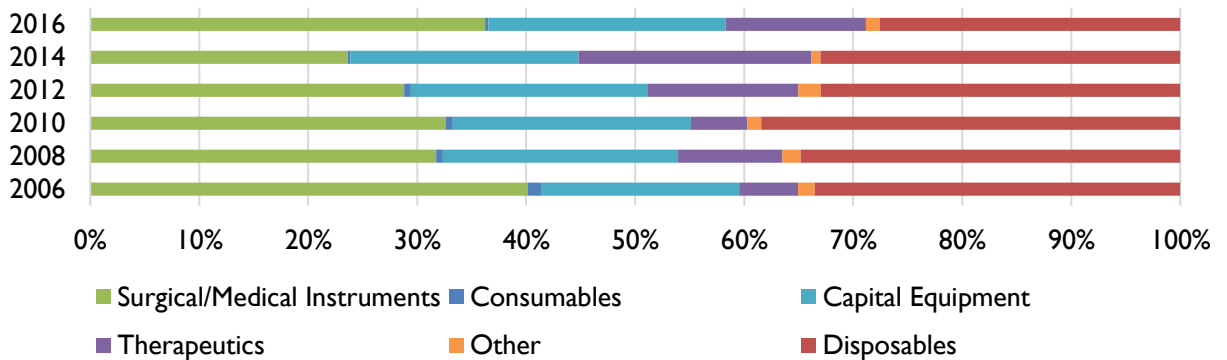
- 1. Inter-sectoral upgrading from surgical gloves to medical devices.** Malaysia's participation in the natural rubber industry helped to spur its participation in surgical gloves (Daly et al., 2017). After solidifying its position as a natural rubber exporter in the 1980s, Malaysia began to engage in manufacturing activities, producing latex gloves (RJA, 2011). Over time this industry grew with 105 firms participating in export-oriented latex glove production in 2014 (MIDA, 2014). Capitalizing on success in the surgical gloves industry, and the knowledge and capacities learned from surgical gloves, Malaysia shifted into the medical device industry. Initially, firms leveraged experience in latex rubber to move into other medical plastics, producing disposable kits and blood transfusion tubing, gradually moving from domestic use to export (World Bank, 2011).

Leveraging capacities and knowledge of international certification requirements and regulatory requirements abroad, Malaysia moved further into surgical and medical instruments production. This transition was aided by both the entry of MNCs into the country and also the emergence of larger local firms who began as contract manufacturers for simple products and grew in capabilities to produce complex products, such as finished orthopedic devices (World Bank, 2011). While exports were minimal, they grew at a steady

pace across multiple categories. By 2014, Malaysia’s medical device exports surpassed surgical glove exports for the first time, indicating a successful chain upgrading.

2. Product upgrading by diversifying into surgical/medical instruments and capital equipment is notable. Beyond moving from surgical gloves to medical devices, Malaysia is also upgrading into more advanced product categories. For several decades, Malaysia has been a small, but consistent supplier of surgical and medical instruments. However, since 2006, Malaysia has consistently increased exports of therapeutics and capital equipment (Figure 14). In 2006, 5% of medical device exports were therapeutics, however, by 2016 it increased to 13% of total medical device exports, an 852% increase. Capital equipment export share also grew, albeit at a slower pace, increasing from 18% to 22% of total exports, growing 383% (UN Comtrade, 2018). This growth reflects strategic positioning and investments that allowed the country to learn from other industry activities to enter higher value product segments and improve its competitive position. The established activities in electrical components, such as semiconductors facilitated entry into medical capital equipment (Frederick & Gereffi, 2016).

Figure 14. Medical Device Export Share by Segment, 2006-2016



Source: UN Comtrade (2018). Based on HS-2002 product categories defined in Table A-1; Malaysia exports; downloaded 27/08/2018.

Product upgrading benefited from increased institutionalization via the establishment of a regulatory council and by the concentration of firms in select areas, which spurred cluster formation. Under the regulatory council, firms improve production processes and move towards international compliance, helping them better connect with global firms and integrate into the medical devices GVC.

Programs and Policies

Growth has been driven by specific programs and policies that increased both the scope and depth of participation in the medical device GVC. These policies were led both from the top-down and the bottom up. State-led programs from Medical Device Act (MDA) and the Malaysia Industrial Development Authority (MIDA) combined with the promotion of the industry by government agencies as a high growth sector further spurred growth. At the same time, AMMI and key private sector stakeholders provided strong support for growth. The major programs and policies implemented that facilitated this growth are detailed below.

3. Inter-sectoral upgrading into Medical Devices. Malaysia's established position in the surgical gloves industry provided a base for entry into the medical device GVC. By capitalizing on established abilities in latex rubber, and the subsequent move to surgical gloves, Malaysia was able to attract new investments in medical supplies. Further, attractive investment packages and the creation of EPZs helped bring demanding foreign firms into the nation, facilitating movement into medical devices. Specific program/policy the country used to help spur this movement include:

- To attract investments, Malaysia enacted the Promotion of Investment Act in 1986. Under the current iteration of the policy, foreigners are allowed to hold 100% equity in operations and are given additional tax incentives and investment tax allowances (Koty, 2017).
- In the mid-2000s Malaysia created investment programs specifically for medical devices. First, the creation of EPZs for major manufacturers, attracted surgical glove producers, and allowed local firms to expand operations. Most notably the Malaysian firm, Top Glove, expanded to 40 factories in country and abroad. It is now regarded as the largest producer of surgical gloves, which now produces additional medical supplies (Top Glove, 2018).
- The country also offered additional tax incentives for medical device and other high-tech manufacturers. These included tax allowances and exemptions of 100% for up to five years plus additional incentives after the five-year period for capital equipment investments and other reinvestments in the industry (MIDA, 2008).
- The AMMI works towards promoting Malaysia via participation in regional and global showcases and by forging links with foreign firms. Having one actor dedicated to this activity helps to streamline messaging and spur the development of a national brand (AMMI, 2016).
- Workforce development programs undertaken by public and private educational institutions cultivate a skilled workforce. These programs developed curriculum based on input from industry participants with a focus on developing firms capable of producing devices suitable for export (Hui-Nee, 2013).
- The certification and knowledge for these advanced medical supplies provided a base for firms to expand into other devices, such as catheters and simple medical instruments (World Bank, 2011).
- Investments in infrastructure and logistics helped improve efficiencies within the country and allowed for better integration into global supply chains. This includes investments in seaports, airports and telecommunications in major medical device producing regions (MIDA, 2008, 2014).

4. Product Upgrading by diversifying into multiple medical device product categories. Malaysia is growing into more sophisticated product lines, building its domestic capabilities as a medical device hub. This has allowed for advancement of domestic firms to supply MNCs and helped make Malaysia a more attractive location for global firms. Actions to help spur this growth included:

- The Eleventh Malaysia Plan (RMK-11), the strategic plan for economic growth in the country, prioritized the medical device sector as a high potential driver of economic growth. Under the program, public and private sector actors are investing US\$4.1B over four years to further growth and create 86,000 new jobs by 2020 (AMMI, 2016). Investments focus on R&D as well as improvements in education and new business ventures (MIDA, 2018).

- A tax incentive program established in the mid-2000s promoted investments in new equipment for all firms operating in the medical device sector to foster the adoption of more complex technologies, citing growing demand domestically and in key ASEAN nations, such as Singapore (Hui-Nee, 2013). Manufacturing companies receive special incentives to invest in new equipment and technologies. Firms, operating in the country can receive tax incentives totaling up to 60% of capital equipment investments (MIDA, 2008).
- The MDA strengthened patent and intellectual property right protection in the medical device field. By closely monitoring all production in the nation, it can better protect firm specific knowledge, an important consideration for many global firms. This was critical to upgrade into more advanced and innovative product categories.
- The establishment of a national regulatory council under the Medical Device Act helped to promote adoption of GMPs among local producers, creating opportunities for deeper GVC participation. Aligning with regional and global market regulations helped to strengthen linkages with foreign firms. Specific programs that helped achieve this upgrading include:
 - Stipulation that all medical device establishments register with the government and receive permission to participate in the industry. This safeguards manufacturing and quality standards (Gross, 2012).
 - Participation in the Asian Harmonization Working Party helped to align Malaysia with other regional markets in several industries, including medical devices. The voluntary working group aims to align members with best practices and facilitate sharing of knowledge towards a more standardized regulatory approach to industries. Malaysia, along with Singapore, are seen as having the most advanced regulatory environment of the ten nations in the ASEAN Medical Device working group (Field Research, 2018b).

4.2 Key Lessons for Pakistan

The Dominican Republic and Malaysia have both managed to drive their growth in an increasingly competitive GVC by using both diversification and intersectoral upgrading to enhance the economic benefits of chain participation. In both cases, valuable lessons exist for Pakistan if it is going to integrate into the medical devices GVC to a more significant degree.

1. **Establishment/use of EPZs to increase competitiveness and strengthen linkages with key global firms.** Global investors in the medical devices industry, in general, have come to expect EPZ benefits as a necessary condition for potential consideration (tax holiday, duty free imports and exports, no land /local taxes). Both the Dominican Republic and Malaysia have established strong EPZs with competitive terms to support both foreign and local firms alike. Benefits in both countries include tax holidays, capital investment promotion policies, national treatment and 100% foreign equity ownership. These EPZs have helped to support investor confidence in operating in unfamiliar business environments, and overcome constraints associated with operating in developing countries. This geographic clustering of firms has also helped to contribute to knowledge spillovers in Malaysia.
2. **Leveraging of related industries to enhance participation in the medical devices GVC.** While neither country entered the GVC based on a homegrown industry, their participation in the medical devices sector has notably drawn on capabilities developed in near-by industries. Malaysia was able to use regulatory and quality compliance and technical

experience in both rubber glove and electronics components manufacturing to launch into medical supplies and then capital equipment devices. The Dominican Republic leveraged its capabilities in the T&A sector combined with its regulatory knowledge of supplying low cost devices such as certain catheters to move into specialized medical textile products, tapping into a strong labor pool and deepening the product range offered.

- 3. Strong industry coordination and institutionalization facilitated articulation of industry growth strategy in Malaysia.** Malaysia's medical devices sector is well institutionalized through AMMI. The AMMI serves as a marketer of the industry, promoting industry growth and potential abroad and working to attract FDI. The agency works closely with the MDA to assure all actors meet minimum quality standards and helps better gauge industry activities and coordinate activities. The coordinated approach facilitates national branding initiatives and consistent messaging has led to the development of the nation's reputation as a global medical device supplier.
- 4. Workforce development has been identified as a critical element in driving product upgrading and growth.** Both countries have developed a range of programs to develop human capital for the industry, illustrating the importance of skilled personnel for the industry. These have been focused on the specific segments in which the countries are operating. The Dominican Republic has focused on operator programs combined with training a smaller number of professionals in select roles through study abroad programs and engineering electives.

5 Recommended Upgrading Trajectories for Pakistan

Opportunities for Pakistan to make strong headway into the medical device industry are limited in the short term by productivity challenges, technological and labor constraints, and limited existing capabilities beyond precision metal. These should be addressed before longer-term growth strategies are pursued. Pakistan's participation in the medical device GVC has benefited from inertia, yet changing dynamics such as shifting global demands and a declining workforce necessitate change in order for the industry to survive. Despite historical competitive advantages in surgical instruments, Pakistan is facing new challenges, with exports plateauing in 2016 and 2017 (UN Comtrade, 2018). In addition, important security concerns along with a difficult business climate make investments by MNCs an unlikely proposition in the short term. However, several upgrading trajectories in the short to medium term will help position the industry for growth in the long term. Recommended upgrading trajectories include:

Short term: Process upgrading to increase production efficiencies. The most pressing upgrading trajectory is to make investments in new technologies and training programs to increase the productivity of the industry. The surgical instrument industry is facing growing pressure to reduce cost and increase productivity while also facing labor shortages. Several stakeholders cited these issues as significant challenges to future growth in the industry. Currently, the industry is plagued by low levels of technology with manual production and slow production times. Investments in new technology can help increase production efficiencies in the industry. These investments should be determined based on a review of capabilities and where current bottlenecks exist in production. A shift towards more technologically advanced production also signals a greater demand for semi-skilled labor in order to use new machines and production tools. Training challenges are especially notable given the nature of production and the need for several years as an

apprentice before reaching full productivity in the production of precision metal instruments. By investing in training programs and curriculum to attract new workers and by continued investment in new technologies to increase productivity, Pakistan can increase the competitiveness of the industry.

Medium term: Market diversification into emerging markets with growing demand for medical devices. Despite exports to over 100 nations, Pakistan's exports remain concentrated with 52% of total exports going to the US, Germany, and the UK (UN Comtrade, 2018). Moving forward, Pakistan should seek to grow exports in emerging markets. Diversifying export market will help mitigate risk to increased regulatory changes and downward pressure on price from lead firms. Taking advantage of increasing economic partnerships and cooperation, China offers a growing market opportunity, especially considering the potential for increased economic cooperation under the Belt and Road Initiative. Other Asian markets like India, Singapore, and China Hong Kong also offer promising alternatives for Pakistan. These nations are raising healthcare expenditures, insurance coverage is expanding and demand is growing along with population. These markets also tend to have lower regulatory hurdles for entry, allowing smaller firms the chance to increase exports.

Long Term: Product diversification into new medical device segments, specifically disposables and therapeutics. The medical device GVC covers many products. Currently, Pakistan only participates on a large scale in one notable product category, surgical instruments. Successful medical device clusters around the world have consolidated their position by developing capabilities in a diverse base of products. In particular diversification into disposables, a labor-intensive segment that capitalizes on Pakistan's low-cost labor supply. A second segment, therapeutics, such as implantables, the fastest growing product segment globally. Initial upgrading into implantable devices is occurring in Pakistan among select firms but policies that help promote this trend on a larger scale will better position the nation in the medical device GVC. Pakistan should also pursue policies that encourage producers to cater to trends on the global market within the precision metal product category such as single use and minimally invasive instruments.

Intersectoral upgrading into related industries. Within Pakistan, several related industries, such as T&A and offshore services exist. Strategic partnerships can create new opportunities for deeper medical device GVC participation. Pakistan can encourage partnerships among textile and medical device firms to spur movement into medical textiles and with services exporters to provide medical IT services, such as transcription. Furthermore, given rising competition and high entry barriers for medical devices, one strategy for growth is to use the experience and knowledge from current participation in the industry to build strengths in other sectors, such as barber tools, manicure/pedicure supplies, and cutlery. This is advisable especially for firms struggling to comply with new regulatory standards and buyer demands in the medical device GVC. Further, unlike Pakistan, countries such as Malaysia, which are highly active in the medical device GVC have a strong domestic market that can support many smaller firms. Pakistan can leverage its capabilities from several generations in surgical instruments and its current activities in related fields to increase competitiveness in related metal instrument industries including potentially launching their own brands due to lower barriers to entry for new actors.

6 Appendix

Table A- I. Medical Devices Product Categories, Based on Trade Data Classifications

Product Category	Product Examples	HS Code Aggregation	HS96 Codes 6-Digit (HS02-07 changes)
Disposables	Needles, syringes, catheters, tubing, IV sets, bandages, surgical gloves	90183	901831: Syringes, with or without needles 901832: Tubular metal needles and needles for sutures 901839: Needles, catheters, cannulae etc. (medical) (changes to Catheters, cannulae & the like in HS02) 9018391010-90: Infusion equipment 9018399010-20: Infusion and transfusion of serum 9018399090: Other needles and catheters, cannulae and the like
Medical & Surgical Instruments	Dental Instruments, Forceps, Medical Scissors, Dialysis Devices, Defibrillators	90184 90185 90189	901841: Dental drill engines (expands to dental drill engines, whether/not combined on a single base with other dental equipment in HS02) 901842: Instruments and appliances, used in dentistry 901850: Ophthalmic instruments and appliances (expands to "" nes 90.18 in HS02) 901890: Instruments, appliances for medical, etc. science, nes (expands to Instruments & appliances used in medical/ surgical/veterinary sciences, incl. other electro-medical apparatus & sight-testing instrument, nes in 90.18 in HS02)
Therapeutic Devices	Artificial body parts, hearing aids, pacemakers, crutches, implants, prosthetics	9021	902111: Artificial joints (changes to 902131: Artificial joints HS02) 902119: Orthopedic/fracture appliances, nes (changes to 902110: Orthopedic/fracture appliances in HS02) 902121: Artificial teeth 902129: Dental fittings, nes 902130: Artificial body parts, aids, and appliances, etc. (changes to 902139: Artificial parts of the body other than teeth, dental fittings & joints in HS02) 902140: Hearing aids, except parts and accessories 902150: Pacemakers 902190: Orthopedic Appliances, nes (expands to appliances which are worn/carried/implanted in the body, to compensate for a defect/disability (excl. of 9021.10-9021.50) in HS02)
Capital Equipment	MRI, Ultrasound machine, X-rays, Patient Monitoring Systems, Blood Pressure Monitor	90181 90182 9022	841920: Medical, Surgical Or Laboratory Sterilizers 901811: Electro-cardiographs 901812: Ultrasonic scanning apparatus 901813: Magnetic resonance imaging apparatus 901814: Scintigraphic apparatus 901819: Electro-diagnostic apparatus, nes (expands to "" used in medical/ surgical/dental/ veterinary sciences (incl. apparatus for functional exploratory examination/for checking physiological parameters), nes in 90.18) in HS02) 901820: Ultra-violet or infra-red ray apparatus (expands to "" used in medical/surgical/dental/veterinary sciences in HS02) 90221: Apparatus based on the use of X-rays, whether or not for medical, surgical, dental or veterinary uses, including radiography or radiotherapy 90222: Apparatus based on the use of alpha, beta or gamma radiations, whether or not for medical, surgical, dental or veterinary uses, including radiography or radiotherapy apparatus 902230: X-ray tubes 902290: Other, including parts and accessories
Consumables /Medical Supplies	Bandages and dressings	3005	300510: Dressings, adhesive; and other articles having an adhesive layer, packed for retail sale for medical surgical, dental and veterinary use. 300590: Wadding, gauze, bandages ad similar (excluding adhesive dressings) impregnated or coated with pharmaceutical substances, packaged for retail.
Other Appliances	Breathing devices and other mechano-therapy devices	9019 9020	9019: Mechano-therapy appliances; massage apparatus; psychological aptitude-testing apparatus; ozone therapy, oxygen therapy, aerosol therapy, artificial respiration or other therapeutic respiration apparatus; 9020: Other breathing appliances and gas masks (excluding protective masks having neither mechanical parts nor replaceable filters)

Source: Bamber & Frederick (2018) ; see also Bamber & Gereffi (2013) for another application.

Table A- 2. Top Five Global Importers by Product Category by Value (\$US Mil), 2016

Importer	Disposables		Capital Equipment		Therapeutics		Instruments		Consumables		Other	
	Value	Share (%)	Value	Share (%)	Value	Share (%)	Value	Share (%)	Value	Share (%)	Value	Share (%)
World	34,944	17	41,704	20	51,375	25	56,074	28	7,275	4	12,240	6
EU-15+US	22,506	64.4	20,100	48.2	33,282	64.8	31,435	56.1	4,568	63	7,025	57
EU-15	14,833	42	11,478	28	24,028	47	19,781	35	3,347	46	4,035	33
USA	7,673	22	8,622	21	9,254	18	11,653	21	1221	17	2,990	24
China	1,603	5	4,671	11	2,382	5	3,018	5	--	--	449	4
Japan	1,832	5	2,566	6	2,312	5	2,546	5	197	3	645	5
Mexico	940	3	--	--	--	--	1,726	3	209	3	--	--
Switzerland	--	--	--	--	1,753	3	--	--	159	2.2	--	--
India	--	--	943	2.26	--	--	--	--	--	--	--	--
China, HK	--	--	--	--	--	--	--	--	--	--	413	3
Top Five	26,881	77	28,280	68	39,729	77	38,725	69	5,134	71	8,532	70
Pakistan	96	0.3	97	1.6	45	0.1	111	0.2	7.99	0.11	21.43	0.18
HS2002	90183*		90181*, 90182*, 9022, 841920		9021*		90184*, 90185*, 90189*		300590, 300510		9019, 9020	

Source: UN Comtrade (2018). Based on HS-2002 product categories defined in Table A-1; all exporters; downloaded 27/08/2018.

Table A- 3. Leading Importers in East Asia & Pacific

	2002	2004	2006	2008	2010	2012	2014	2016
East Asia & Pacific (US\$, Million)	10,850	15,899	19,195	24,089	29,866	37,788	39,901	41,008
	Share of Regional Imports (%)							
China	14	16	15	19	21	25	28	30
Japan	43	39	36	34	33	31	27	25
Australia	10	11	11	12	11	10	10	10
Rep. of Korea	8	7	9	8	7	7	7	7
Singapore	5	7	7	6	6	6	7	7

Source: UN Comtrade (2018). Based on HS-2002 product categories defined in Table A-1; all exporters; downloaded 27/08/2018.

Table A- 4. ISO 13845 Certification by Region, 2004-2016

	Certifications							Global Share								Growth Rate
	2004	2006	2008	2010	2012	2014	2016	2004	2006	2007	2008	2010	2012	2014	2016	2004-2016
Europe	1307	3574	7463	11034	12232	12884	14705	54%	45%	54%	56%	59%	55%	49%	50%	1025%
Middle East	54	267	286	456	723	760	834	2%	3%	2%	2%	2%	3%	3%	3%	1444%
Africa	29	37	63	104	186	164	168	1%	0%	0%	0%	1%	1%	1%	1%	479%
Central and South America	23	106	164	219	320	316	423	1%	1%	1%	1%	1%	1%	1%	1%	1739%
North America	850	2444	3033	4040	4719	5631	6185	35%	30%	21%	23%	21%	21%	21%	21%	628%
East Asia and Pacific	123	1257	1966	2480	3328	5628	6329	5%	16%	18%	15%	13%	15%	21%	21%	5046%
Central and South Asia	16	341	259	501	809	897	941	1%	4%	3%	2%	3%	4%	3%	3%	5781%
World	2402	8026	13234	18834	22317	26280	29585									1132%

Source: ISO Survey, 2017

Table A- 5. Medical Device Regulation in Major Asia-Pacific Markets

Country	Authority	Most Recent Relevant Regulation
China	China Food and Drug Administration (Ministerial level since 2013)	2014: Regulations for the Supervision and Management of Medical Devices' (Decree No 650); Announcements No. 25 and No. 74 containing 186 new standards for medical devices
India	Central Drugs Standard Control Organisation & State Licensing Authorities	2017: Medical Device Rules
Japan	Pharmaceuticals and Medical Devices Agency	2014: Pharmaceuticals and Medical Devices Law
Malaysia	Medical Devices Authority, Ministry of Health	2012: Medical Devices Act
New Zealand	New Zealand Medicines and Medical Devices Safety Authority	1981: Medicines Act
Singapore	Medical Devices Branch, Health Sciences Authority	2010: Medical Device Regulation; 2013/14: Remote Health/Telemedicine Guidelines
South Korea	Ministry of Food and Drug Safety (High Risk Devices) and Medical Device Information & Technology Assistance Centre (low risk devices)	2003: Medical Device Act (Law 6909) & 2011: Amendment (Law 10564)

Source: Authors based on (BMI Research, 2018b).

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