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The Opportunities and Risks for Achieving Sustainable Labour in a Global Value Chain:
A Case Study from Sri Lanka's Apparel Sector

Preface

Southern Voice's flagship initiative on the *State of the Sustainable Development Goals* (SVSS) has generated country-level, evidence-based analysis to enrich the global dialogue on the 2030 Agenda. SVSS is neither a typical data-driven analysis of progress nor a traditional monitoring exercise of Sustainable Development Goals (SDGs). Instead, through this research initiative, we seek to identify the 'second-generation' challenges of the global agenda along with the policy responses to address them.

Our cross-country and regional analyses show that, on the one hand, national governments have made discernible progress in designing policy frameworks aligned with the Agenda. The governments have recognised the importance of not leaving the most vulnerable behind. On the other hand, weak coordination among relevant stakeholders and lack of horizontal coherence remain as challenges in achieving the Goals. Silo approaches continue to undermine national governments' ability to address systemic problems and create the necessary conditions to end poverty for all. Paucity of financial resources, along with no changes in the allocative priorities, are symptomatic of most of the developing countries' drive towards SDGs.

With these challenges in mind, the SVSS report identifies three layers of critical action and analysis. *First,* we explore who is potentially excluded from deriving the benefits of SDG delivery within the country's contextual realities. *Second,* we recognise that the Goals are not necessarily additive (even within a holistic agenda), and delve into the links among Goals and their interconnections, so as to maximise their synergies and fend the trade-offs. *Third*, we explore the implications of the current conduct of the global institutions and policies for the national efforts to implement SDGs.

The present study aims to understand how the fourth industrial revolution has moved along the value chain and impacted workers on the apparel sector in Sri Lanka.

We hope that this piece of Southern Voice's research will enlighten the thought process of the policy community and development practitioners in their efforts towards a fuller realisation of the 2030 Agenda.

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Acknowledgements

Abstract

The Fourth Industrial Revolution (4IR), with its advanced technology, is creating new work options but also job losses and polarisation. The 4IR will impact the Sustainable Development Goals (SDGs), especially in achieving sustainable economic growth and decent work for all (SDG 8). This study uses a qualitative approach complemented by secondary quantitative data. A multi-dimensional, SDG-based, sustainable-labour lens is used to form the conceptual framework that explores how automation impacts labour, particularly low-skilled workers operating within the global value chain (GVC) in the apparel industry in Sri Lanka.

The study finds that automation in this industry has not led to the major displacement of low-skilled workers. However, it has narrowed the range of jobs while favouring high-skilled ones. The apparels sector uses GVCs to access technology and investment to gain economic benefits aligned with SDG 8. GVCs thus forge synergies between skills development (SDG 4), and infrastructure and trade facilitation (SDGs 9 and 17). These trends have negative social consequences that affect job perceptions—mainly among women performing routine manual work—due to the social stigma attached to jobs, higher stress levels, and a lack of flexibility. This is exacerbated by a lack of institutional support outside the workplace for housing, childcare, and training. This study points to challenges in the environmental domain, especially in relation to global consumption (SDG 12).

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Acronyms and abbreviations

4IR	Fourth Industrial Revolution
BoI	Board of Investment
EPZ	Export Processing Zones
FDI	Foreign Direct Investment
GVC	Global Value Chain
OBM	Original Brand Manufacturing
SDG	Sustainable Development Goal
SME	Small and Medium Enterprises
US	United States
WTO	World Trade Organization

Introduction

The Fourth Industrial Revolution (4IR) is transforming economic systems and upending traditional understandings of work and skills. The 4IR is characterised by a fusion of technologies that include artificial intelligence, the internet of things, robotics, quantum computing, and nano and bio-technology, that all allow for greater digitisation and the production of increasingly complex and high-value outputs (Foreign Affairs, 2016). It has renewed debates on the gains and losses for workers as advanced machines and technology change how they work. While technology can create new and innovative jobs, disruption will take place; job polarisation and job losses are expected (Nedelkoska and Quintini, 2018; World Bank, 2017). Disruptions are highly contextual and depend on socio-economic structures and how states, businesses, and communities respond. While gains and opportunities exist, there are also risks for developing countries. Thus, there is a need to understand how the 4IR is likely to impact workers. The types of workers at risk, at what costs, with what skilling, social protection, and worker protection measures, are all questions requiring attention. When developing countries join the fray, willingly or unwillingly, as the 4IR becomes part of development strategy, these questions will be paramount.

While the 4IR has taken hold, countries have also sought to achieve the Agenda 2030 Sustainable Development Goals (SDGs), which strive to reduce inequalities, bring about shared prosperity, and combat climate change. While Agenda 2030 recognises technology as a driving force in achieving its objectives, it is vague on the expansive reach of the 4IR and how it is supposed to interface with the SDGs. Thus, the ramifications of 4IR have not been fully explored, even though it will directly impact SDG 8—promoting sustained, inclusive, and sustainable economic growth, full and productive employment, and decent work for all—and especially affect workers at the lower end of the value chain.

In order to study the impact of 4IR on workers and how it interacts with the SDGs in country contexts, we examine automation in the apparel industry in Sri Lanka. We seek to understand how the 4IR has travelled through the value chain and impacted workers, especially unskilled or low-skilled workers. The analysis aims to explore three cross-cutting tenets of sustainable development: the influence of systemic concerns on achieving the SDGs, synergies and trade-offs among domains (social, economic, environmental, and institutional) that relate to interlinkages among the SDGs, and the ultimate objective of leaving no one behind.

Rationale for the study

The 4IR technological journey, spearheaded by smartphones and data, is causing rapid changes in the ways we live and work. Societies must embrace *creative destruction* (Schumpeter, 1942), where technology makes some jobs obsolete but also creates new ones through creativity, innovation, arbitrage, and risk. Knowledge will be the most sought-after human capital.

Automation may have a greater functional role and can aid, but also replace, human labour (Frey and Osborne, 2013; Arntz, Zierahn and Gregory, 2016).

Automation will impact certain types of labour more than others. Work is generally classified as cognitive (tasks that require more knowledge and skills) or manual (tasks that require more physical skill) (Nedelkoska and Quintini, 2018; World Bank, 2017), and is further divided into routine and non-routine work, as seen in **Error! Reference source not found.**, with examples of job types:

Figure 1. Classification of type of work

Work classification	By task	Type of work—General	Type of work—Apparels
Cognitive	Routine	Measuring, controlling, quality assurance	Cutting machine operations Quality control Merchandising & Purchasing
	Non-Routine	Engineering, advising, research, information gathering, supervising, teaching	Supply chain managers Designers Marketing and brand managers Pattern makers
Manual	Routine	Assembling, driving, fabrication, warehousing, shipping, maintenance	Sewing machine operators Garment pressers Marker makers
	Non-Routine	Guarding, serving, repairing, care work	Line leaders Tailors, custom sewers

Source: based on Fernandez-Stark et al. (2011) and typology quoted in Nedelkoska and Quintini (2018); elaborated by the authors.

Automation's impact will be greatest on work that is both manual and routine. In the manufacturing sector, this involves non-technical repetitive tasks, often using simple task-specific machines (Nedelkoska and Quintini, 2018). The next most vulnerable type of work is routine cognitive work, involving repetitive tasks that require specific technical skill or training, often with advanced task-specific machines or equipment. However, in situations where labour-intensive production is relatively cheaper, automation will be less attractive. This is illustrated by Nissan, which has heavily automated factories in Japan but opts for labour-intensive production processes in India,

where labour is cheaper than robots (The Economist, 2016). The least vulnerable work involves non-routine work, but there is a clear difference between cognitive and manual varieties (International Labour Organization, 2019). The former involves specialised education and training, social interaction, or problem-solving. In contrast, the latter involves little or no educational or training requirements. Thus, the scope of automation monotonically decreases as a function of skill level (Nedelkoska and Quintini, 2018).

Overall, there is no consensus on the scale of unemployment that could be caused by automation - only projections ranging from 47% (Frey and Osborne, 2013) to 9% (Arntz, Zierahn, and Gregory, 2016) in developed countries. However, there is broad agreement on the likelihood of long-term consequences of disruption on labour markets. *Job polarisation* and inequality will result, with a widening gap between high-skill, high-paying jobs, and low-skill, low-paying jobs (Foreign Affairs, 2016). Thus, the 4IR will define how economic ventures take place, what sort of jobs are available, and the skills they will require.

The Asia Pacific Forum on Sustainable Development (APFSD) in March 2019, and the High Level Political Forum in July 2019 noted that the impacts of the 4IR were not considered during the formulation of the SDGs. However, they will have direct impacts on achieving the targets of SDG 8, especially decent work and good working conditions. This must now be given due consideration. In the context of SDG 17, that the Forums noted that developing countries should have greater knowledge of the implications of these technologies, a better handle on access to, and control of, technologies, and better regulatory mechanisms to safeguard against the negative impacts of the 4IR.

The 4IR, Sri Lanka and the apparel industry

Sri Lanka's economic vision anticipates a move towards a knowledge-based economy (Government of Sri Lanka, 2017). This initiative is supported by a mature information and communications technology (ICT) sector. However, there is still low internet penetration with unequal access to the benefits of internet access. This unequal access is also linked to the usual pattern of labour migration from rural to urban and abroad in search of jobs – even with the digital revolution – indicating a move away from agriculture into manufacturing and service sectors. Sri Lanka is also keen to encourage more export-oriented Foreign Direct Investment (FDI) into the country. The largest export commodity at present is apparels, accounting for 62% of total manufacturing exports (Central Bank Sri Lanka, 2018). Apparel is part of a GVC that is transitioning towards high-value, knowledge-intensive processes. Hence, the apparel industry is a good case study for these complex interactions—revealing the impact of automation on workers but also how the state should adjust its policies and practices. By using a sustainable development framework, the paper also provides an analytical perspective that has not been explored previously.

Research questions

This paper seeks to identify the opportunities and risks facing low-skilled labour in an economy that is transitioning towards high-value, knowledge-intensive production in the manufacturing sector. The sub-research questions respond to three main cross-cutting areas of the SDGs:

1. How does automation integrate into the apparel sector and thereby affect the demand for, and supply of, different types of labour in Sri Lanka?
2. What are the synergies and trade-offs among the SDGs that relate to sustainable labour in the apparel sector in Sri Lanka?
3. What are the benefits and risks associated with automation for different types of labour? Who is likely to be left behind?

The remainder of the paper is organised as follows. Part 2 provides the conceptual frame and methodology; Parts 3–5 provide the analysis along the three cross-cutting themes; and Part 6 concludes with some overarching insights and policy recommendations.

Methodology

This section presents the conceptual framework, the mixed-methods approach, the corresponding data collection tools, and limitations of the study.

Changes in work, the SDGs, and defining 'sustainable labour'

A review of the literature offers two ways to understand the concept of sustainable labour. The first is the idea of a decent job; labour is understood as part of providing a secure and sustainable lifestyle. A sustainable labour market is inclusive and productive, oriented to green jobs, has healthy working conditions, and strikes the right balance between job offers and the supply of appropriately skilled workers (Larsen and Rand, 2014). This is labour beyond its income and profit values, and includes dignity, satisfaction, mental well-being, and ecological balance. In this approach, sustainable labour is positioned as integral to the functioning of the economy but is fundamentally anchored to the subjective well-being of the worker.

Another approach to sustainable labour is via the green economy. This conceptualisation focuses on jobs that are environmentally attuned, and are therefore energy efficient, resource efficient, and use green technology (Bowen, 2012). Indeed, labour conceived from an environmentally sustainable perspective is meant to transform conventional industries and orient them towards greater automation so that there is less waste and more energy efficiency. A green job is also considered a decent job, but is less concerned with actual labour value and more concerned with environmental sustainability (United Nations Environment Programme [UNEP], 2008).

In both conceptualisations we encounter a dilemma. The push for automation is entails higher efficiency and productivity, which is related to both the economic domain and the environment domain. However, as trade unions have noted, it is equally important to focus on a just transition, which reduces negative consequences for workers themselves (Cragg, 2015; Trades Union Congress, 2008). Thus, the application of a sustainable labour lens is central to the understanding of how automation will impact workers and how the system adapts to deal with that change.

The four domains

The main elements of a framework for sustainable labour are jobs that improve economic security, social inclusion, environmental sustainability and institutional processes. The latter is understood as the explicit and implicit rules that guide the behaviour of individuals for collective outcomes.

A literature review was undertaken to identify characteristics of the elements of sustainable labour, —as well as the SDGs, targets, and indicators (see Figure 2). These four elements guided data collection and the analysis of automation's impact.

Figure 2. *Characteristics of sustainable labour*

Social Domain (SDG 4, 5, 8)	Environmental Domain (SDG 12/8)
Equality of opportunity; treatment/dignity of workers; Education/skills opportunities networks **Related targets – 4.4, 4.3, 5.4, 8.5, 8.8**	Safe working environment low carbon industries **Related targets: 12.2 (reflected in 8.4 and includes 6.3 and 7.3), 12.6**
Economic Domain (SDG 8)	**Institutions Domain (SDG 17, 1/10, 8)**
Productivity Profitability Wages and income Job Security (Unemployment) **Related targets – 8.1, 8.2, 8.3, 8.5, 8.6**	Representation social safety nets/protection Trade/technology regulations /guidelines **Related targets – 1.3, 10.4, 8.8 (also social) 17.11**

Elaborated by authors

As shown in Figure 3, the conceptual framework brings together several levels of analysis, and analytical approaches. First, the broader framing of this research engages critically with the concept of sustainable labour and its characteristics (column 1 in Figure 3). It then engages with the GVC's different levels to follow how global automation filters down to the national context, through an industry, and to a worker (column 2). The circular arrows indicate that each level is not purely linear or uni-directional. Inter-dependencies exist, with backward and forward linkages in the global and local spaces of industry. Companies and workers adjust using multiple pathways. At each interface, based on the type of information needed, a different analytical approach is used

(column 3). This is guided by the three cross-cutting tenets central to this study—systemic concerns, synergies and trade-offs, and Leaving No One Behind (LNOB). These are the three main study areas linked to the SDGs. These issues are also linked, but, as seen in Column 4, will use different tools and analytical methods to draw out each.

Figure 3. Conceptual framework

Interfaces	Cross-cutting Analytical themes	SDG Domains – Sustainable labour characteristics	Tools
Global	**Systemic Concerns**	**Social** Equality of opportunity, treatment / dignity, Education / skills, networks *Related targets – 4.4, 4.3, 5.4, 8.5, 8.8*	• Literature Reviews and 15 KPIs for trend analysis (1978 – 2018). • Labour capital ratios to infer diffusion of technology
National Industry	**Synergies and Trade offs**	**Environmental** Safe working environment, low carbon industries *Related targets: 12.2 (8.4), 12.6*	• Policy and Programme Mapping for alignment • SDGs to SDGs Interactions scoring with network analysis
Worker	**Leave no one Behind**	**Economic** Productivity, Profitability, Wages and income, Unemployment *Related targets – 8.1, 8.2, 8.3, 8.5, 8.6* **Institutions** Representation, social safety nets/protection Trade/technology regulations /guidelines *Related targets – 1.3, 10.4, 8.8*	• 43 life histories of workers (gender, age, location)

		(also social) 17.11	

Elaborated by the authors

Methodological approach

A qualitative approach complemented by secondary quantitative analysis was adopted for this study. Qualitative methods allow in-depth exploration with more probing and rich textual analysis. Accessing publicly available, disaggregated, quantitative data on labour, the industries, and workers is quite difficult. In fact, much of the literature on apparel sector workers has used qualitative methods. Hence, the study uses a qualitative approach in a narrative form, and uses quantitative data when available.

- Systemic concerns: A trend analysis using literature and key person interviews was carried out to trace how FDI and other support helped integration into GVCs and the outcomes. The trend analysis covered two periods: 1978–2005 (from the opening of the economy to the end of the quota regime under the Multi-Fibre Agreement) and 2005–2018 (leading into the post-war development phase). Further, Pike et al (2006), Gerreffi (1999), and Gereffi et al. (2005) demonstrate that the movement of capital from developed to developing countries also includes technology through trade and investment work. Given that disaggregated data is scarce, the same logic is used to infer the diffusion of technology globally to industry by looking at labour capital ratios using available industry data. This information was then used to analyse how, as the apparel sector became more integrated, automation interacted with workers and what the drivers were.
- Synergies and trade-offs: A two-step method was used. First, a policy and programme mapping was undertaken to align state and industry policies and programmes with the sustainable labour characteristics and corresponding SDG targets. Data were drawn from the policy review and substantiated through interviews. This mapping exercise provides insights into what policies are aligned to what type of SDGs and how they impact different types of workers.
  Second, a network analysis was carried out using the interactions model developed by the Stockholm Environment Institute (Nilsson, Griggs and Visbeck, 2016). This was applied to the apparel sector as a whole and looked at the synergies and trade-offs among the sustainable labour characteristics and other SDG indicators that emerged during the policy mapping. A 7-point scoring scale was used to show the strength of the relationship, the direction, and the positive (synergy) or negative (trade-off) relationship. This helped to determine what combinations of characteristics had a greater influence on the sector and different types of workers. This was scored by the authors based on data gathered for this study.

- Leave No One Behind: Life histories were used to trace the pathways used by an individual, be it in education, work, or accessing public goods. Life histories offer insights into lives as lived, as experienced, as told, and as capable of being reconstructed (Dhunpath and Samuel, 2009, ix-x). Reconstruction highlights the individual agency of the respondent. Hence, it is a tool that helps examine structural factors that determine life chances and how individuals respond to specific socio-economic dynamics (Dhunpath, 2000).The interview guidelines and questions directly responded to the four elements of sustainable labour and focused largely on exploring educational backgrounds (SDG 4), work experiences and perceptions of a good job (SDG 8), and family background and commitments (SDG 5). The analysis drew on the similarities, ambiguities, and nuances—both overt and subtle—that the respondents had experienced (Locke and Lloyd-Sherlock, 2011).

Data collection

Primary data collection took place at two levels—among workers, and with industry professionals and other stakeholders directly engaged in the apparels sector (See Table 1 and 2 in the appendix).

Limitations

It was challenging to access workers in general. It was also not possible to access workers in small and medium enterprises (SME) who are integrated into the GVC. Additionally, disaggregated data on firms and large-scale quantitative data, as well as environmental data, was scarce. While the findings may not be generalisable, the qualitative approach offers insights on how the 4IR can cause displacement of workers from multiple perspectives.

Findings

GVCs fast fashion and automation: The systemic barriers affecting workers
Since the late 1970s, the apparel industry in Sri Lanka has evolved from an unsophisticated low-value-added model to a highly sophisticated high-value-added model. The early industry specialised in the "cut, make, trim" (CMT) model, which involved assembling apparels based on designs and intermediate inputs—including fabrics and accessories - that were provided by international clients (Fernandez-Stark et al., 2011). As the industry evolved, some firms were able to move beyond the simple CMT model: Original Equipment Manufacturers (OEMs) handle the entire production process, including sourcing of raw materials; Original Design Manufacturers (ODMs) also handle elements of the pre-production process like research and design; Original Brand Manufacturers (OBMs) handle post-production processes, such as marketing and are able to manage their own brands. Today, the country's largest apparel firms are indeed developing their

own brands, thereby moving from ODMs to OBMs. Evidence of the industrial evolution can be inferred from the composition of apparel exports.

Today, the industry's exports of high- value- added products have increased. This is demonstrated by its performance under certain Harmonised Commodity Description codes (HS codes): "apparel and clothing accessories; knitted or crocheted" (HS 61) and "apparel and clothing accessories; not knitted or crocheted" (HS 62). Specifically, the export performance of products that require sophisticated production, such as underwear and lingerie, has increased significantly (Figure 4 and Figure 5). These products require sophisticated production processes including extensive pre-production and post-production capabilities. The increase in high-value-added exports has led to a significant increase in revenue. As seen in Figure 6, the industry nearly doubled its revenue on these two product categories—HS 61 and HS 62—from 2.74 billion USD in 2005 to 4.74 billion USD in 2017 (United Nations Conference on Trade and Development, 2003).

Figure 4. Sri Lankan exports of apparel and clothing accessories; knitted or crocheted (HS 61)
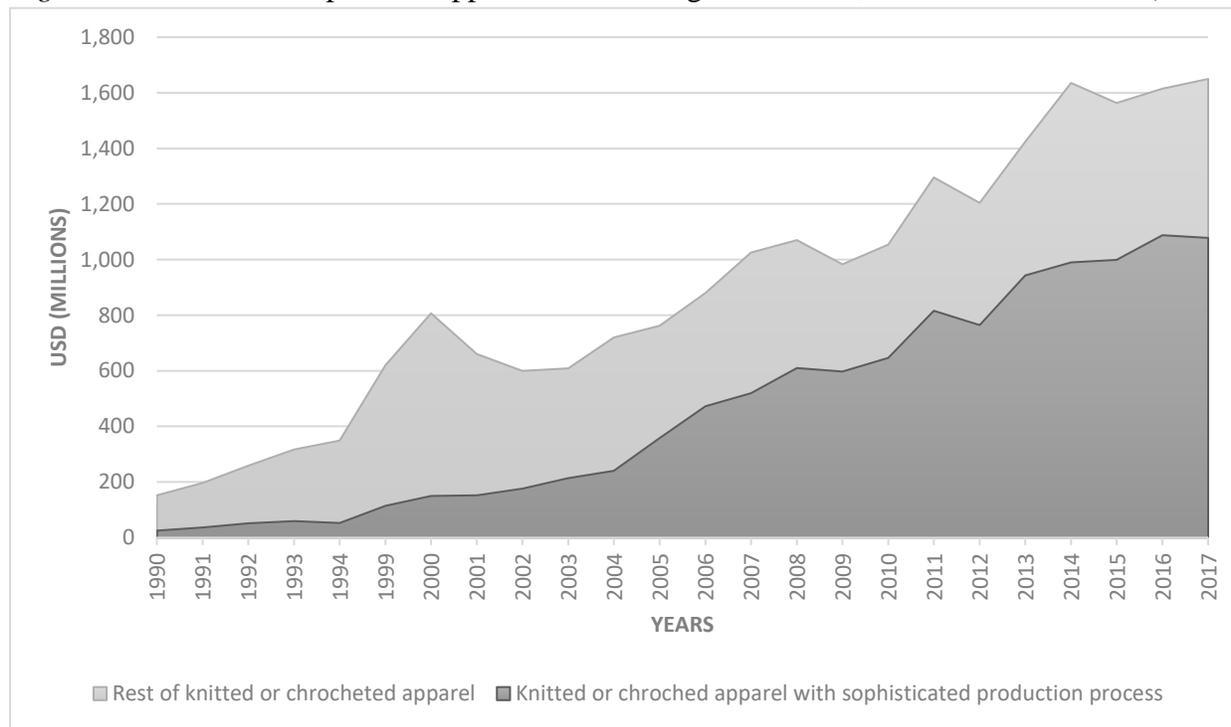
Source: DESA/UNSD statistics; compiled by authors

Figure 5. Sri Lankan exports of apparel and clothing accessories; not knitted or crocheted (HS 62)
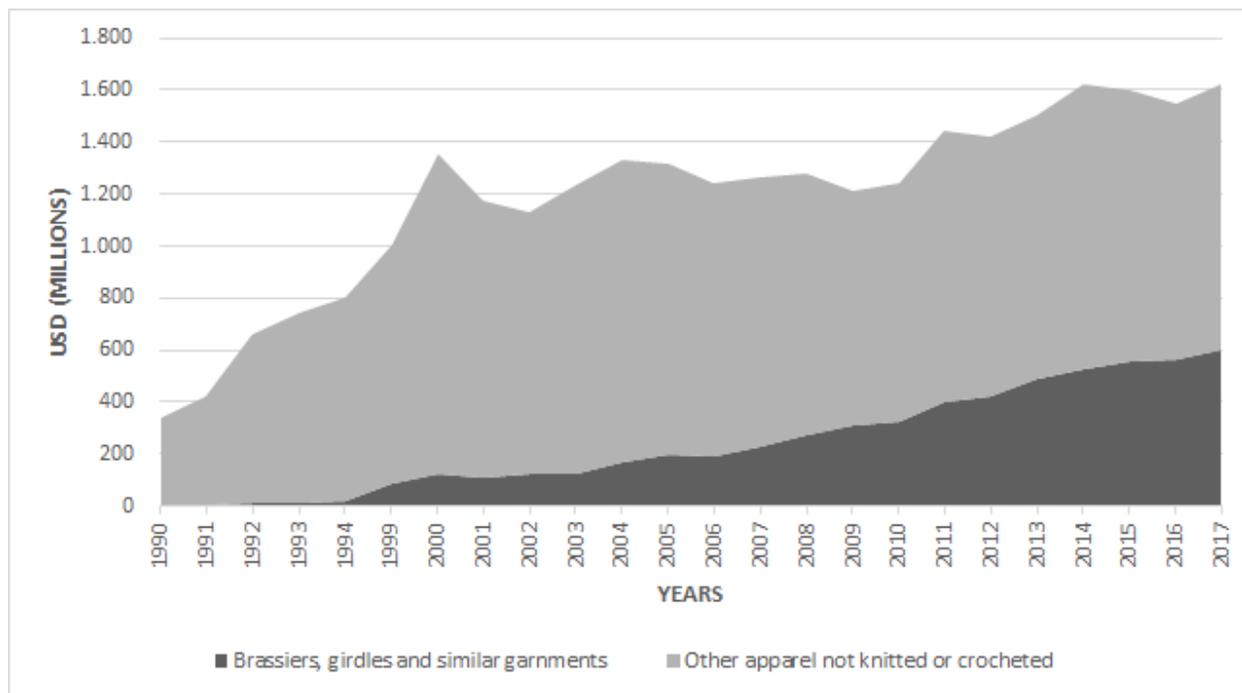
Source: DESA/UNSD statistics; compiled by authors.

The immediate causes of the industry's export performance are capital deepening and technological diffusion, both of which are influenced by the 4IR. Technology has enabled leading firms in the industry to transition from a CMT to OBM model.

While the production of apparel remains a labour-intensive process, parts have been progressively automated. Such automation increases efficiency and reduces labour costs associated with routine manual and cognitive tasks. Broader technological diffusion has allowed firms to develop new techniques to design, market, and manage complex production systems. As a result, the industry can effectively compete against other developing countries that have lower labour costs in low-value-added segments of the production process. Instead, large successful firms in the industry have a comparative advantage in the high value-added segments of the production process. This is reflected in the shift to high-value, low-volume output associated with HS codes 61 and 62. However, the access to innovative technologies and the competitive pressure to adopt these solutions emerges through GVCs.

The underlying cause of the industry's export performance and overall development is its position in the GVC. The GVC for apparels can be traced to the General Agreement on Trade and Tariffs (GATT), which later evolved into the World Trade Organization (WTO). The GATT directly influenced the trajectory of apparel supply through the Multi-Fibre Arrangement (MFA), which governed trade on textiles from 1974–2004. Following the Uruguay Round, which established the WTO, the Agreement on Textiles and Clothing (ATC) replaced the MFA (Lowenfeld, 2008). The

new agreement introduced a 10-year period to gradually remove quota restrictions on textiles and clothing products by 2005. This meant that most developing countries, including Sri Lanka, could compete for quota free access to important international markets such as the United States and Europe. The domestic policies of Sri Lanka were broadly designed to take advantage of these international developments.

Sri Lanka's early policies aimed at the apparel GVC can be traced to the late 1970s. After a brief and unsuccessful effort to achieve autarchy, the economy was opened to FDI in 1978. The Greater Colombo Economic Commission (GCEC) was established with the explicit goal of encouraging foreign investment and seeking integration with GVCs for manufactured goods such as apparels (Panditharathna & Jayatilake, 2017). In 1992, the GCEC evolved into the Board of Investment (BoI) to reflect a new investment policy introduced in 1990. The new policy enabled automatic investment approvals, removed various restrictions (especially regarding ownership) on joint ventures, allowed foreign investors to purchase up to 40% of listed companies without approval, and allowed foreign investors around the country to be situated in private free-trade zones, to boost linkages between FDI and domestic industries (Panditharathna & Jayatilake, 2017). However, the GVC itself is a response to the development of new fashion trends in the second half of the 20th century.

The GVC in the apparel sector emerged in part as a response to "fast fashion" in the US and Europe in the 1960s. The phenomenon is characterised by rapid fashion cycles that constantly update fashion trends; today, a fashion cycle—from the runway to retail outlets—can be as short as two weeks (Barnes and Lea-Greenwood, 2006; Bhardwaj and Fairhurst, 2010). Fast fashion has created a dependence on exponential growth because of the virtuous cycle of demand and supply of apparel. It has broken the barrier of exclusivity and provided greater access to brands (Ariely, 2012). As fast fashion trends generate demand for increasingly customised designs, the GVC has evolved to meet this demand.

Direct investment enabled through the GVC continues to be important to the Sri Lankan apparel industry. FDI and the various joint ventures with local firms enable capital—financial, human, and social—to diffuse.. Between 2005–2017, as demonstrated by Figure 6 total investment (z-axis) increased from 45,879 LKR million to 175,891 LKR million. Meanwhile, between 2000–2017, the export earnings (y-axis) increased from 162,533 LKR million to 657,347 LKR million. The relationship between capital investment and exports is extremely important. The correlation suggests that firms have increasingly resorted to capital investments to improve production processes. The workforce, however, only changed slightly: between 2000-2014, the workforce averaged about 285,000, peaking at 307,000 in 2009. During the same period, export earnings increased more than threefold. This demonstrates a greater reliance on technology and efficiency over time. This is also related to changes in the labour force, discussed later in this case study.

Figure 6. BoI Enterprises: exports in apparels (LKR Mil) compared to total investments, foreign investments (LKR Mil), and workers.
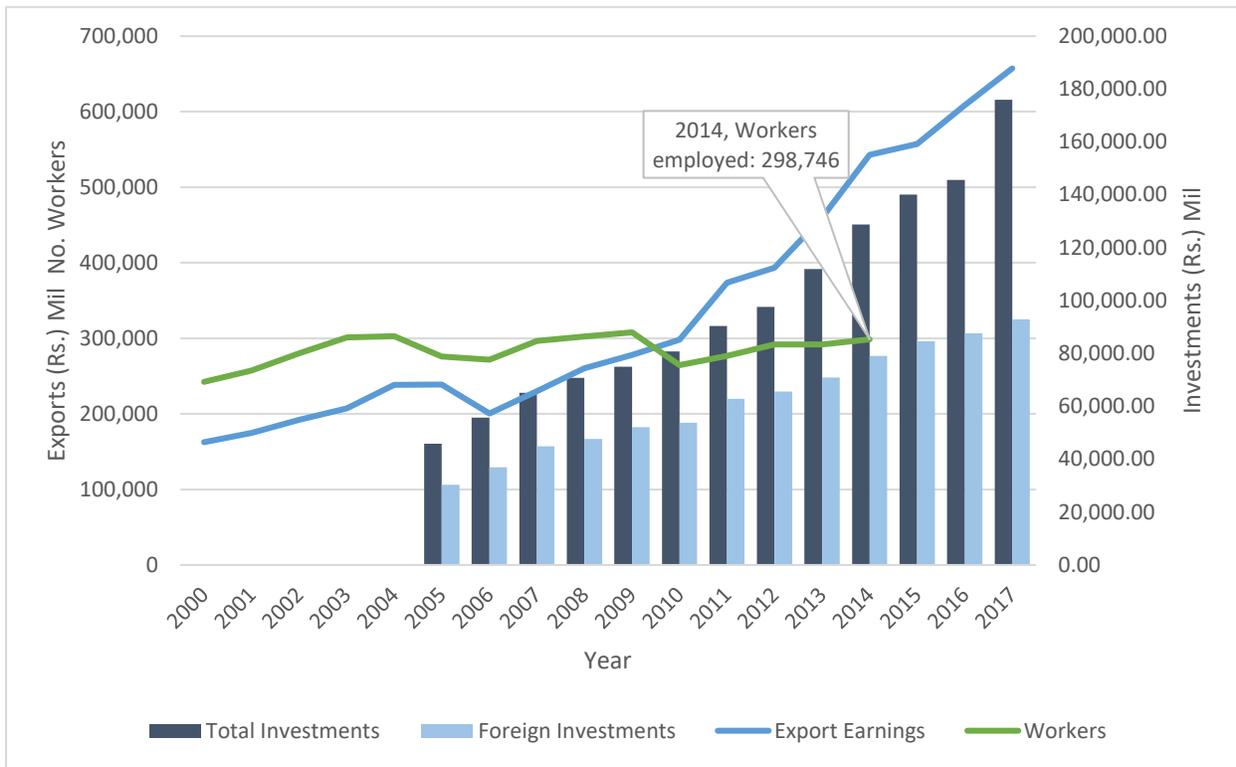
Source: Central Bank Sri Lanka (2008-2018); compiled by authors.

The current generation of FDI has shifted towards *strategic partnerships* between large apparel manufacturers and international buyers. These partnerships reflect the growing competence of local manufacturers and their increasingly complex production methods, emphasising high-skilled labour (i.e. non-routine cognitive) as opposed to low-skilled manual labour. This shift can be partially inferred by examining the foreign component of total investments. As seen in bar charts in Figure 6, in 2005, FDI amounted to about 66% of total investments; by 2017, this had declined to 52%. This is a remarkable improvement because total investments quadrupled in the same period. Thus, while the global system has diffused capital and technology to the apparel sector, the current trend in Sri Lankan apparel industry leaders is to invest in innovation and technology towards becoming a service provider.

Improvements in labour productivity are spilling over into the wider apparel industry. Capital deepening and technological diffusion help explain the sustained increases in labour productivity in national apparel industries (Figure 7). By 2015, the apparel industry seems to have fully recovered from the 2008-09 financial crisis and employment had surged beyond pre-financial

crisis levels. However, the value added of each worker has increased by about LKR 200,000 in the same period.

Figure 7. Labour productivity in apparel firms with more than 25 employees
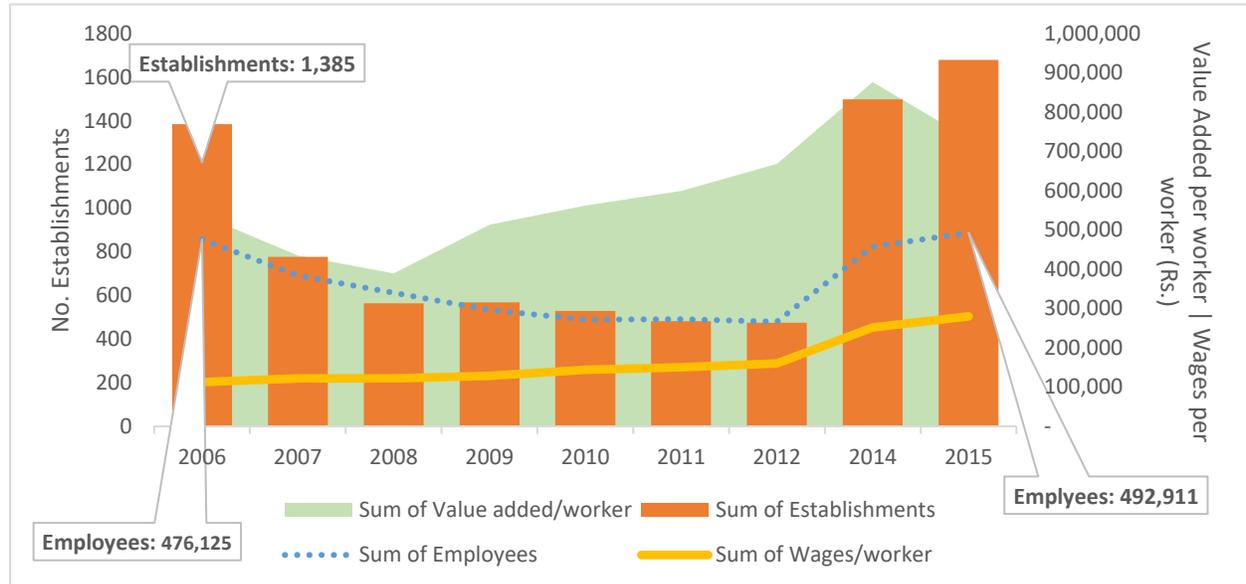
Source: Annual Survey of Industries – Department of Census and Statistics; compiled by authors

This transition to high-value outputs has not benefited everyone in the industry equally. It has resulted in consolidation that has displaced small players and prioritised larger firms. In 2004, there were approximately 817 apparel exporting firms; by 2011, the number had dwindled to 450[1]. At present, the sector is dominated by three very large players which employ over 25,000 workers, a cluster of large players, with the majority employing between 600 – 10,000[2] workers, and medium and small-scale apparel companies that employ less than 300 workers[3]. It is a varied landscape, made more complicated by different methodologies for collecting and categorising employment data. The larger firms benefit from increasing returns to scale to integrate into the GVC. They are better able to leverage capital to compensate for increasing labour costs, develop high-value outputs, and maintain strategic partnerships with lead firms. Furthermore, they are better able to meet the various compliance standards, such as those of Sedex and Worldwide Responsible Accredited Production (WRAP). This transition has also influenced the demand and supply for particular types of labour.

The transition has reduced the value-added contribution of low-skilled workers relative to high-skilled workers. Automation reduces the scope for routine work. For low-skilled workers, this

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[1] This data was made available to the authors by the Joint Apparel Association Forum
[2] Based on available firm information of members on the Joint Apparel Association Forum website
[3] This number is based on Sri Lanka's SME policy.

reduces the scope for value addition; they can only add value through non-routine manual work. In contrast, automation can assist high-skilled workers by allowing them to focus on non-routine cognitive work. As the transition towards OBMs continues, the demand for low-skilled workers will continue to decrease; meanwhile the demand for high-skilled labour in the pre- and post-production processes will continue to increase.

Interlinkages among sustainable labour domains: Synergies and trade-offs

Mapping key state policies, programmes, and industry initiatives
The survey of policies to analyse synergies and trade-offs revealed 17 policies that led to the establishment and development of the Sri Lankan apparel sector. These policies were mapped to 25 different SDG targets across the four primary domains—economic, social, environmental, and institutional (See figure 8). Important policies that emerged outside of these characteristics, such as on infrastructure (SDG 9), housing (SDG 11), and inequality (SDG 10), were categorised as "other." If there was an alignment between the SDG target and policy objectives that supported apparel industry workers, those targets were given a "yes/tick mark" as opposed to a "no/x mark" as visualised in Figure 8.

Figure 8. Policy mapping against sustainable domains/sustainable labour characteristics

| Policies	Social					Economic				Institutional				Environmental		Other							Total
	4.3	4.4	4.5	5.4	8.5	8.1	8.2	8.3	8.6	1.3	10.4	17.11	8.8	12.2	12.6	9.2	9.3	9.4	9.5	10.3	11.1	11.2	
Establishment of the GCEC/BOI to attract FDI.	✗	✗	✗	✗	✓	✓	✓	✓	✓	✗	✗	✓	✓	✗	✗	✓	✓	✗	✗	✗	✗	✗	9
State-led development initiatives such as the 200 Garment Factories Programme.	✗	✗	✗	✗	✓	✓	✓	✓	✓	✗	✗	✓	✗	✗	✗	✓	✓	✗	✗	✗	✗	✗	8
Wages Board Ordinance No.27	✗	✗	✗	✗	✓	✗	✗	✓	✗	✓	✓	✗	✓	✗	✗	✗	✗	✗	✗	✓	✗	✗	6
Factories Ordinance No.45	✗	✗	✗	✗	✓	✗	✓	✗	✓	✗	✗	✗	✓	✗	✗	✗	✗	✗	✗	✗	✗	✗	4
The National Environmental Act No.47	✗	✗	✗	✗	✗	✗	✓	✗	✗	✗	✗	✗	✗	✓	✗	✗	✗	✓	✗	✗	✗	✗	3
Tarrif reforms such as the removal of textile reforms.	✗	✗	✗	✗	✗	✓	✓	✓	✗	✗	✗	✓	✗	✗	✗	✓	✗	✗	✗	✗	✗	✗	5
Free trade and agreements and policies to secure preferential trade partnerships such as EU GSP+.	✗	✗	✗	✗	✗	✓	✓	✓	✗	✗	✗	✓	✗	✗	✗	✓	✓	✗	✓	✗	✗	✗	7
Sri Lanka Institute of Textile and Apparel (SLITA), which replaces the SLCITI and SLTTSC. Min of Industry and Commerce. - GoSL	✓	✓	✓	✗	✓	✓	✓	✓	✓	✗	✗	✓	✗	✗	✗	✓	✓	✗	✗	✗	✗	✗	11
SLITA + JAAF - Productivity Improvement Programme - PPP	✓	✓	✓	✗	✓	✓	✓	✓	✓	✗	✗	✓	✗	✓	✗	✓	✓	✗	✗	✗	✗	✗	12
SLITA + JAAF - Technical Training Programmes - PPP	✓	✓	✓	✗	✓	✓	✓	✓	✓	✗	✗	✓	✗	✗	✗	✓	✓	✗	✗	✗	✗	✗	11
Brandix College of Clothing Technology - Private Initiative (industry public good)	✓	✓	✗	✗	✓	✓	✓	✓	✓	✗	✗	✓	✗	✗	✗	✓	✓	✗	✗	✗	✗	✗	10
MAS - Management and Training Institute - Private Intitiative (industry public good)	✓	✓	✗	✗	✓	✓	✓	✓	✓	✗	✗	✓	✗	✗	✗	✓	✓	✗	✗	✗	✗	✗	10
JAAF + CIM - Dip.Apparel Marketing - Industry Initiative	✓	✓	✗	✗	✓	✓	✓	✓	✓	✗	✗	✓	✗	✗	✗	✓	✓	✗	✓	✗	✗	✗	11
University of Moratuwa - Department of Textile and Clothing Technology. MA, BS, and BA Fashion Design (in partnership with LCF)	✓	✓	✗	✗	✓	✓	✓	✓	✓	✗	✗	✓	✗	✗	✗	✓	✓	✓	✗	✗	✗	✗	11
Shop and Office Employees Act No. 19	✗	✗	✗	✗	✓	✗	✗	✓	✗	✓	✓	✗	✓	✗	✗	✓	✗	✗	✗	✗	✗	✗	6
Trade Union Act No.44	✗	✗	✗	✗	✗	✗	✗	✓	✗	✓	✓	✗	✗	✗	✗	✓	✗	✗	✗	✗	✗	✗	4
Total	7	7	3	0	12	11	13	14	9	2	2	11	4	2	0	12	10	1	3	1	0	0	

Elaborated by the authors

Figure 8 shows a clear link between policies and the economic domain. Productivity (8.1, 8.2, 9.2), GDP growth (8.1), and GVC integration through technology upgrading (8.2, 9.3) are emphasised. The social domain is clearly linked to jobs (8.5) and skilling (4.2/4.3).Some targets received no hits, which illustrates the gaps that affect women's access to work (5.4 on care work). While environmental policies exist and compliance with them is necessary, their effectiveness is difficult to estimate. These measures are not directly related to the worker but to industry compliance. Very few companies have signed on to standards such as Global Compact. In the institutional domain, many policies align to target 17.11, given the direct and indirect support for trade and exports. Interestingly, there are notable gaps in applying some policies to trade unions (8.8) that are limited in the EPZs. It is also important to note the "other" targets that were accounted for within this mapping process. These SDG targets, as explained earlier, are relevant to workers in an indirect way—in relation to decent work conditions. For example, the issue of adequate housing (target 11.1) and transport (target 11.2) for migrant workers is critical to their jobs. There were no policies that clearly supported the need for migrant workers to access housing or local government official services.

Interactions model of the apparel sector

By mapping public policies to SDG targets—as shown above—the paper illustrates the relationships between those policies and targets (see Figure 9). While these policies have emerged over the last four decades, applying a SDG framework focuses upon the priorities of those policies, and the overall sustainability of the industry. The graph help identity the synergies (green arrows) and trade-offs (red arrows) between the different SDG targets. Moreover, the graph illustrates the direction of this influence from the source SDG to the target SDG. The size of the SDG target depends on how many policies, programmes, and industry initiatives are relevant to its content (see Figure 8). The size of the arrows demonstrates the strength of the relationship between those SDG targets along the 7-point scale; the thicker the arrow the stronger the relationship. The apparel industry illustrated 135 interactions between the SDG targets.

Figure 9. Network analysis - current situation of interactions in the apparel sector
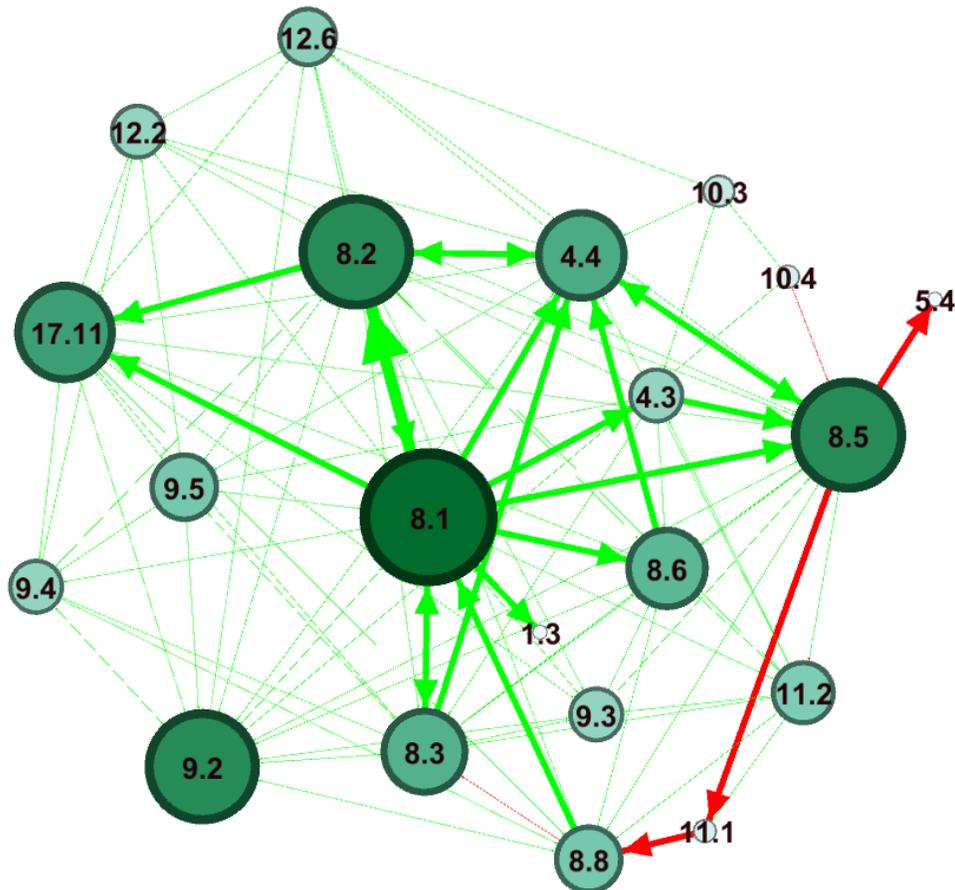
Elaborated by the authors

The mapping results and the network analysis reveal that most policies and programmes relevant to the development of the apparel sector have focused on the economic domain. This focus has

had a positive aggregate impact for both workers and the industry. The industrial upgrading process has enabled a movement up the value chain. However, while initial development benefited all types of labour, the latter stages of the industry's evolution have disproportionately benefited high-skilled workers. This is evident in the relationships between the SDG targets, especially those in the economic domain.

The synergistic relationships in this domain are centred on target 8.1, which relates to economic growth. The important policy was the establishment of the GCEC and its successor, the BoI, both of which were given explicit mandates to attract FDI through infrastructure development, regulatory concessions, and foreign partnerships (Ekanayake, 2013; Fernandez-Stark, et al., 2011). This also had a positive bi-directional relationship with target 8.2, which encouraged industrial upgrading and value-addition. Other direct economic policies that helped the apparel industry include: the removal of textile tariffs, which reduce the production costs of Sri Lankan apparels, albeit at a cost to the textile industry; State-led development initiatives such as the *200 Garment Factories* programme of the 1990s (Athukorala and Ekanayake, 2014); and diplomatic efforts to secure trade concessions, such as the Generalised Scheme of Preferences from the European Union (Ekanayake, 2013). There is also a strong relationship between targets 8.1, 8.3, and 8.6. To this end, specialised public agencies, such as the Sri Lanka Institute of Textile and Apparel (SLITA), developed close partnerships with industry to improve productivity and training. The industry itself, through the Joint Apparel Association Forum Sri Lanka (JAAFSL), also developed programmes to boost productivity, research, and industrial upgrading. However, it is worth noting that as the industry moves to high-value production, it is beginning to develop its own productivity improvement programmes; some of the largest firms have their own training institutes. This also means that the initial public policies that supported low-skill workers are not being replicated or enhanced to address the present material and institutional challenges.

The relationship between the economic domain and the social domain—especially in targets 4.3 and 4.4—reflects the continued demand for high-skill labour. Given the overwhelming role of public education, the supply of labour is dependent on the quality of schools and universities. Early government efforts focused on improving knowledge and technical skills by introducing special courses in important public universities, often in partnership with international organisations, donors, and other universities. Apart from SLITA, the best example of these initiatives is the Department of Textile and Clothing Technology, which was established in the University of Moratuwa, Sri Lanka (Fernandez-Stark, et al., 2011). The department has expanded its courses to reflect technical and managerial requirements of the apparel sector. It also has active partnerships with foreign affiliates, including the London College of Fashion. As the industry has upgraded, this demand has continued.

To help enable supply, the industry has responded by opening its own technical facilities. The industry body, JAAFSL, has also partnered with the Chartered Institute of Management (CIM) to provide a diploma in marketing, a necessary skill for high-value production.

Target 5.4 currently manifests as a trade-off or a gap. As highlighted in numerous interviews, the lack of childcare and support for women's work at home dis-incentivises them from pursuing long-term careers in the apparel sector. The lack of coherently linked policies that would enable women to commit to long-term careers is a critical issue given the industry employs such a large female workforce. However, the government's existing policies, including the Wages Ordinance No.27, the Factories Ordinance No.45, and the Shop and Office Act No.19, that reflected in the BoI labour standards and employment guidelines (Board of Investments (n.d.), have helped create working conditions superior to Sri Lankan competitors in other parts of the value chain. These initiatives, which have been bolstered by some industry initiatives by leading firms, have helped the apparel industry maintain its appeal to more conscious consumers and retailers, even as poor labour conditions have damaged the reputation of suppliers in neighbouring states. This increases the positive synergies between targets 8.6 and 8.1.

The economic domain's influence on environmental SDG targets is more complicated. Only three of the largest apparel firms have signed the UN Global Compact to reduce environmental impacts. The incentive to increase environmental sustainability is, largely, structurally determined by the GVC. Relatedly, the incentive to invest in environmentally friendly technology is mostly driven by consumer demand. But as many of industry experts noted, while most consumers may prefer apparels produced with environmentally sustainable methods, they are unwilling to pay a premium. If these investments lead to higher prices, retailers are likely to switch to other suppliers in the GVC, even if they have lower environmental standards. As a result, most firms choose to make these investments if there is also a clear economic benefit in improved efficiency. Some noted that firms are willing to invest in environmentally-sustainable technology for other reasons, even if economic benefits are not decisive. These included a desire to reduce negative externalities of production or increase the appeal of the factories to workers in the surrounding communities. The state's own environmental policies, such as the National Environmental Act No.47, help set a minimum standard. However, when examining the entire GVC, these efforts are structurally determined by consumer trends and the preferences of leading firms, especially in the US and Europe—and are more market driven (Hemachandra, 2015). An important influence is the *fast fashion* trend, which is leading to unsustainable consumption habits in the developed world. Thus, even as production becomes more environmentally friendly, it depends on a demand cycle that is less so. Today, the global industry for apparel is considered the second most polluting industry, after oil. Moreover, the industry is responsible for more GHGs than the maritime and aviation industries combined.

The relationship between institutions and the economic domain is also complicated. On the one hand, institutional reforms concerning labour rights—for example those associated with target 10.4—and national public services in health, education, and nutrition, allowed the apparel industry to access a reliable workforce. This was particularly important in the early stages of the industry's development (Lopez-Acevedo and Robertson, 2016). However, in recent times, the Sri Lankan industry has avoided the controversies involving workers in other countries such as Bangladesh, where poor working conditions have led to multiple deaths in highly-publicised accidents. These institutional advantages, however, have not necessarily kept up with the demands imposed by the 4IR. A constant complaint within the industry was that the supply of labour and public policies were inadequate to meet industry demands. Among workers, the complaints were stressful working conditions and stagnant wages. These complaints are the results of path-dependent institutional choices. There are few other industries that have integrated into the GVC, and public services—especially regarding education—have struggled to meet the demands of an internationally integrated economy. As a result, low-skilled workers are being marginalised within the GVC, but the institutions in Sri Lanka are struggling to help manage declining working conditions and increasing displacement without affecting aggregate welfare.

There is a relationship between some SDG targets that is not clearly identified in the main domains but influences their performance. For instance, targets 9.2 and 17.11 are featured prominently, indicating a web of connections. The latter is important, as the sector has contributed positively towards increasing exports from Sri Lanka and thereby enabling integration into the GVC and access to appropriate skills locally, and is thus tightly interwoven with targets 8.1 and 8.2. Industrial upgrading has made the sector more economically viable and is an important source of export income and employment (target 9.2). But the absence of strong synergies is due to the weakness in promoting inclusive *and* sustainable industrialisation, as none of the existing policies, at present, are largely focused on these features.

Finally, some significant trade-offs are noted in the social domain. Achieving full and productive employment (target 8.5) for all is not enabled when women lack the necessary care options (target 5.4). Female workers continue to be marginalised particularly because of persistent gender roles. The nature of their work within a regimented, automating factory floor does not lend itself to flexible hours nor adequate time off to respond to caregiving responsibilities. In the absence of concerted efforts by the GoSL to respond to this policy gap, care work is offered by the informal private sector and remains unregulated. Tapping into informal care options is also difficult as they are expensive and mainly concentrated in urban centres. While some factories have offered care services, this is not the norm. Similarly, for migrant workers (singled out in target 8.8 but also as part of target 8.5), the situation is further exacerbated as target 11.1 (housing) cannot be easily achieved. Sub-standard living conditions, along with concerns regarding the women's safety and access to public services, is a trade-off in relation to target 8.8.

Limitations of applying a synergies and trade-offs analysis to the SDGs

While synergies and trade-offs can be tracked across the different targets of the SDGs, this analysis becomes more complicated when considering different worker types: routine manual workers, and non-routine cognitive workers. For example, policies that create synergies for one type of worker may not do so for another. Under targets 4.3 and 4.4, initiatives offer affordable education and access to skills, in respect of both university and vocational training. Thus scoring policy implementation for all types of skill providers cannot be done with a single score.

Workers and automation: Who is at risk of being left behind?
Workers on the factory floor are the group with which the SDGs are most concerned. They have incomplete education, weak social ties, and few assets. Need, rather than choice, dictates their job decisions. This section draws primarily from the life histories of workers, supplemented with stakeholder interviews and existing literature.

Automation and productivity

Over time, new machines and processes have simplified complex tasks and reduced damage and wastage in sewing and cutting processes. Automating cutting has also helped streamline processes by reducing the time for the "inputs" to be sent to the production floor. Certain types of tasks are being automated—machines cannot completely replace the role of the worker because of the complexity of the sewing process.

As new machines have been introduced, certain job types such as 'helpers,' and some jobs in design and cutting, have become redundant. Workers have been reassigned due to labour shortages, however, some choose different options. One worker observed that:

> Before the auto cutter was brought, four had been working in the other machine and there had been three such machines. So, for each shift there were 12 workers who operated the machines so in total, there were 24 workers. Now all that work is done by a single auto cutter machine. Some had resigned, others had joined other garments [factories]. That's because they were removed from the position of cutter here. Some had gone abroad for work (Male, auto cutter operator, resident, 22 years).

According to CSO and union representatives, wages earned can significantly reduce, hence, workers choose to leave. But in such instances, their ability to find work elsewhere is limited due to their lack of transferable skills. They either engage in lateral migration or seek work overseas in other factories.

All the workers surveyed were earning the same or a slightly higher basic salary stipulated by the Wages Ordinance, as also reflected in other studies (Jayaweera, 2003; Ruwanpura, 2015,

Gunawardana, 2014). In line with the Wages Ordinance, the basic income varied based on the number of years of experience and the grade of skill but, regardless, does not constitute a living wage—a factor emphasised in the literature (Ruwanpura, 2016), and by CSO and union representatives. In addition, the workers' "take home" wages included incentives paid for targets and a monthly attendance bonus paid to discourage absenteeism. According to industry professionals, 40% of the wage constitutes the basic wage for which workers receive statutory benefits (Employees Provident Fund/Employees Trust Fund). The remaining 60% comes from incentives. Workers' ability to gain a greater income is dependent on team effort—as incentives depend on the final output of the entire production line. This puts pressure on the workers to outperform each other and to 'keep up.'

The provision of incentives to the entire line has impacts in different ways. On the one hand it can build team spirit and commitment. But it can also strain relationships among co-workers, as the slowing down of one worker risks the loss of the incentive to the whole group. Another worker noted that:

> We are of course paid an incentive and that is to the whole line. But if there are faults and errors, the incentive is cut by as much as 25%. So then there are tensions in the line and people blaming others. At times I am sick of this work, you know, especially when we cannot finish the work. It is really frustrating. I am, at times, sick of all of this. So much to do at the factory and when I come home, there is more to do! (Packing, female, resident, 40 years, 22 November 2018).

This also puts a strain on each worker's relationship with the supervisor. Workers reported being "scolded" both by the supervisor and fellow line workers when they fall behind.

The focus on the collective rather than the individual also helps self-regulation—a dynamic discussed by Gunawardana (2014). If an individual wishes to take leave, this has to be discussed with others in the line to minimise the risk of absences on the same day. While such practices may be informal arrangements, they reflect the degree of pressure placed on the worker to maintain a speed of work that helps them reach targets with minimal interruptions.

The push to produce faster, and more efficiently, is palpable in some of the recent physical changes made to the factory floor. Machine operators in some factories are now moving between two to three machines to complete different tasks in the sewing process. This requires standing for the duration of the shift. From a managerial perspective, this re-structuring minimises workers' feelings of isolation, breaks the monotony of work (Wijesekera, 2017), and is allows workers to complete their tasks more efficiently (International Labour Organization, 2019). Employers contend that the health implications of standing and working for 8 hours or more is reduced by providing appropriate flooring (Wijesekera, 2017), while industry professionals interviewed stated there are mandatory breaks every two hours with chairs for resting. But there has been contention

over the use of these machines among workers. Some more experienced female workers feel that it adds more stress and are considering exiting from the sector if the factory floor is restructured completely.

> There are more machines than we had before. Previously we would sit and sew. Now we are walking [about] and sewing. And now we are standing. I can work with about three machines now, but have to walk from one machine to another. It is better to sit and sew than stand and sew[...] about a half is standing and working. Finally, the whole factory would be standing. That is what we hear (Machine operator, female, resident, 32 years, 22 November 2018).

This new method has also reduced the number of workers in a single line. The "extra" workers are used to create a new production line, thereby helping to increase output. It echoes the argument of the employers that such modes of operation help workers to be more efficient. However, the push for increased productivity and the pressure to meet targets does not necessarily yield adequate compensation for workers. Thus, automation within this GVC, while increasing efficiency, is also threatening enthusiasm to stay in the job at the lower end.

Working conditions

Workers generally enjoyed good working conditions—infrastructure and benefits—that improved with the scale of the firms. This included opportunities to reskill, for upward mobility and for promotions. In general, labour rights were protected but with restrictions on freedom of association and collective bargaining, because trade unions are not as effective within the EPZs. Instead there are Joint Consultative Committees (JCCs) within each factory that provide a more limited space for workers.

Despite these relatively "good" working conditions however, workers' concerns regarding their jobs are more fundamental. Their worries are derived from the imposition of a rigid work culture, lack of flexibility, and the monotony of their work—that comes mainly from the need to meet targets, lead times, and incentives. The persistent focus on achieving targets was cited as a reason to leave workplaces prematurely even when such work was compensated financially or otherwise. While opportunities exist to move up the career ladder, there was a great reluctance to take up such opportunities. The reasons varied from lack of time to improve skills due to work and home duties (common among women), limited educational background (common among men), and unwillingness to take on the pressure that comes with higher levels (i.e. supervisors). The commensurate wages were not considered adequate to compensate for assuming more pressure— from both workers and management. These concerns emerged when workers reflected on their perceptions of a "good job":

> A good job is something like, say when I wake up in the morning, my mind should be relaxed with the recognition that I am going to this place to work. What I mean is, there

should be a liking towards the working environment. One should also like the job and the people in the workplace. I would place the income as important only after these because that working environment should be good enough for us to work and earn a salary (Cutting operator, male, resident, 40 years)

Flexibility and freedom, and being treated respectfully and humanely, were all emphasised as important, for women especially. In addition, men cited the importance of a wage scale that provided due recognition to their labour.

Migrant workers

Figure 10. Life history of a female migrant worker
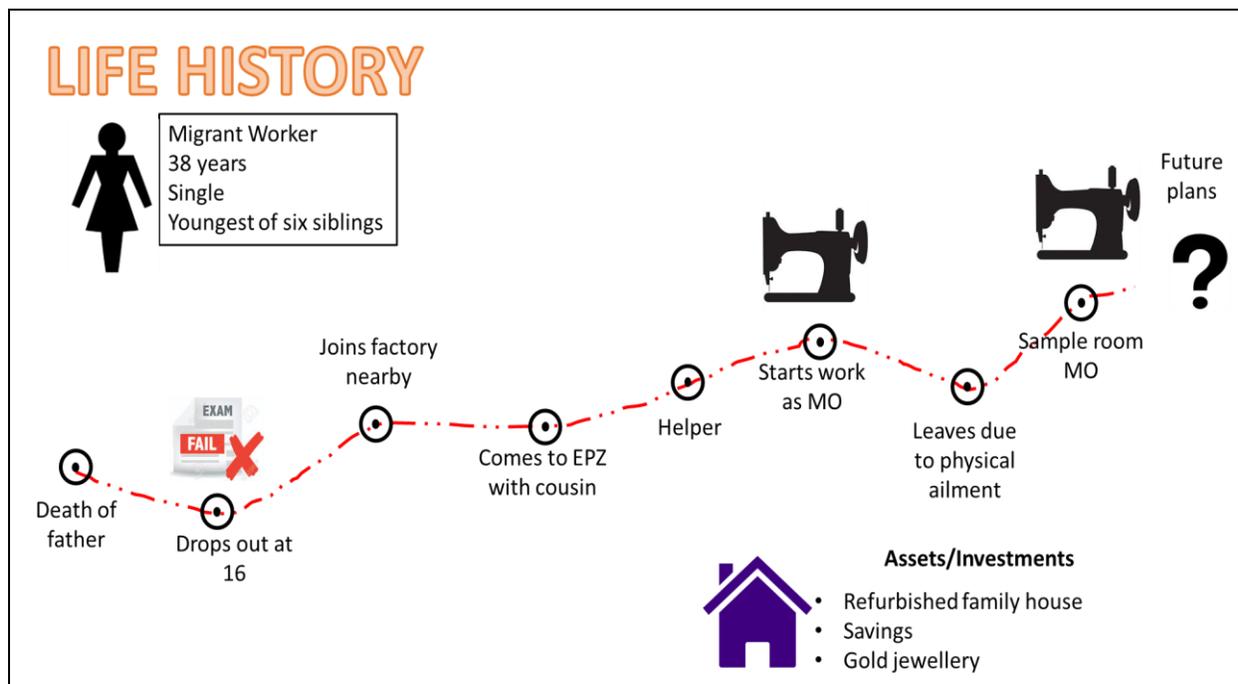
Source: *Author illustration based on life history as described by a 38-year-old, single, female migrant worker*.

From the outset, a stark contrast in the quality of work and personal lives was evident between migrant workers and resident workers. The latter were able to continue to work for a longer period, at times exceeding 15 years because of the ability to balance their personal and work lives more easily. Noticeably, working a night shift was less worrying for women, since a group would work shifts and return home at night together. Minimal disruptions to family life, the provision of transport and meals, and the shift basis of work offered by the larger firms, along with the bonus schemes and non-pecuniary rewards systems, work in the favour of rural women. For men, the

sector offers a stable monthly income—even if they consider this to be inadequate—and it continues to be a better alternative in comparison to other options available in the informal sector.

In contrast, migrant workers quickly experience a rupture to their social fabric. They also experience a breaking down of social ties to their community because they are unable to take more than two days of leave at a time. While they have more opportunities if they wish to change jobs, not all jobs changes have positive results. They also have to set aside money for their own living expenses while simultaneously supporting their families in their village (Hancock et al, 2015). Their living conditions continue to remain sub-standard (Attanapola, 2004, Jayaweera, 2003) and some boarding houses are prone to flooding during the rainy season.

An element of ghettoisation has also taken root in the locations close to the EPZs, such as in Katunayake. "Garment girls" are considered easily recognisable and perceived to occupy public spaces considered hang-out places for the workers in the Zone (Hewamanne, 2006; Lynch, 2002). Hence, the type of work they engage in (routine, manual) and where they work (the EPZ) contribute to defining who they are in other spaces (with police, local administrative units, and in the local community). They are thus "marked" as a group of individuals external to the social fabric of the community and are treated as imposters—a factor that both the union and CSO representatives emphasise. Integrating in the local community around the EPZs, therefore, remains beyond the workers' reach.

The extent of this outsider perception is most evident in the state administration. Institutionally, such workers are not recognised nor counted as "legitimate" residents (with voting rights) of the locality (Hewamanne, 2008), thus leaving them outside of public support. They are not eligible for assistance during emergencies such as floods, and they struggle to find public schools for their children. But attempting to secure a permanent footing is extremely difficult. On the income they earn, few can afford to purchase real estate given its high cost. In such conditions, workers do not anticipate staying in the sector long-term (see

Figure 10), rather, they perceive it as a stop-gap solution that helps them stabilise their family situation, save some money, purchase some assets, and return "home" (Attanapola, 2004; Hancock et al, 2015). These investments are all concentrated away from the EPZ and, therefore, their eventual return is considered inevitable (see

Figure 10).

Figure 11. Life history of a male migrant worker
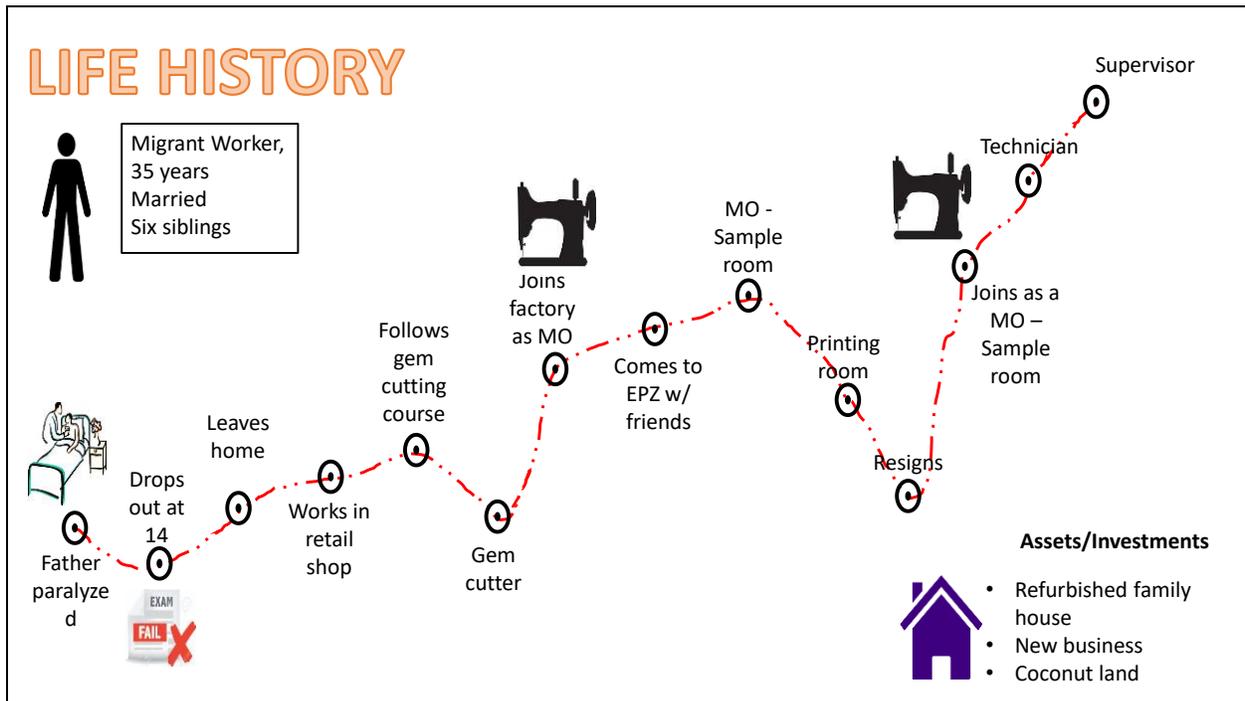
Source: Author illustration based on life history as described by a 35-year-old, married, male migrant worker.

Despite being from regions heavily reliant on agriculture, workers do not foresee a future in this sector. This places migrant labour in a difficult conundrum. There are limited options for them when they return home, and staying on in an urban space is expensive and legally challenging. Male migrant workers, in particular, attempt to save money by taking on additional work—either through Manpower Agencies or as wage labour—but how far such efforts help them resolve these problems remains unclear.

There are, however, a few outliers. The life history depicted in

Figure 11 shows how migrant workers can establish themselves within the sector, with much perseverance complemented by concerted support from both family and immediate supervisors.

Generally though, those who migrate in order to secure work continue to be more vulnerable to being left behind, especially because neither state structures nor factory management has been able to respond to the temporality of their work lives. For women, the lack of secure living environments, social networks, services, and protection mechanisms of the state greatly influence their job decisions. Hence, the benefits reaped by residents are higher than those for migrant workers.

Female workers

Women outnumber men on the factory floor and also comprise the largest percentage within the industry. At the institutional level, both the state and companies fail to ensure that women can balance their work and family lives. While larger firms carry out empowerment and skilling programmes, and a few provide care facilities, the absence of day care centres in all factories prevents women's progress, meaning they cannot remain at their jobs (Solotaroff, Joseph and Kuriakose, 2017). For migrant workers who are women, and for married women, the chances of being left behind are higher.

Unlike men, women are also saddled with social stigma, especially in EPZs in urban centres, which are perceived as spaces with unlimited freedom and loose morals (Hewamanne, 2006). Women are keenly aware of how difficult it is to shed such labelling and sometimes view the restrictions placed by boarding house owners (especially in disallowing outsiders to the premises) as a form of protection against such social scorn. In fact, factory employment is looked down on as a career choice by teachers and parents, and is problematic when it comes to marriages, and therefore continues to be socially unacceptable. These negative opinions deny women formal job opportunities, despite active efforts by the sector to end this stigma.

Specialisation of skills

In general, the workers in the garment sector on the factory floor come into the sector with few educational qualifications and little additional training. The industry provides training specific to the work they will carry out, whether it is cutting, ironing, or sewing. They also acquire skills on the job. Furthermore, they also tend to become specialised and efficient in certain tasks—i.e. sewing the hemline, the seam, or a collar. This too is linked to efficiency. Such specialised skills do not lend well to the future plans of workers to set up a small sewing shop at home or in the village. The space to learn such pattern making and cutting is non-existent in the factories. Only a few had foreseen this gap and opted to take lessons through courses offered by private entities, but many were unable to find adequate time to seek out such learning opportunities.

As machines become more complex and can assist workers to carry out more complex tasks, transferable skills also decline. Importantly, those at risk of being displaced as a result of automation, or those who are leaving of their own choice, have a set of skills that are not transferable to other types of work. Therefore, although opportunities may exist within the industry itself, the ability to use these same skills to move up the career path is limited. For instance, as the cutting section has become increasingly automated, workers have to acquire new skills to either move to a similar level or move up to a supervisory level. Additionally, the skills acquired to operate machines are specific to the apparels industry, so workers can only seek work in the same sector.

Conclusions and implications

Within this global-national-industry-worker vortex, a few pertinent issues that speak to the opportunities and risks facing low-skilled labour in the context of the 4IR and the SDGs emerge.

As the case study illustrates, Sri Lanka's integration into the apparel sector GVC generated positive effects on economic growth and decent work and, therefore, did push the objectives set within certain targets under the economic growth domain. Target 8.1 (economic growth) has had strong synergies with technological upgrading (target 8.2) and job creation (targets 8.5, 8.6). It is clear that the state and industry worked together to ensure they capitalised on the opportunity that was created by global trade regimes, by creating economic policy and infrastructure, and putting in place some vital skills and knowledge infrastructure and partnerships that supported growth. This created synergies among trade policies (SDG 17), economic policies (SDG 8), and education policies (SDG 4) to benefit from the GVC. In addition, good performance on social indicators linked to labour (i.e. labour rights, no child labour) has allowed Sri Lanka to gain a better foothold in the GVC.

It is also clear that as the industry graduated into OBMs, the benefits of the GVC did not transfer to newer SMEs and are now more beneficial to the larger companies who are able to meet social and environmental standards, make strategic partnerships, gain from FDI, and invest capital in technology and skilled workers. Thus, the scale of operations also matters. That being said, some SMEs have gained a foothold due to being highly specialised, accessing technology through new avenues and gaining from strategic partnerships, thereby showing the growing need for technological innovation to survive in the fast-evolving global marketplace.

The GVC, especially the drive for fast fashion and its need for shorter lead times and greater efficiency, coupled with Sri Lanka's transition to high end products and move from CMTs to OBMs, has resulted in a greater amount of technology and automation entering the Sri Lankan value chain. While it is also clear that automation has not replaced all routine manual jobs, there is a greater demand for high-skill jobs. This will continue to be the trend. This will be a future

challenge for the sector and indeed for Sri Lanka. As greater innovation is needed in the knowledge economy, the skilling and reskilling process needs to be able to link with industries to ensure that this demand is properly understood and met.

Disruptions to jobs are problematic and complex at the lower end of the job spectrum. There is greater chance of job fallout for unskilled or semi-skilled workers—in particular with routine manual work and routine cognitive work—especially as a consequence of automation as firms become more capital intensive and carry out technological upgrading. As experienced in the apparel sector, wages can stagnate at this level, jobs can become more monotonous and stressful, and a lack of flexibility and the regimented pursuit of higher productivity will make these factory-floor jobs less desirable. Further, social issues of stigma, or unsatisfactory housing and an inability to settle down faced by migrant workers, also impact the choice to continue with the job. As seen in the synergies and trade-offs section, in order to achieve sustainable labour, it is necessary to deal with interlinked issues—especially within social and institutional domains such as skills, housing, childcare, and state services, especially for migrant workers, to ensure that the jobs are more desirable. For those that fall out of the sector, there is also a need to ensure adequate unemployment benefits and social protection measures that help workers acquire the necessary skills to re-enter the workforce, preferably a return to the formal sector with its accompanying labour protections.

Among low-skilled workers, and in terms of LNOB, women feature more prominently in manual routine jobs. However, the reasons that prevent women from continuing to work, such as affordable childcare, safe working and living environment, and security while travelling, limit women from full and productive employment. Women also disproportionately "suffer" the stigma of working in the apparel industry, despite attempts by the industry to address these perceptions. Women who migrate face greater difficulties, and while they enjoy decent work conditions, they do not at times enjoy decent living conditions. If women are married and migrate they also face the challenge of being separated from their children. While technology upgrades and better working conditions help within the workplace, these issues outside of the workplace still create a trade-off for women's full and productive employment (target 8.5). This shows the need to think beyond the scope of work, technology, and productivity when addressing sustainable labour. Without such efforts, the 4IR could exacerbate existing tensions between high-skill and low-skill workers and lead to systemic disruption that could reverse the valuable gains in human welfare.

the environmental domain highlights both positive and negative consequences within and among SDGs. While the supply of *fast fashion* is increasingly responsive to the economic, social, and environmental concerns of the industry, the consumption of fast fashion itself is not necessarily sustainable. The idea of fast fashion contradicts the ethos of SDG 12 within the global GVC. This too needs to be tackled as a systemic issue at a global level. Even if companies make improvements in production and research, this itself may not negate the cumulative effects of the industry that is

fuelled by exponential growth and consumerism, which leaves in its wake a large amount of waste and pollution. At present, the advancements of the 4IR are used to drive this high level of consumerism, while at the same time using resources efficiently. However, both are not aligned to the same objective. Thus, while the industry and the GVC may be vital for achieving SDGs related to economic growth and poverty within Sri Lanka, sustainable consumption—both locally and globally—also needs to be actively brought into play at a global level. These multi-level synergies and trade-offs have to be reconciled. Global cooperation is necessary to set minimum standards, improve monitoring and evaluation, and discourage incentives that lead to unsustainable consumption or production.

In conclusion, automation's impact can be highly asymmetrical across different segments in society. The potential for automation to render either positive or negative outcomes is determined by how national policies respond to such trends by supporting reskilling, access to social safety nets, and the possibility to switch jobs. Furthermore, to exploit the positive outcomes of automation, a government should be prepared for the changes and variations that can occur within labour demand. Only when such negative outcomes can be balanced through the possibilities for positive outcomes, can the notion of sustainable labour be addressed more constructively. Taking into consideration the findings of this study, we conclude with a set of recommendations that could potentially mitigate the effects of automation on low and unskilled workers in Sri Lanka.

The way forward: Some recommendations

Strengthen access to relevant skills training. The 4IR demands skilling at the high end and intensifies demands to adjust rapidly to technological change. The apparel industry has proactively sought to provide the necessary infrastructure to build the capacity of local personnel. It has been a good example but these efforts can be limited in scope and scale, thus placing the onus on the state to strengthen reskilling opportunities. Unless the Tertiary and Vocational Education Commission (TVEC) and the tertiary educational system recognise these rapid changes and adapt accordingly, the gap between youth aspirations and available job options will continue and possibly widen further. Sri Lankan youth and women will find it more difficult to adapt. A rethinking of what constitutes formal education, and how the education system itself can be adapted, needs to be carried out and aligned to achieving target 4.4. Furthermore, as in the past in the apparel industry, stronger ties between educational centres and industries will be important for meeting skilling requirements.

Provide adequate safety nets and social protections. In the absence of an unemployment benefits scheme, the government of Sri Lanka must look to provide or strengthen existing safety nets. This would be of fundamental importance to ensure that people are not vulnerable to being left behind, especially as the manufacturing sector becomes more automated. This is especially important in the context of greater informality of work that is also a consequence of the 4IR.

Recognise the duality of the role of women. Both the state and the apparel sector must recognise the dual roles women are expected to perform in Sri Lankan society. This must be followed with acknowledgement that if gender disparities are to be addressed, the provision of affordable care (elderly and childcare) and more flexibility in work lives are vital. In addition, there is a need to address the number of women who are enrolled in STEM streams, in order to increase the number who will benefit from high end jobs as the Sri Lankan economy transitions to a knowledge-based economy.

Strengthen public-private partnerships. As a low middle-income country that has prioritised economic growth, Sri Lanka is moving into a knowledge economy. More diversified options to replace jobs that are becoming obsolete are necessary to achieve more secure employment. As shown in the case of the apparel sector, one of the key reasons for its success is that the state worked with industry to make advances. This is also necessary in the context of the challenges of the 4IR to generate new jobs and ensure that conducive conditions are in place.

Research into the 4IR and its impact on workers. It is important to get a good sense of how technology is expected to impact workers, and for trade agreements to be aware of these impacts. But in order to do so, we have noted a stark gap in the literature. The lack of available data and access to existing data sources makes it extremely difficult to understand the impact of the 4IR on labour dynamics in Sri Lanka. There must be concerted efforts to fill this gap, either through qualitative or quantitative research, that could then inform better policy-making. Even for the implementation of the SDGs this is a crucial issue, as trade negotiations are outside of the SDG realm but have a direct impact on workers, employment, and livelihoods.

The need for a nexus or linked approach. The need to look at synergies and trade-offs and the look beyond one domain is also important. This is challenging but necessary in an industry linked to a GVC. Here a government does not have the agency necessary to enhance all synergies or address all trade-offs. These relationships are more complex and require vertical and horizontal integration. Thus, policymakers need a thorough understanding of the scale and scope of synergies and trade-offs—local, national, and international. However, in a dynamic space where much is beyond the control of one set of policymakers, this is a huge request. Thus it is also about the partnerships that are formed. For issues that have more of a global footprint, such as environmental and social issues, these partnerships become more pertinent and necessary.

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Appendix

Table 1 provides a breakdown of the 43 interviews that were conducted with workers. Table 2 provides a breakdown of the 15 interviews with professionals in the sector.

Table 1. Breakdown of interviews by location, size of company, type of work, and gender

Location	Type of company	Type of work	Female	Male	Total
Katunayake EPZ*	Large	Cutter	-	01	01
	Very large	Laser cutter	-	01	01
	Very large	Machine operator	03	03	06
	Large	Sewing machine operators	07	00	07
	Large	Quality checker	01	00	01
Ragama EPZ*	Very large	Sewing machine operators	04	00	04
	Very large	Sewing machine technician	00	01	01
	Large	Cutter	00	02	02
Galle Rural	Very large	Sewing machine operators	06	01	07
	Very large	Packing	01	00	01
	Very large	Mechanic	00	01	01
Ratnapura Rural	Very large	Sewing machine operators	02	03	05
	Very large	Cutting	01	01	02
	Very large	Quality checker	01	00	01
	Very large	Stores	01	00	01
	Large	Ironing	00	01	01
	Large	Stores	00	01	01
Total			27	16	43

Note. *11 (09 Females and 2 Males) respondents in Katunayake and 01 (Male) respondent working in the Ragama EPZ were migrant workers.
Elaborated by the authors.

Table 2. Breakdown of interviews conducted among industry professionals by gender

Type	Female	Male	Total
Industry professionals	01	05	06
Association representatives (both large and small associations)	00	02	02
Trade Union representatives	0	1	01
CSO representatives	2	0	02
Other professionals/Researchers	2	2	04
Total	05	10	15

Elaborated by the authors.