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Policy Analysis

Improving Sustainable Consumption and Production in the Garment Sector in Cambodia

In collaboration with:
Ministry of Environment, Cambodia

Acknowledgement

The following Policy Analysis, Improving Sustainable Consumption and Production in the Garment Sector in Cambodia, was developed as part of the technical support provided to the Ministry of Environment (MoE) of Cambodia through the SWITCH-Asia SCP Facility, which is funded by the European Union.

The following are acknowledged for their help in the publication of this Policy Analysis: H.E Lina and the Director General, Department of Natural Resources and Environment Inspection (DGE) Team for the main body of the work; the SCP Facility Technical Working Group and relevant organisations in organizing consultations and providing interviews.

The European Union launched the SWITCH-Asia programme with a mission to support the transition of Asian countries to low-carbon, resource-efficient and circular economies while promoting sustainable consumption and production patterns within Asia and greener supply chains between Asia and Europe. The programme aims at providing a platform to promote sustainable consumption and production (SCP) policies and practices in Asia and enhance the awareness and dialogue of local stakeholders. The SWITCH-Asia SCP Facility aims at strengthening the implementation of SCP policies at the national level.

Aim of this publication

The objective of this Policy Analysis is to provide a detailed analysis of the policies in Cambodia that enable or hinder the achievement of sustainable consumption and production (SCP) in the garment sector, with a focus on the management of resources, waste, wastewater, and chemical flows. The Policy Analysis aims to assist policymakers in relevant ministries, as well as other stakeholders, to better identify areas of opportunity for further action towards SCP. Here are presented a series of policy recommendations that can work with existing regulations and emerging policy priorities to accelerate the shift toward SCP in Cambodia's garment sector, and to future-proof the sector against the increasing demand for sustainable production practices in the global market.

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In close collaboration with: The Ministry of Environment, Cambodia

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Message from the Minister of Environment and Chair of the National Council for Sustainable Development

The Royal Government of Cambodia is strongly committed to inclusive and sustainable development. Guided by the National Council for Sustainable Development's Strategic Plan 2018–2023, the sustainable consumption and production (SCP) of goods and services is one of the green economy priorities; therefore, protecting the environment and social well-being while increasing business competitiveness and promoting innovation. With support from our partners, the Ministry of Environment has integrated SCP in policies and initiatives to enable green and inclusive growth. With the goal to improve SCP practices in the textile and garment sector, the project "Formulation of the Sustainable Consumption and Production (SCP) National Roadmap and delivery of demonstration project focused on SCP and Circular Economy in the textile and garment sector" furthered identification of policy measures and practices on the side of the industry towards waste management, resource efficiency, circularity. This report shows these measures while connecting them to the Cambodia's Roadmap for SCP 2022–2035. The key stakeholders in the sector have contributed to the report while seeing it as a basis for working together towards advancing SCP.

I would like to thank colleagues representing government, garment and textile sector, the European Union, and the SWITCH-Asia SCP Facility and its experts for their support of this work. I would also like to encourage all relevant parties to support widespread uptake of SCP and move forward to the green industry and effective, transformative change in Cambodia.

Say Samal
Minister of Environment and
Chair of the National Council for Sustainable Development

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ABBREVIATIONS

3Rs	Recycling, re-use, and repurposing (of waste)
ADB	Asian Development Bank
ASEAN	Association of Southeast Asian Nations
BFC	Better Factory Cambodia
CEAP	Circular Economy Action Plan
COMPED	Cambodian Education and Waste Management Organization
CMT	cut-make-trim
CSR	corporate social responsibility
DoPC	Department of Pollution Control
EBA	Everything but Arms
EIA	environmental impact assessment
EPR	extended producer responsibility
ESIA	environment and social impact assessment
EU	European Union
EUR	Euro - €
FDI	foreign direct investment
FTA	free trade agreement
GDP	Gross domestic product
GGGI	Global Green Growth Institute
GHG	Greenhouse gas
GMAC	Garment Manufacturers Association in Cambodia
IGES	Institute for Global Environmental Strategies
ILO	International Labour Organization
ISO	International Organization for Standardization
JICA	Japan International Cooperation Agency
LCA	Lifecycle assessment
LFG	landfill gas
MISTI	Ministry of Industry, Science, Technology and Innovation
MoE	Ministry of Environment
MoI	Ministry of the Interior
MSDS	material safety data sheets
MSW	municipal solid waste
n.d.	no date
NDC	Nationally Determined Contribution
NDSP	National Strategic Development Plan

NESAP	National Environment Strategy and Action Plan
NGO	Non-governmental organisation
NPCC	National Productivity Centre of Cambodia
NSDP	National Strategic Development Plan
NSPGG	National Strategic Plan on Green Growth
PA	polyamide
PE	polyethylene
PES	polyester
PET	polyethylene terephthalate, the chemical name for polyester
PM	particulate matter
PP	polypropylene
PPCA	Phnom Penh Capital Administration
PVC	Polyvinyl chloride
RGC	Royal Government of Cambodia
RDF	refuse-derived fuel
REACH	Registration, Evaluation, Authorisation and Restriction of Chemicals
RMG	readymade garments
SBTi	Science-Based Target initiatives; also just SBT
SCP	Sustainable consumption and production
SDG	United Nations Sustainable Development Goals
SEZ	special economic zone
SSEZ	Sihanoukville Special Economic Zone
TATA	TATA Brand Equity & Business Promotion Agreement
tCO2e	Tons of carbon dioxide equivalent
TEST	transfer of environmentally sound technology
TSCA	Toxic Substances Control Act (US)
TWG	Technical Working Group
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
UNIDO	United Nations Industrial Development Organization
US	United States of America
USD	US dollar - $
WWF	World Wide Fund for Nature
WRAP	Worldwide Responsible Accredited Production program
WTP	water treatment plant
ZDHC	Zero Discharge of Hazardous Chemicals

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Chapter

01

Introduction

1. Introduction

1.1 Objective

The objective of this report is to provide an analysis of the current policy environment for garment production in Cambodia, applying a systems lens to identify challenges and opportunities for enhancing the sustainability of the sector. To maintain the competitiveness of Cambodia's garment sector in the global market, a shift to sustainable consumption and production (SCP) patterns is both necessary and inevitable. SCP is conceived as a critical framework for achieving the social and economic benefits and minimizing the environmental burden of the garment sector in Cambodia.

Accordingly, this policy analysis report focuses on key SCP requirements in Cambodia's garment sector, such as use of sustainable inputs, efficient production processes, and waste management including solid waste and wastewater treatment. The report concludes with a set of policy recommendations focused on improving monitoring and enforcement of regulations, the sustainable use of resources, solid waste and wastewater treatment, and other SCP measures that are urgently needed in the garment sector in Cambodia.

1.2 Scope of the Analysis

Cambodia is the 8th largest exporter of clothing and footwear in the world, in an industry that is globalised, internationalised, interconnected and highly competitive. Key export markets such as the US and the EU are increasingly implementing policies to improve the environmental and health impact of their imports, so compliance with requirements for sustainable production as well as consumption will be essential if Cambodia is to maintain its role in the global garment sector. A shift to sustainable consumption and production is both necessary and inevitable. Accordingly, this policy analysis report focuses on key SCP requirements in Cambodia's garment sector, such as the use of sustainable inputs, efficient production processes, and waste management including solid waste and wastewater treatment. The report concludes with policy recommendations on sustainable use of resources, waste and wastewater treatment, and other SCP measures that are urgently needed in this industry in Cambodia.

Chapter 1 summarises the socioeconomic aspects of the garment sector in Cambodia, which provides 19% of national GDP, accounts for nearly 72% of the value of total national exports (Global Green Growth Institute, 2018), and is the major source of national employment (Geres, 2021). Major global fashion brands such as Adidas, Gap, H&M, Marks and Spencer, Nike, Tesco, UNIQLO and Zara have located their manufacturing chain in Cambodia. According to the latest figures from the Ministry of Industry, Science, Technology and Innovation (MISTI), there are roughly 3,936 firms currently operating in the garment and textiles sector in Cambodia (MISTI, *pers. comm.*). Of these, 792 are large factories, and 3,144 are small- and medium-sized enterprises. While Cambodia is one of the fastest growing economies in ASEAN, wages remain low across the sector. This presents

challenges and opportunities as key export markets increasingly demand more sustainable and ethical production from their suppliers, including better working conditions for factory workers. The pressures of rapid economic development and shifting demands from global markets make the transition to sustainable consumption and production patterns in Cambodia inevitable.

The background necessary to understand how Cambodia has become one of the most attractive producers of clothing and footwear, with full details of the social, environmental, and consumption issues in the garment sector is provided in Chapter 2. Factories in Cambodia mainly handle dyeing and finishing of textiles and assembly (sewing) processes in the garment supply chain, and Cambodia relies on imported textiles, mostly from China (Rastogi, 2018; GGGI 2018b). The major environmental impacts are caused by energy (including greenhouse gas (GHG) emissions), the use of water and materials, and solid waste and wastewater generated from industrial waste, which includes discarded clothes, leather, rubber, raw material residues, sludge and industrial wastewater. The water used in dyeing and washing factories has become one of the major pollution sources in Cambodia. Much of the industrial waste produced by the sector ends up in landfills. Because industrial garment waste is not properly managed, informal waste re-use and re-purposing has grown, including the use of such waste as fuel in brick kilns.

As most of Cambodia's garment sector is controlled by foreign capital and the products are mostly exported, domestic consumers in Cambodia are not able to effectively promote the sustainable consumption of garments. Much of the growing unsustainable consumption and production patterns in the global textile sector can be linked to fast fashion, which has emerged as one of the top concerns for achieving sustainable development in the textile sector. Any realistic demand for sustainable consumption will have to rely on changing consumer behaviour in the export destinations, but the emergence of affordable fast fashion has significantly changed the global consumption pattern for garments towards a rapid purchase, short product lifestyle, and a rapid disposal model, and this is unfortunate. This linear trajectory needs to be changed to become a series of circular loops. See, for example, the positive supply chain initiatives of the Sustainable Apparel Coalition (https://apparelcoalition.org/).

One way to break the unsustainable linear consumption and production chain is through certification and labelling schemes that would empower consumers to recognise products that are harmful to the environment and enable them to choose products that are more environmentally compatible and socio-economically responsible. Such labelling schemes can send signals up the production chain from consumers to producers, influencing the types of sustainable production practices that firms seek to adopt. However, since participation in labelling schemes is often costly, mandatory certification and labelling might become an additional trade barrier preventing Cambodian firms from accessing global markets. Thus rapid, aggressive efforts in developed countries to improve traceability and reduce environmental impacts from garment production have massive implications for Cambodia's garment sector.

Export markets and major brands are undertaking a wide range of SCP measures that hold implications, and challenges, for the garment sector in Cambodia. For example, campaigns to reduce harmful chemicals in textiles are being promoted in the Nordic countries. In Denmark, Finland, Sweden and the UK, consumers are being targeted to recycle their clothes and purchase second-hand or redesigned clothes. There are online markets for vintage clothing, clothes-lending services based on subscription, clothes libraries, clothes donations, repair cafes, and swap markets for clothes. The used clothing material can also be re-purposed into other products, completing the circular economy approach. At the company level, H&M in Cambodia aims to reach 100% renewable energy use by 2030; reduce the water used in production by 25% by 2022 (compared to water used in 2017); achieve zero waste sent to landfill by 2023; and attain 30% utilisation of Zero Discharge of Hazardous Chemicals and gateway levels 1–3 chemicals by 2021. On the other hand, uncontrolled export of used clothes to developing countries has become another form of international waste dumping, similar to e-waste and plastics.

The presentation of the existing policy environment in Cambodia in Chapter 3 indicates that the country is already making steady progress towards SCP in the garment sector. Various policies put in place since 2012 have been moving the sector in the right direction. Examples include the current National Strategic Development Plan (NSDP) 2019–2023 that is establishing a development strategy to improve competitiveness, create value-addition, establish supporting industries, and develop value chains in the garment and footwear sector; the National Environment Strategy and Action Plan 2016–2023 that has improved Cambodia's waste management policy and introduced market-based mechanisms such as landfill and incineration fees, pay-as-you-throw, and extensive producer responsibility schemes; and the National Strategic Plan on Green Growth 2013–2030, which identifies and confirms the role of the Ministry of Environment (MoE) to implement a wide range of activities including resource and waste management, pollution controls, and the implementation of reduce, reuse, recycle (3Rs) programmes.

A key part of the methodology of this report included in-person or online interviews with key stakeholders from government, business, and organisations to gain first-hand information and a better understanding of the challenges ahead, and to share recent initiatives and test some possible policy options. Some of the key findings from stakeholder interviews are presented in Chapter 4, including that all parties recognise the need for greater monitoring and enforcement of regulations, that access to infrastructure for waste recapture and reuse is lacking, and that partnerships are needed for continuous upgrading and improvement of facilities and practices. Many stakeholders are working on these issues and helping to prepare the sector for future growth, including the MISTI and MoE.

Based on the current status of the garment sector, existing policies, laws and regulations, and interviews with key stakeholders, several gaps regarding SCP were identified in Chapter 5. First, all the waste is mixed, collected, and transported to landfill without appropriate separation or treatment. Second, 3R practices are limited and mainly involve informal urban labourers who are unprotected from environmental pollution and health impacts. Third, textile products are relatively difficult to recycle compared to other products. Fourth, upstream businesses should utilise eco-design and avoid materials and designs that are problematic to deal with downstream.

The report also notes a range of good practices globally and from neighbouring countries in Chapter 6. For example, in Vietnam, the World Wide Fund for Nature (WWF) has worked with the Vietnam Textile and Apparel Association to propose a Strategic Roadmap, which includes establishing a textile sector water partnership, adopting water-saving practices, improving surface water quality through best practices in chemical and wastewater management, capacity building, and a smart water use programme. The European Union (EU) has adopted a Circular Economy Action Plan and is developing an EU strategy on textiles. The Netherlands has adopted a policy programme for a circular textile industry (2020–2025) where circular business models would become standard practice in the sector. The United Nations Framework Convention on Climate Change (UNFCCC) has launched a Fashion Industry Charter aiming to achieve net-zero emissions by 2050. Some private sector initiatives include Make Fashion Circular, the Fashion Pact, Sustainable Apparel Coalition, Textile Exchange, and Roadmap to Zero Programme, which are described below.

Based on the current situation of the garment sector in Cambodia and international good practice, a series of policy recommendations are suggested in Chapter 7. These recommendations are organised thematically and include high-level policies, monitoring and enforcement, industrial waste management, sector development, sector promotion, and knowledge and capacity building.
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Chapter

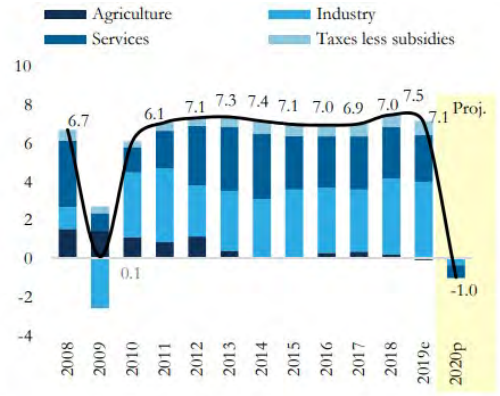
02

Overview of the Social and Economic Context of the Garment Sector in Cambodia

2. Overview of the Social and Economic Context of the Garment Sector in Cambodia

2.1 The garment sector in Cambodia's socioeconomic development

Cambodia is a Southeast Asian country located in the southern Indochina peninsula with a landmass covering 181,035 km^2 (Patel, 2018). Of the total population of 16.48 million, 31% are urban dwellers (National Institute of Statistics, 2017). Cambodia's economy has emerged as one of the fastest growing in East Asia: between 2011 and 2019, annual GDP growth exceeded 6% as illustrated in Figure 1 (World Bank Group, 2020). The economic share of the garment and footwear sector has been significant, especially in exports, which have grown from 8.4% in 2017 to 17.7% in 2018 as illustrated in Figure 2 (World Bank Group, 2019). Cambodia is the world's 8th largest exporter of clothing and footwear. Moreover, the garment sector in Cambodia is the main source of government revenue and the largest sector for employment. In 2019, this sector alone contributed 17% of Cambodia's real GDP growth, employing a local labour force of 941,000 workers representing 10.7% of total national employment and 21% of paid employment (World Bank Group, 2020).



Source: Cambodian authorities and World Bank staff estimates.
Note: e = estimate; p/proj. = projection.

Figure 1. Different industries' contribution to GDP growth in Cambodia (percent)

Source: World Bank Group (2020) based on Cambodian authorities and World Bank estimation

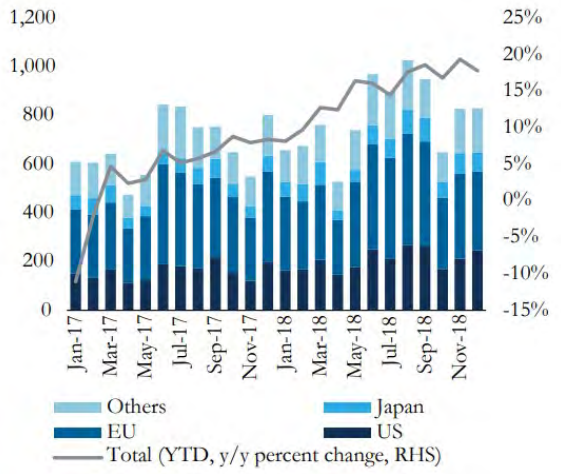


Figure 2. Garment and footwear exports by main destinations (USD million)

Source: World Bank Group (2019) based on Cambodian authorities

Economic growth and development in Cambodia is highly dependent on foreign capital and markets. In 2018 foreign direct investment (FDI) was estimated at USD 3 billion, 13.4% of GDP. China is the single largest investor, accounting for roughly three-quarters of total FDI in Cambodia (World Bank Group, 2019). Increased global demand for garments has contributed to the rapid growth of the sector in Cambodia. Developed economy markets, such as the EU, Japan, and the US have been key drivers of garment sector growth as illustrated in Figure 2. Garment exports account for about 80% of Cambodia's total exports to the EU under the EU's Everything but Arms (EBA) scheme, which has provided preferential, duty-free, and quota-free access to the EU market since 2001. The partial withdrawal of Cambodia's EBA treatment since August 2020 could impact the garment sector exports significantly. While the effects of the COVID-19 pandemic on garment sector exports have largely nullified the economic effects of the partial withdrawal of the EBA treatment (Chheng and Sochan, 2021), post-pandemic recovery efforts may be hindered if the withdrawal remains in place. Moreover, the current pandemic-driven global economic slowdown is predicted to result in negative economic growth for Cambodia, as shown in Figure 1 (above).

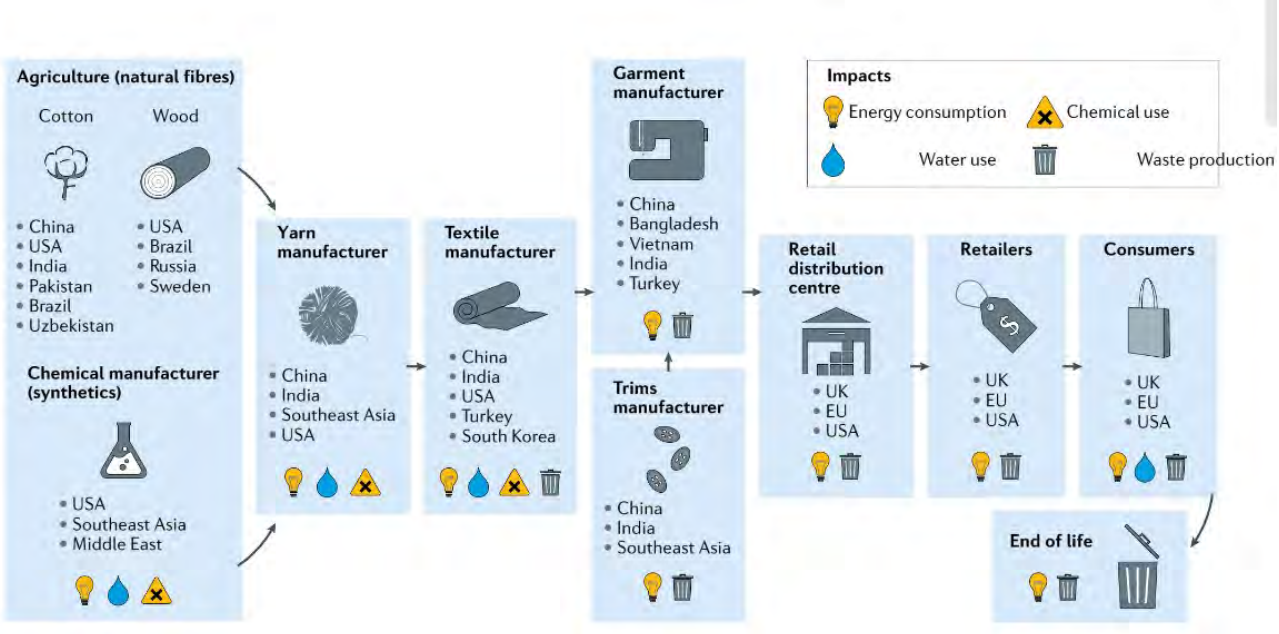


Figure 3. Global garment manufacturing supply chain

Source: Niinimaki et al., 2020

The activities in the global garment supply chain take place in different countries at each stage (Figure 3). In a typical linear economic model of production, the supply chain starts from agriculture and continues through yarn production, textile manufacturing, garment manufacturing, retail distribution, retailers, consumers, and finally end of life (Niinimaki et al., 2020). Major global fashion brands from different countries, for example Adidas, Gap, H&M, Marks and Spencer, Nike, Tesco, UNIQLO and Zara have all located the manufacturing segment of their supply chain in Cambodia (Textile Focus, 2019).

About 60% of garment and textiles factories operate in or close to Phnom Penh and transport their finished products 185 km by rail to Sihanoukville port. Prior to the onset of the COVID-19 pandemic in early 2020, Cambodia's garment and textiles sector boasted roughly 3,800 factories and employed more than 960,000 workers across the production chain (Geres, 2021). It is estimated that from 50 to 120 factories permanently closed during 2020; however, 112 new factories opened (Arnold, 2021; Kunthear, 2021). Recent reports suggest that despite the permanent closure of many factories due to the COVID-19 pandemic, the garment sector in Cambodia remains attractive to investors.

Government policies are highly supportive of FDI, offering incentive schemes such as 100% foreign equity ownership, up to 9 years of tax holidays and exemption from import duties (Rastogi, 2018). Most garment and textile workers are women; long hours and relatively low pay are characteristic of this sector. The hourly wage of permanent garment factory workers can be as low as USD 0.88, with the average worker logging in 216 hours per month (ILO, 2018); permanent workers are paid a government mandated minimum salary of USD 192 per month, while temporary workers receive a minimum of USD 187 (Kingdom of Cambodia, 2020; Medina, 2021). The COVID-19 pandemic has worsened the position of workers, with many experiencing month-long delays in the payment of wages as firms struggle with reduced cashflow resulting from the decline in global demand. The temporary closure of more than 400 factories during the pandemic led to more than 150,000 factory workers losing their jobs by July 2020 (Xinhua, 2020). While these job losses were short term, the negative effect on workers has been significant despite efforts by companies and government to support workers' basic needs.

As a result of Cambodia's rapid economic growth in the past decades, the poverty rate and consumption inequality in the country have steadily declined. Nevertheless, the drivers of poverty in the country are changing, and income inequality seems once again to be increasing. For example, rural households make up roughly 80% of the population, but their income represents just 60% of all urban household income (Hansen, et al. 2019). Economic growth tends more to benefit the 'non-poor', and urban poverty is becoming more pronounced in the current economic growth pattern. The lowest 40% of the population is said to be doing less well when their status is compared to what it was during earlier periods of economic growth. Moreover, in recent years non-agricultural wages have become the major driver of poverty reduction, compared to 2009–2013 when agricultural income was the primary driver (World Bank Group, 2019). Thus, the closure of garment factories and the loss of employment from the garment sector may reverse the poverty reduction gains achieved over the past few decades if these closures are not rapidly addressed. Their effect on augmenting poverty will also depend on how well or poorly Cambodia recovers from the COVID-19 pandemic crisis.

Cambodia's participation in the global value chain has occurred faster compared to that of neighbouring countries such as Malaysia, Thailand, or Vietnam. The rapidity of Cambodia's integration into regional and global value chains since the 1990s has largely been the result of the garment sector's development. Cambodia's environmental and social obligations are also being driven by ASEAN integration aspirations, especially through the ASEAN Socio-Cultural Community Blueprint 2025 (ASEAN, 2016). Nevertheless, Cambodia has not been able to upgrade its position in the global value chain to the next stage of development as other countries in the region have done. In fact, the current FDI flow to the country is mainly driven by its low-skilled, low-wage labour force and its geographic location relative to the key export markets. To upgrade its participation as part of a more advanced regional and global supply chain, green technological upgrading and the development of local human capital through education and skill development, in addition to policy support for trade agreements, will be critical (World Bank Group 2019b). Key export markets such as the EU and the US are increasingly implementing policies to improve the environmental and health impacts of their imports, making it more important than ever for Cambodia to enhance environmental and social due diligence in its supply chains. Compliance with the requirement to introduce sustainable practices in the supply chain will be essential to maintain Cambodia's role in the global garment sector.

2.2 Opportunities for SCP in Cambodia's garment sector

Globally, sustainable consumption and production (SCP) has emerged as a practical and systematic approach to sustainability issues. SCP emerged in the 1970s as an end-of-pipe solution to address the effects of industrialisation on the environment and society, culminating in the first UN Conference on the Human Environment in 1972 (Akenji, Bengtsson and Schroeder, 2017). Gradually during the 1980s SCP evolved towards a 'cleaner production' approach to policymaking focused on increasing the efficiency of natural resource use, waste minimisation, and reducing the effects of pollution in the manufacturing sector. During the 1990s, SCP shifted towards a more systemic approach involving eco-efficiency through lifecycle assessment (LCA) to analyse the impacts of products and services through the involvement of all stakeholders and in all stages of production and consumption. Today, SCP is viewed as a holistic approach to minimising negative environmental impacts from consumption and production systems, while promoting quality of life for all. As such, SCP involves decoupling economic growth from environmental degradation by reducing the material and energy intensity of economic activities across the entire supply chain and reducing GHG emissions and liquid and solid waste from extraction, production, consumption, and recycling/disposal stages.

Moreover, the modern concept of SCP takes into consideration the integration of the environment and economic development to address the dual challenges of mitigating environmental crises caused by modern civilisation and improving the livelihoods and wellbeing of those in low-income countries. SCP also enriches and broadens the discussion on national development trajectories, opening up conversations regarding consumption and production practices and societal values in different countries (Akenji, Bengtsson and Schroeder, 2017). Thus, the framing, needs, priority areas, and means to achieve SCP or sustainable development differ from one country to another.

Introducing SCP in Cambodia could yield significant benefits in terms of the environment, human health, society, and economic prosperity. Based on an analysis by the Global Green Growth Institute (GGGI), an economic model based on a 'Green Industry' scenario could see economic growth decoupled from environmental degradation. The Green Industry scenario assumes 5% growth in the garment sector and increases in efficiency for labour, energy, water, and the use of materials, as well as technological upgrading for wastewater treatment and the use of renewable energy sources. Under this scenario the garment sector could increase real GDP by USD 2.7 billion between 2015 and 2030. This growth would be decoupled from negative environmental impacts, resulting in a 46% increase in the garment sector's contribution to GDP while at the same time reducing negative environmental impacts (GGGI, 2018b).

Moreover, this green scenario could reduce GHG emissions by 3.37 million tons of carbon dioxide equivalent (tCO_2e) by 2030, and by 6.59 million tCO_2e by 2040 compared to 2015 levels. In the garment sector, the GHG emission reduction could reach 17.1% in 2030 (GGGI, 2018a). This green growth scenario could improve the productivity of both the garment and electronic industries by 80% by 2030 in terms of water and labour productivity. For instance, investments made in material efficiency could be returned within four to five years (GGGI, 2018a). It should be noted that this analysis was conducted before the onset of the COVID-19 pandemic in 2020. The extent to which the social and economic shocks of the pandemic will affect the projections presented by GGGI remains unclear.

A shift to SCP patterns of consumption and production in the garment sector is inevitable if Cambodia is to maintain its competitive position in the global market and a potential move up the value chain. From a competition perspective, wages in Cambodia have increased rapidly, from an average monthly income of USD 153 in 2014 to USD 170 in 2018 (Kingdom of Cambodia, 2018) and USD 192 in 2021 (Ministry of Labour and Vocational Training, 2020). Although further income increases would improve workers' living standards, the sector's competitive advantage, which is

based on low wages, might disappear, resulting in factories relocating to lower-wage neighbouring countries, such as Vietnam or Indonesia (see Section 6.1). In spite of this, adopting SCP practices to improve productivity and shifting to the production of better-value products could help transition the garment sector to a higher position in the regional and global supply chain.

Moreover, consumer understanding and awareness of the social and environmental effects of the garment sector is increasing, in part due to online information sharing (Ellen MacArthur Foundation, 2017). International NGOs such as Greenpeace (2016), and WRAP (2017) have played an important role in raising awareness about the huge environmental impacts of the garment sector, forcing consumers to re-evaluate the current production and consumption model. Recently, unprecedented consumer attention on plastic waste and pollution in marine ecosystems has raised concerns over the linkages between fast fashion and microfibre pollution in the world's oceans (Vassilenko et al., 2019). Thus, incorporating SCP into manufacturing in the garment sector in Cambodia is probably both unavoidable and inevitable, but it holds out both the challenge and the promise of enabling a beneficial transition for human health, society, the environment and economic prosperity.

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Chapter

03

Background: SCP in the garment sector in Cambodia

3. Background: SCP in the garment sector in Cambodia

3.1 Social issues in Cambodia's garment sector

There are many social aspects relevant to the sustainability of the garment sector, such as its potential contribution to poverty alleviation, reduction of the inequality gap, provision of decent employment opportunities, and empowerment of women in the labour force. Cambodia's garment, textile, and footwear industries grew rapidly in the 1990s, thanks to cheap labour costs and exemptions from export quotas under the Multi-Fibre Arrangement and its successor, the Agreement on Textiles and Clothing (Arnold and Shih, 2010; Asuyama and Neou, 2012). By 2016, 80% of workers engaged in the sector were women, especially those who had migrated from rural areas to the cities (ILO, 2018). By providing employment opportunities for women, particularly rural-urban migrants, the development of the garment sector contributed significantly to the elimination of poverty in Cambodia (Yamagata, 2006). Past issues such as forced overtime work, illegal wage cuts, child labour and payment below the minimum wage (Paster, 2005; Polaski, 2004) have been eliminated to a large extent.

Cambodia has come to be highly regarded by global buyers as a country with better working conditions in the garment, textile, and footwear industries (Natsuda et al., 2010). The monitoring programme called Better Factory Cambodia (BFC), led by the ILO and the International Finance Corporation of the World Bank, has substantially contributed to the improvement of working conditions. The programme was introduced during the process of signing the 1999–2004 Textile and Apparel Trade Agreement (TATA) with the United States. The TATA agreement used modular training and inspections to ensure compliance with working conditions in factories that manufacture goods for foreign markets, and only those factories that complied with regulations were allowed to export (ILO, 2019; Heintz, 2007; Hess, 2013; Robertson, 2020). The programme is considered a successful case of a market-based framework for improving working conditions through applying the buyers' Code of Conduct (Arnold, 2010), and it has been rolled out in eight other countries as the Better Work Programme. It should be noted that the BFC and TATA agreements lacked enforcement mechanisms as 'addressing disputes or enforcing the labour laws [was] not the mandate of the BFC.' Inspectors had no capacity to compel factories to comply with regulations; rather, BFC inspectors verified conditions in participating factories, publicly reported violators, and provided advice on how violators could improve compliance. Labour rights organisations and workers have expressed frustration at the lack of enforcement under the BFC, and they question the efficacy of the programme if it cannot address labour and human rights violations in participating factories (Merk, 2012).

Factory and working conditions have improved in Cambodia; however, many issues remain (Shea et al., 2010), and some safety and health issues still need to be addressed (Oka, 2016; Eisenbruch, 2017). Though wages have increased and are above the Cambodian minimum and average wages, labour unions argue that they are still below the living wage (Kane, 2015), and some analysts claim that real wages have fallen during the implementation of the BFC programme (Arnold and Hess,

2017). Moreover, employers have shifted from fixed-term employment to indefinite employment. BFC has been unable to address some of these issues, in particular wages and contract issues, as its mandate precludes it from interfering in industrial relations (Arnold, 2013; Lawreniuk, 2020). Finally, while there are more than 600,000 workers participating in the BFC (ILO, 2019), this means that roughly one-third of all garment sector employees in Cambodia work outside the reach of the programme. While the BFC demonstrated that its framework for improving working conditions, based on the 'reputation-sensitive' buyers' Code of Conduct, has had a definite effect (Oka 2010; Lupo and Verma, 2020), it has also made clear some limitations, and thus additional approaches are required, such as the development of workers' bargaining power (Shea, 2010).

In this regard, some recent studies have highlighted that women workers, who make up the majority of workers in the garment sector, gained experience in organising and developed their collective bargaining power through union activities (Lawreniuk, 2020; Pike, 2020). One study also showed that their experience in organisation and negotiation in the workplace, as well as their improved wages, helped to mitigate sharp fluctuations in family income and led to the empowerment of women within households (Pike, 2020). Additionally, although women in the garment sector have been identified as having limited access to health and sanitation services and are at risk of HIV infection (Webber et al., 2010), several NGOs are providing health and sanitation programmes, along with HIV and reproductive health interventions (Heng and Bajracharya, 2017; Bunmey et al., 2017). Such programmes have also helped to address the welfare and empowerment of workers.

It is important to mention the challenges that lie ahead for improving the social ramifications of the garment sector. First, the economic and social consequences of the COVID-19 pandemic on the garment sector and its workers should be carefully studied. According to a survey of International Textile Manufacturers Federation members, orders for textiles had diminished 31% worldwide by June of 2020 (Davis, 2020). Such a sharp drop in demand for the sector immediately forced companies to shut down some factories, with significant consequences for workers, most of whom are outside of the social protection systems. In other garment-exporting countries such as Bangladesh, India, and Pakistan, millions of workers lost their contracts immediately after the start of the pandemic (Malik and Naeem, 2020). In Kandal Province of Cambodia, less than half of the garment workers affected by factory suspensions had received their wages by the end of May 2020 (Sen, 2020). Furthermore, the lack of prevention measures (masks, alcohol sanitising gel, social distancing, etc.) against the spread of infection was also highlighted in other countries including Bangladesh (Ellis-Petersen and Ahmed, 2020), indicating the remaining risks for workers despite the general improvement of working conditions over the previous decade.

Cambodia has long been regarded as lagging behind other Asian countries in terms of infrastructure and quality compared to other suppliers to the garment sector (Chan, 2011). During the first decade of the 21st century, the sector substantially improved productivity and diversified sales to the US market to include Japan and Europe where higher-value products are in demand (Asuyama and Neou, 2012). Productivity in Cambodia's garment sector grew at a compound annual rate of 2.2% between 2003 and 2015, as reported by the National Institute of Statistics. Thus, sectoral labour productivity stood 30.1% higher in 2015 when compared with 2003 (ILO, 2016). Labour productivity in Cambodia's garment sector nevertheless lags significantly behind other countries in the ASEAN region. Studies have demonstrated that the labour productivity of Cambodia is only 22% of the productivity of Thailand (Chang and Huynh, 2016; Schmucking, 2020). The Cambodian garment sector has so far been limited mainly to the middle stage of the value-chain, namely cut-make-trim (CMT), which depends on ready availability of cheap labour (Natsuda et al., 2010). The closing of this gap in relative productivity is essential for Cambodia to achieve both real wage increases for workers and a shift upwards in the garment sector value-chain.

There are two compelling reasons for Cambodia to continue the efforts to assume a broader and more value-added role in the global garment sector value chain. First, an industrial structure relying on cheap labour leads to price competition with other suppliers, which may endanger the sustainability of the sector in the long term. Second, accelerated automation and digitalisation will make it more

difficult to maintain employment in labour-intensive industries. According to a report by McKinsey & Company in 2018, international fashion brands expect automation in the garment sector to be effective in cutting costs, reducing waste, and enabling the provision of high value-added products through customised production (Andersson et al., 2018). Still, automation has some bottlenecks such as technical challenges, high costs, and the required technical knowledge and labour skills to manipulate and maintain the machines. Thus, rapid replacement of workers or relocation of currently offshored manufacturing in Cambodia to the developed markets is unlikely to take place. Instead, many buyers will combine low-cost mass production in labour-intensive factories in low-wage countries with the production of higher value-added products in semi-automated factories in re-shored/nearshore locations. Even in such an eventuality the present system of production in the garment sector, depending on low-wage, labour-intensive, and routine CMT work, would face pressure to cut labour and wages, while automation may also free workers from long working hours (Bárcia De Mattos et al., 2020).

It is therefore urgent and important for the Cambodian garment sector to develop its competence in sectors other than CMT by applying new technologies and upgrading worker skill sets. An Asian Development Bank (ADB) study suggests the high potential of the Cambodian garment sector in applying 'Fourth Industrial Revolution technologies,' such as automation and digital technologies, which would also assist in monitoring material flows and preventing wastage. Though the technological shift may cause up to 12% of the current workforce to be displaced, it could also generate positive gains in employment and productivity by at least a 20% decline in the amount of time spent on routine physical tasks by 2030. The shortage of skills needed for this technological shift must be addressed through training and skills development to prepare the sector for the challenges of a more digitized and automated production model in the future (ADB, 2021).

3.2 Environmental challenges and SCP in Cambodia's garment sector

Different types of environmental impacts occur at all stages of the garment sector supply chain during fibre production, clothing production, and in the use and after-use phases, as shown in Figure 4. First, the fibre and textile production processes are resource intensive. It is estimated that in 2020 more than 68% of all fibres used in the global textiles sector were extracted from non-renewable sources, including fossil fuels (Chen et al., 2021). Indeed, it has been estimated that more than 98 million tonnes of non-renewable resources are used in the production of fibres and textiles each year (Ellen MacArthur Foundation, 2017). In 2019, Cambodia imported more than 2.5 million tonnes of nylon and other polyamides from China alone (World Integrated Trade Solution, 2019). Textile production, including the farming stage, uses about 93 billion m3 of water annually (Ellen MacArthur Foundation, 2017). The textile production chain is thus the second most polluting industry in the global economy after the oil and gas industry (The Price, 2018). From the perspective of climate change, the environmental impact has also been well documented with quantitative data. Quantis (2018) estimated that the garment sector, including fibres, textiles, apparel, and footwear, generates as much as 8% of the world's greenhouse gas (GHG) emissions. This environmental impact is projected to increase 49% by 2030 under the current business-as-usual scenario. Another severe environmental deterioration that is less quantified results from the wastewater released to the natural environment during production. Dyeing and treatment of textiles for the garment sector are responsible for about 20% of the total industrial water pollution worldwide (Kant, 2012). In addition, an issue currently gaining attention globally is the enormous quantity of plastic microfibres entering the ocean during the washing stages of garments made from plastic-based materials, such as polyester, nylon or acrylic. To the extent that factories in Cambodia are making use of these materials, efforts should be made to upgrade production processes to minimise how much microfibre waste is being discharged as wastewater.

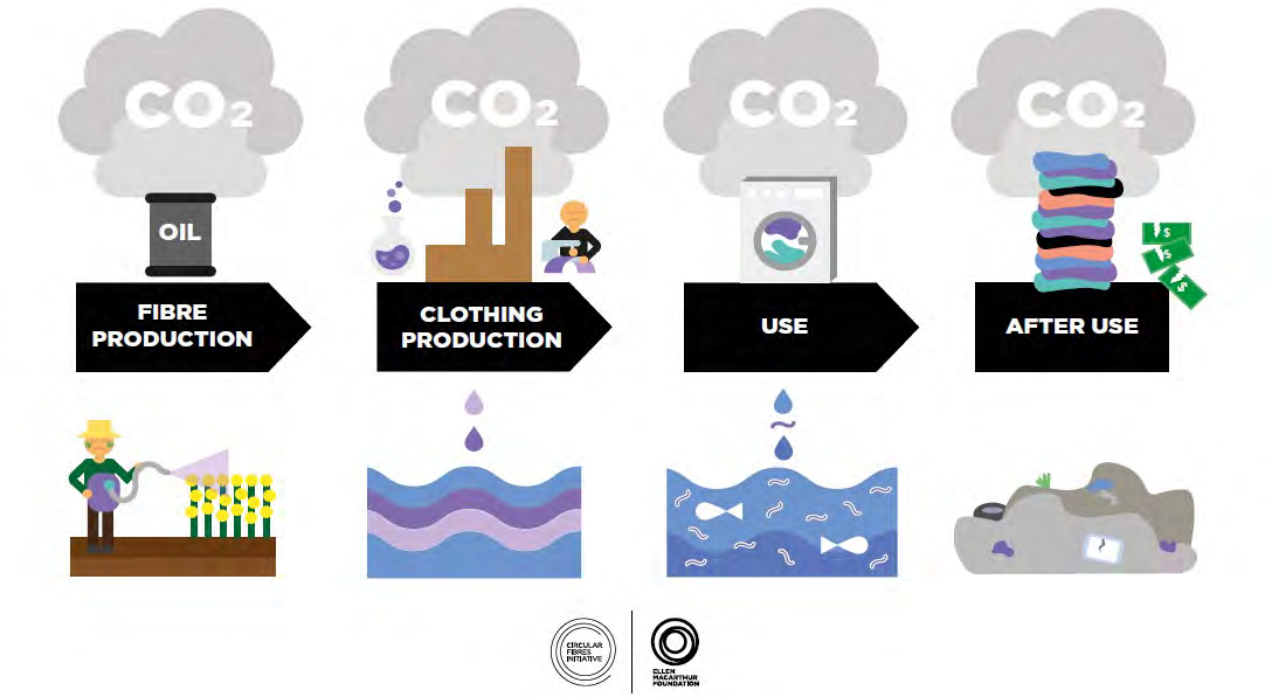

Figure 4. Environmental impacts along the garment supply chain

Source: Ellen MacArthur Foundation (2017)

In Cambodia, the garment sector is mostly based on the CMT model with imported textiles (Ready Made Garments [RMG] Bangladesh, 2019) from countries like China, from which Cambodia procures 60% of its textiles (Nikkei Asia, 2020). Factories in Cambodia are engaged in the steps of dyeing and finishing of textiles and assembly processes (sewing) in the garment supply chain. The major environmental damage results from energy, water and material use, and solid waste and wastewater generated from industrial waste (GGGI, 2018b). The increasing number of factories in the garment sector before COVID-19, especially in Phnom Penh City and Kandal Province, have multiplied industrial waste including discarded clothes, leather, rubber, raw material residues, sludge and industrial wastewater (Ministry of Environment, 2009). The garment sector in Cambodia, as the largest source of toxic discharge to water in the country, contributes 69% of all the toxic pollution to water from all sectors (ADB, 2016). Fewer than 400 enterprises (with 22.7% of these in synthetic resins and plastic materials, spinning, weaving and finishing textiles, and footwear sectors) are responsible for almost 63% of all toxic discharges (ADB, 2016). Wastewater discharge has increased significantly in the past few years, and polluted water from dyeing and washing factories has become one of the major pollution sources in Cambodia. As a result, an opportunity exists to explore options for input substitution to replace unsustainable, toxic and/or hazardous inputs such as energy, dyes and chemicals in factory activities in Cambodia. The Zero Discharge of Hazardous Chemicals (ZDHC) Roadmap to Zero programme is currently working to eliminate dangerous chemicals and substitute them with recommended substances in the textiles sector. The ZDHC programme has developed a toolkit that assists producers to implement sustainable chemical use and wastewater treatment processes and provides a database of 'manufacturing-restricted substances list (MRSL)' and recommended substitutions (UN Environment Programme, 2020[1]).

Based on an assessment conducted by the Institute for Global Environmental Strategies in 2020, the industrial solid waste from garment industries in Cambodia is collected by Sarom Trading Company and transported to industrial landfill in PorSen Chey, located in Phnom Penh. Collected industrial waste is dumped in an open-dumping disposal site without any treatment. Quantification of the waste deposited in landfill from Sarom Trading Company is not currently available (Singh et al., 2018).

1 See also https://www.roadmaptozero.com/input#Gateway-Chemical-Module and https://www.roadmaptozero.com/

Under the guidance of MoE's 2002 Declaration on collecting and transporting industrial solid waste in Phnom Penh (still in effect), the following types of industrial waste from the garment sector are currently being landfilled (Ministry of Environment, Cambodia 2002): semi-dry waste removed from effluent treatment pools; coloured fibres containing polyvinyl chloride; rubber waste and vulcanised rubber containing polymer-butyltin; and waste from production and utilisation of printing ink.

Because the waste generated by the garment industry is not being properly managed, informal waste re-use and re-purposing has grown. In the current construction boom in Cambodia, the brick-making sector is also growing, and some companies are using garment waste as fuel for brick kilns. A national survey revealed that 23 kilns out of 465 (4.9%) use garment waste as fuel, so the garment waste generated from factories in Phnom Penh is burning in brick kilns in the areas where factories are located, as the textile offcuts are easily available and cheaper than using forest wood. Self-employed pickers sort through the waste dumpsite and sell textile offcuts and garment waste to brick factories as low-cost fuel. These garment-burning practices, however, result in severe health problems among brick workers, who often work without masks, as well as on the local households exposed to the kiln smoke without any protection. The burnt garment waste generates hazardous levels of PM2.5 and PM10, particulates that pose numerous health risks, as well as toxic smoke from openly burning chemicals. Those working the garment-fuelled kilns in the brick sector are normally poor and debt-bonded migrant workers from rural areas who seek non-agricultural opportunities to repay their debts (Crang et al., 2020). Thus, although most garment products are exported for consumers in developed economies, the negative environmental consequences fall mainly on some of the most vulnerable and disadvantaged people in Cambodia, under current waste-treatment practices.

3.3 Unsustainable consumption in Cambodia's garment sector

Today most garment producing factories in Cambodia are foreign capital owned. Cambodia remains attractive to foreign capital investors not only for the comparatively advantageous low cost of labour, but also for the country's weak local enforcement of environmental and social regulations (Nachemson, 2020). Compared with the influence represented by foreign capital, domestic actors in Cambodia have relatively limited powers to demand a shift towards sustainable consumption. Since garment production in Cambodia serves mostly for export purposes, the issues of unsustainable consumption of apparel should be understood in the context of the export destinations in the European and Asian markets upon which the Cambodian garment sector relies.

The emergence of affordable fast fashion has significantly changed the global consumption pattern for garments towards a model based on rapid purchase, short product lifestyle, and rapid disposal. Compared with buying habits 15 years ago, each person today buys 60% more items of clothing than before (McKinsey & Company, 2016). The lifespan of clothing has likewise been decreasing, and clothing in 2002 has a 50% shorter lifespan than clothing produced in 2012, and this is likely even shorter today (Muthu, 2014). The average American woman possesses USD 550 worth of unworn clothing in her closet (Huffpost, 2014). In the UK, about 30% of clothing in wardrobes has not been worn for at least a year (WRAP, 2020). The Council for Textile Recycling estimated that each American throws away 70 lbs (32 kg) of clothing and other textiles each year (Council for Textile Recycling, n.d.). Globally, fast fashion has undergone an explosive expansion since the early 2000s, led by brands such as H&M and Zara (Caro and Martinez-de-Albeniz, 2014) and others that produce cheap products with huge negative environmental impacts in developing countries like Cambodia. Global clothing sales nearly doubled from USD 1 trillion in 2002 to USD 1.8 trillion in 2015, and the figure has been estimated to reach USD 2.1 trillion by 2025 (Fibre2Fashion, 2014). Moreover, research shows that excessive consumption is in fact worse for our wellbeing and economic sustainability, and that a shift towards patterns of consumption that help to increase people's wellbeing is urgently needed. Current mass, fast consumption is fuelled by social media and the easy access to goods enabled by

online shopping. As a result, people are buying more clothes than they can afford and/or need, and more than the amount that could even make them happy. Indeed, such shopping behaviour does not make consumers happier (Greenpeace, 2017).

In 2016, Greenpeace published a powerful advocacy report entitled 'Timeout for Fast Fashion', which pointed out that consumers could change their behaviour by buying less and choosing second hand, eco- and fair-traded products. The report reflected a growing consumer awareness of the environmental and social impacts of garment sector production chains in North American and European markets. Nevertheless, the report concluded that much of the responsibility resides with fashion brands and manufacturers to transform their business models (e.g. to stop producing products with large negative impacts on the environment and worker health) and incorporating strong commitments concerning ecological boundaries and real consumer needs (Greenpeace, 2016). In addition, other research shows that even consumers who consider themselves highly aware, environmentally and socially speaking, do not necessarily reflect their own values in their purchasing behaviour (Gwozdz et al., 2013; McNeil and Moore, 2015).

Policymakers, fashion brands and NGOs have significant and influential roles to play in providing the enabling environment for consumers to make sustainable choices easier, and by instrumentalising the awareness and voluntary actions of the consumers in the overseas market. Especially because of the dominant market position of Western retailers and brands, these companies can exert a strong influence on their suppliers and can thus drive the necessary sustainability shift in the global garment supply chain (Koszewska, 2011). The Government of Cambodia and actors in the garment sector are advised to explore the possibility of collaborating with global retailers and brands to address sustainable consumption in their respective markets.

3.4 Certification schemes for sustainable garments

Besides policy and regulatory measures, a certification and labelling scheme is an important instrument for brands to communicate an improved understanding of the environmental and social conditions in their production processes to consumers. Such communication is becoming more important because consumers are increasingly concerned about the harmful components and residues in and on the garment products they buy, and the environmental degradation generated by the production process (Meding, 2008). A 2007 OECD report by Fliess et al. targeting manufacturers reveals that there are many certification processes and labelling schemes available, mainly focused on business-to-business activities. Corporate social responsibility reporting and consumer guides are also produced with auditing performed by independent organisations to ensure the credibility of their reports (Fliess et al., 2007). These are voluntary market-based schemes with transparency and sustainability claims outside the regulatory frameworks (Dowell et al., 2000). They empower consumers to identify products that are harmful to the environment, and to choose products that are more compatible with sustainable values (Robert et al., 2002). Compared to other forms of consumer-oriented communication, labelling has the advantage of being highly visible directly on the products, especially when compared with other less-direct forms of communication such as sustainability reports published by the brands.

Sustainability certification schemes mainly address the environmental and social aspects of the production chain. They may be adopted through third-party bodies that set the standards, through the certifying organisation, or through the entire market as a *de facto* standard without third-party monitoring. Based on these distinctions, the International Organization for Standardization (ISO) has defined three types of environmental labelling, Type I, Type II and Type III, which have different characteristics of certification contents and process (Table 1).

Table 1. Comparison of three types of ISO eco-labels

Source: Moore and Wentz, 2009; Koszewska, 2011

Type	Form of adoption	Basis of certification	Life cycle analysis	Prospects for development
Type I	Voluntary	Based on multiple criteria from third-party programmes that award a license to authorise the use of labels on products indicating environmental preferability within a category based on lifecycle considerations	Simplified	Good
Type II	Self-declaration	Self-declaration of environmental claims based on common terms, definition, and symbols	No	Weak
Type III	Voluntary	Based on quantifiable environmental data under pre-set categories produced by a qualified third party and also verified by a third party	Yes	Average

Examples of common labels from several projects and brands in the garment sector are shown in Table 2, below.

Table 2. Examples of labelling in garment products

Source: Koszewska, 2011; Chowdhury, 2015

Label	Target	Criteria	Description	Logo
Blue Angel Germany	Product	Environment	The first and oldest environmental label for products and services – about 10,000 products and services in 80 product categories apply	
Care & Fair-Siegel	Product	Labour	Against illegal child labour and to support people working in carpet production in India, Nepal and Pakistan	
Clean Clothes Campaign	Organisation	Society and economy	An alliance of organisations in 13 European countries to cover the aspects of women's rights, consumer advocacy and poverty reduction	
Ecocert (France)	Product	Environment	Specialised in the certification of organic agricultural products	

Label	Target	Criteria	Description	Logo
Eco Mark (Japan)	Product	Environment	For products that impose less environmental impact than similar products in their manufacture, use and disposal; and reduce environmental impacts in other ways	
EcoMark (Africa)	Product	Environment	Provides a continent-wide and cross-sectoral label to mark sustainable products made in Africa. It particularly supports small and medium enterprises to get certified	
Ecomark (India)	Product	Environment	For consumer goods that meet the environmental criteria and the Indian quality requirement standards	
European Fair Trade Association (EFTA)	Organisation	Society and Economy	An association of 11 fair trade importers in nine European countries (Austria, Belgium, France, Germany, Italy, Netherlands, Spain, Switzerland and United Kingdom)	
EU Eco-Management Audit Scheme (EMAS)	Product	Environment	European instrument based on Regulation of the European Parliament and Council to encourage organisations to improve their environmental performance	
EU Eco-Label / EU Marguerite	Product	Environment	To encourage businesses and market products to be kinder to the environment	
Environmental Choice (New Zealand)	Product	Environment	It originated from a New Zealand Government initiative and International Accreditation; New Zealand manages it on behalf of the Minister for the Environment	

Label	Target	Criteria	Description	Logo
Fair Trade	Product	Society, economy and environment	Registered by Fairtrade Labelling Organisations International (FLO) to certify products that meet social, economic and environmental standards	
Fair Wear Foundation	Organisation	Society and economy	A not-for-profit foundation with business associations, trade unions and labour NGOs equally represented	
Global Organic Textile Standard	Product	Environment	The standard applies to all natural fibres in the production, processing, manufacturing, packaging, labelling, exportation, importation and distribution	
Nordic Swan	Product	Environment	Covers 66 product groups in Scandinavian countries	
Oeko-Tex Standard 100	Product	Health	Respond to consumers' demand for textiles with no health hazards	
Rugmark / Goodweave	Product	Labour	To end illegal child labour in the handmade rug sector and offer educations to children in India and Nepal	

Certification and labelling schemes also present some challenges. On the producer side, such schemes, while designed to enhance the clarity and transparency of market signals and facilitate intentional consumption among consumers, can in effect act as barriers to market entry for many firms, especially in the developing world. For a country such as Cambodia, where the majority of factories are small- and medium-sized entities engaged in low-value addition production of garments and textiles destined for markets in the EU, Japan, the US, and in other emerging economies, the cost associated with certification scheme requirements (including the costs of certification) could become a barrier that prevents Cambodia from entering those markets (Moore and Wentz, 2009). Indeed, several studies have indicated that eco-labelling schemes can have a net-positive impact on high-value exports from developing countries, while having a net-negative impact on lower-value addition exports due to the prohibitive costs of eco-label participation pricing smaller firms out of the market (Nimon & Beghin, 1999; Joshi, 2004; Sheldon et al., 2009; Roe et al., 2014). The proliferation of eco-labels also presents a challenge in that the more labels exist, with slightly different measures, methods, and messaging, the more the market signal becomes blurred and consumers become confused (Gadema & Oglethorpe, 2011; Brécard, 2014). This confusion among consumers results in a weakening of the perceived value of the greenest eco-labels (Yokessa & Marette, 2020). Studies have shown that firms end up confused about which eco-label is best for them to pursue, and thus choose to participate in lower-value labels (Banerjee & Solomon, 2003; Marette, 2010).

In spite of these deficits in certification and labelling, such schemes remain one of many options available for enhancing sustainability in the garment sector. However, given the relatively weak bargaining capacity of Cambodian factories compared to foreign brands and manufacturers, at the present time it is challenging for them to apply certification and labelling towards sustainability in their operations without partnerships and support from government and brands. Moreover, as the price for exports to major markets such as the EU, the US and Japan from Cambodia has been stagnant in recent years (ILO, 2016), the additional financial investment available for quality and sustainability concerns, including adoption of labelling schemes, may be limited. For the future policy outlook, it is important for the garment sector in Cambodia to be aware of the increasing demands and regulations on sustainability in their sector that could ultimately become a barrier to Cambodia's position in the global garment supply chain.

3.5 Sustainability initiatives supported by various actors

There are several initiatives led by governments and international organisations, such as the EU, designed to enable sustainable consumption in the garment sector, and this could have important effects on the export of garments from countries like Cambodia. For example, the Nordic Council of Ministers for the Environment has called for cooperation on initiatives to encourage consumers to use textiles in more environmentally friendly ways (Nordic Council of Ministers, 2015). Nordic countries are promoting campaigns to reduce harmful chemicals in textiles through declaration and labelling schemes of textile content in European markets. These countries are contributing to the EU Strategy for a Non-toxic Environment in textiles as called for by the 7th Environment Action Programme (European Union, 2013). The Common Nordic Guidelines empower Nordic textile companies to demand their suppliers to comply with specific chemical regulations (Watson, 2017). With increasing restrictions on the harmful chemicals that can be used in textiles in the global market, manufacturing countries like Cambodia will have to respond to the new regulations to ensure that their products comply with export market requirements.

The roadmap of the EU Strategy for Sustainable Textiles was released in January 2021 (European Commission, 2021), and in it the EU has identified the textile sector as a priority industry under the European Green Deal. The Circular Economy Action Plan issued in 2020 specified a set of comprehensive measures to be covered in the Strategy for Sustainable Textiles, as follows: application of the sustainable product frameworks to increase the use of secondary raw materials and reduce hazardous chemicals; improvement of the business and regulatory environment by supporting the product-as-service models, and circular materials and production processes and international cooperation, provision of guidance for separate textile waste collection; and enhancing the re-use and recycling of textiles through innovation and some measures such as extended producer responsibility. With these actions, the Strategy for Sustainable Textiles aims to 'create conditions and incentives to boost the competitiveness, sustainability, and resilience of the EU textile sector, taking into account its strengths and vulnerabilities, after a long period of restructuring and delocalisation, and addressing its environmental and social impacts'.[2]

Multi-stakeholder collaboration led by experts is playing an important role to support the sector's sustainability transition. In April 2021, WRAP, a UK-based non-profit, launched 'Textile 2030', an expert-led initiative to apply scientific knowledge to lead the garment sector in retail, supply, reuse, and recycling towards circularity and system change in the UK. Brands such as NEX, Primark, Tesco, Marks and Spencer, Sainsbury's, and John Lewis Partnership joined as members of the initiative. WRAP also launched the 'Love Your Clothes' initiative targeting consumers to enhance their awareness of the value of clothes and to encourage them to make the most of the clothes they already have. The initiative introduces practical tips to help consumers make their clothes last longer, reduce environmental deterioration from laundering, deal with unwanted clothes, and make

2 https://eismea.ec.europa.eu/news/towards-more-sustainable-circular-fashion-sector-four-cosme-projects-making-it-happen-2021-06_en

the most of their wardrobe. In countries Sweden, Finland, and Denmark sales of redesigned and second-hand clothes are increasing. Consumers choose second-hand clothes because they are affordable, unique, and environmentally friendly (Fues and Norberg, 2011). There are a variety of services available to promote sustainable consumption of fashion which meet consumer's need to be well-dressed, such as online markets for vintage clothing, clothes lending services based on subscription, clothes libraries, clothes donations, repair cafes, and swap markets for clothes (Nordic Council of Ministers, 2015).

Global fashion brands such as H&M are launching initiatives toward a circular and climate positive fashion sector, and to be a fair and equal company. Globally, H&M aims to be climate positive across its entire value chain by 2040. From a material use perspective, H&M's sourcing of recycled materials more than doubled to 5.8% in 2020 compared to 2.2% in 2019 and aims to increase this to 30% by 2025. In Cambodia, H&M aims to reach 100% renewable energy use by 2030, reduce the water used in production by 25% compared to 2017 by 2022, achieve zero waste sent to landfill by 2023, and attain 30% utilisation of ZDHC and gateway levels 1-3 chemicals by 2021. The VF Corporation aims to halve the environmental impact from farm-to-front-door processes and to improve the lives of one million workers and local community members in the supply chain. It intends to lead the large-scale commercialisation of circular business models through brand-led re-commerce, design for circularity, and rental initiatives. The Sustainable Apparel Coalition (SAC) brings together more than 250 organisations working together to reduce the environmental deterioration caused by the garment, footwear and textiles sector and promote inclusive social justice throughout the global supply chain. The Higg Index is used by the SAC to standardise value chain sustainability measurement and identify hotspots to improve environmental performance (Sustainable Apparel Coalition, n.d.).

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Chapter

04

Policy Overview

4. Policy Overview

4.1 Policy framework overview related to Cambodia's garment sector

The **Rectangular Strategies for Growth, Employment, Equity and Efficiency Phase IV** (Kingdom of Cambodia, 2018) aim to achieve the following:

- grow the economy by 7% per annum
- create more and higher-quality jobs
- achieve a poverty reduction target of <10%
- prevent the return of poverty
- strengthen the capacity and governance of public institutions

The four priority areas in the Rectangular Strategy include: human resource development, economic diversification, promotion of private sector development and employment, and inclusive and sustainable development.

The **National Strategic Development Plan (NSDP) 2019–2023** (Kingdom of Cambodia, 2018), as the key guiding document for social and economic development, considers the significance of addressing the productivity and competitiveness of Cambodia's industries in the global economy. More specifically, it proposes to formulate and implement a garment and footwear sector development strategy to improve competitiveness, add value, establish supporting industries, and develop the sector's value chains. UNDP found that the earlier NSDP (2014–2018) and related sector strategies have fully prioritised about 78% of the 109 SDG targets reviewed.

As the time this document was being finalized, a new **Garment Sector Development Strategy** had been drafted and was being approved by the Ministry of Economy and Finance.

The **National Environment Strategy and Action Plan (NESAP) 2016–2023** (Kingdom of Cambodia, 2017) noted at the time that the garment sector still relies heavily on imported raw materials with low resource and energy efficiency. In addition, solid waste issues, which include hazardous waste and wastewater treatment, must be addressed. To enhance performance by "reducing, reusing, and recycling" (3Rs), Cambodia will seek to improve its waste management policy and introduce market-based mechanisms such as landfill and incineration fees, pay-as-you-throw, and extended producer responsibility (EPR) schemes. The Action Plan emphasises the need to improve monitoring and compliance of relevant laws and regulations in key sectors, including the garment sector.

The **National Strategic Plan on Green Growth (NSPGG) 2013–2030** (Kingdom of Cambodia, 2013) provides the long-term vision to balance the development of the economy, environment, society and culture with a focus on nine priority action areas:

- Green investment and green jobs creation
- Green economy management in balance with the environment
- Blue economy development with sustainability
- Green environment and natural resources management
- Human resources development and green education
- Effective green technology management
- Promotion of a green social safety system
- Upholding and protection of green cultural heritage and national identity
- Good governance on green growth

In the use of natural resources, the Plan on Green Growth outlines five measures to manage economic activities related to natural resources use:

- Apply environment and social impact assessment (ESIA)
- Mainstream SCP framework
- Reasonable pricing
- Increase the efficiency of natural resources management by the polluter pays principle
- Introduce reduce, reuse, and recycle (3Rs)

In the prioritised activities, the Plan on Green Growth has assigned MoE to implement:

- Management of debris, solid waste and hazardous water, water pollution control, and air pollution control to be implemented in line with a legal standard
- National strategy development for green industry, based on resource efficiency and the 3Rs strategy
- Efficient use of resources by implementing the polluter pays principle.

In addition, the Plan on Green Growth tasks MoE and municipal governments with implementing improved liquid waste management in line with sustainability objectives.

The **Cambodia Industrial Development Policy 2015–2025** 'Market Orientation and Enabling Environment for Industrial Development' (Kingdom of Cambodia, 2015) stresses the productive value of transforming the industrial sector from labour-intensive production to a more skills-driven industry by 2025 through connection to regional and global value chains. For waste management, the policy affirms the need to protect the environment and avoid pollution caused by industrial and chemical wastes. Under this framework, industrial policy will set clear standards and guiding principles for special economic zones (SEZs) encompassing environmental protection and production safety to be led by the Council for Development of Cambodia and the MoE.

The **Cambodia Climate Change Strategic Plan 2014–2023** (Kingdom of Cambodia, 2013) aims to develop a green, low-carbon, climate resilient, equitable, sustainable and knowledge-based society. The Strategic Plan empowers the MoE to implement solid waste and wastewater management through integrated approaches in cities and towns. In addition, as a Party to the United Nations Framework Convention on Climate Change (UNFCCC) since 1996, the Royal Government of Cambodia (RGC) submitted an updated Nationally Determined Contribution (NDC) in 2020, which presented progress on climate-change policies and put forward mitigation targets and adaptation actions to be achieved by 2030. The updated NDC aims to reduce national greenhouse gas emissions by 41.7% (64.6 million tCO_2e/year) by 2030 compared to the business-as-usual scenario. The establishment

of a centralised recycling facility for industrial waste from the garment sector is expected to account for roughly 0.11 $MtCO_2e$ between 2021–2030. Over the same period, the production of refuse-derived fuel (RDF) from either new or old municipal solid waste (MSW) mined from the Dankor landfill will account for up to 0.2 $MtCO_2e$/year. Other initiatives expected to contribute to emissions reductions include a new sanitary landfill with landfill gas (LFG) extraction, LFG extraction from existing Dankor landfills, and the implementation of a National 3R Strategy.

The **Waste Management Strategy and Action Plan 2018–2035** (Capital Administration, 2018) aims to optimise the exploitation of useful resources from solid waste through enhanced waste separation according to material type. The Action Plan seeks to improve and optimise waste collection services based on the type of waste, and to create necessary infrastructure for waste disposal facilities and improve the current existing dumping sites in compliance with environmentally sound management of waste disposal. The Action Plan also promotes the use of recycled products resulting from waste. The Action Plan target setting lists five actions areas:

- Improvement of waste collection to achieve 100% by 2035
- Promotion of recycling to achieve 95% or more for non-organic recyclable waste and 20% or more for organic waste
- Improvement of the management of final disposal sites in terms of leachate management, landfill gas management, working conditions and on-site resource recovery
- Management of special waste for construction and demolition waste, medical waste, industrial waste and E-waste; for industrial waste, reach a collection rate of 100% by 2035, reach 95% or more recycling rate for non-organic recyclable waste and 20% or more for organic waste, and the introduction of treatment technology to reach 50% or more to be treated through environmentally sound methodologies
- Bringing stakeholders into the process through feedback mechanisms, curriculum for environmental education, and 3R practice. For industrial waste management, the first step suggested is to ensure that all waste generators are under valid contracts with waste management companies and to strengthen the monitoring mechanism for illegal disposal and treatment. Subsequently, it is intended to attract investment in waste management to match the business opportunities with waste generators and recyclers.

Although relevant policies and laws are in place, compliance with existing regulations remains weak and policy targets and enforcement are lacking. Moreover, the management of final disposal sites is unsound (Singh, 2018). In the existing legal framework, those who generate waste must manage the waste. In practice, waste collection and disposal are carried out by private waste management companies by receiving the collection fee from waste generators. In addition, illegal disposal and evasion of user fees frequently occurs (Singh, 2018).

4.2 Overview of the national legal framework related to the garment sector in Cambodia

This section will present an overview of the laws and regulations governing the garment sector in Cambodia. Table 3 lists many of the national policies currently in place. Below, a brief discussion of the most important policies follows.

Table 3. National legislation related to solid waste management in Cambodia

General laws, policies, and regulations	• Law on Environmental Protection and Natural Resources Management, 1996 • Sub-decree No. 72 on Environmental Impact Assessment Process, 1999 • Declaration No. 12 on Giving Roles and Responsibilities to the Environmental Departments of Provinces/Cities, 1999
Municipal solid waste management	• Sub-decree No. 36 on Solid Waste Management, 1999 • Inter-ministerial Declaration No. 80 on Solid waste Management in Province/Cities, 2003 • Sub-decree No. 113 on Management of Garbage and Solid Waste of Downtowns, 2015 • National Policy on Urban Solid Waste Management 2020–2030, 2021
Industrial solid waste	• Instruction No. 87 on Factory Hazardous Waste Management, 2000 • Instruction No. 177 on Sludge Management at Factories/Enterprise, 2000 • Declaration No. 83 on Licensing Sa Rom Trading Co. Ltd. to construct an industrial solid waste dump in Phum Chambok, 2001 • Declaration No. 156 on Licensing Sa Rom Trading Co. Ltd. to construct an industrial solid waste dump, and operate waste collection and transport business, as well as monopolise industrial waste storage in Phnom Penh, 2001. • Declaration No. 148 on Collecting and Transporting Industrial Solid Waste in Phnom Penh, 2002 • Instruction No. 11 on Solid Waste Management at Factories, Enterprises and Companies, 2003 • Notification No. 12 on Stopping Trafficking or Providing and Burning of Industrial Waste, 2003 • Declaration No. 387 on the Launch of Standards of the Quantity of Toxins or Hazardous Substances Allowed to be Disposed, 2015 • Sub-decree No. 446 on the organisation and function of the Department of Hazardous Substance Management, 2015
Wastewater	• Sub-Decree No. 27 on Water Pollution Control, 2009 • Notification No. 141 on Water Pollution Control in Provinces/Cities, 2001 • Sub-Decree No. 235 on the Management of Drainage and Wastewater Treatment System, 2017
Other specific waste	• Sub-Decree No. 446 on the organisation and function of the Department of Hazardous Substance Management, 2015 • Declaration on Waste Management from Health Care Service in the Kingdom of Cambodia – Ministry of Health, 2008 • Decision on creation of Medical Waste Management Unit, No. 96 of Red Cross Cambodia, 2009 • National Guide on Waste Management from Health Care Service, 2012 • Sub-decree of E-Waste and Electronic Equipment, 2016 • Sub-decree on plastic bag management, 2017

General Laws, Policies, and Regulations on Waste

The **Law on Environmental Protection and Natural Resources Management** (Kingdom of Cambodia, 1996) aims at protecting and improving environmental quality and health by reducing and controlling pollution; conducting environmental impact assessment (EIA) of projects; and ensuring that the conservation, development, management, and consumption of natural resources in Cambodia are managed in a way that is environmentally friendly and sustainable.

Declaration No. 12 on Giving Roles and Responsibilities to the Environmental Departments of Provinces/Cities (Ministry of Environment, 1999) in the Implementation of **Sub-decree No. 27 on Water Pollution Control** (Kingdom of Cambodia, 2009) and **Sub-decree No. 36 on Solid Waste Management** (Kingdom of Cambodia, 2002) with its further regulation: (1) Instruction/Sechkdey Nainoam No. 50 to strengthen/support/promote the implementation of Sub-decree No. 36; and (2) Instruction/Sechkdey Nainoam No. 51 to support the implementation of Sub-decree No. 27 mentioned above.

National Regulations on Municipal Solid Waste Management

Sub-decree No. 36 on Solid Waste Management was the first regulation to focus on solid waste management in Cambodia including general solid waste management, and also addressed the need for the **Declaration 387 on the Launch of Standards of the Quantity of Toxins or Hazardous Substances Allowed to be Disposed** (Ministry of Environment, 2015) and **Declaration on Standard Limit Setting of Toxic Volumes or Hazardous Substances in Hazardous Waste** (Ministry of Environment, 2015) regulating the hazardous and toxic wastes that may be discharged.

Inter-ministerial Declaration No. 80 on Solid Waste Management in Provinces/Cities (Ministry of Environment and Ministry of Interior, 2003) aims to strengthen the roles and responsibility of local authorities and competent officers to effectively take solid waste management measures in the provinces/cities of Cambodia, including waste collection, cleaning, temporary collection points, transportation, recycling, and disposal of all solid non-hazardous waste.

Sub-decree No. 113 on Management of Garbage and Solid Waste of Downtowns (Kingdom of Cambodia, 2015) set four-fold aims to:

- enhance the responsibilities of ministries, institutions, specialised organisations, sub-national administration and other stakeholders for the management of urban garbage and solid waste;
- transfer the functions of urban garbage and solid waste management to the administration of municipality, city and district and delegate the functions of urban garbage and solid waste management to the administration of district/khan;
- set up necessary measures to improve the effectiveness and safety in the urban garbage and solid waste management; and
- promote raising public awareness and civil participation in the organising and implementing urban garbage and solid waste management.

National Regulations on Industrial Solid Waste Management

Instruction No. 87 on Factory Hazardous Waste Management (Ministry of Environment, 2000) is a response to improper hazardous waste management at machinery workshops or factories/ enterprises to cover petroleum waste, oil, sludge from septic/treatment tanks, and waste from production processing. The Instruction provides several guidelines such as: (1) proper storage of used engine oil or petroleum waste from machinery cleaning/maintenance to avoid its discharge into sewage or public water sources; (2) handling of dry or compressed sludge from septic tanks and

wastewater treatment tanks and proper temporary storage at the sites; (3) prohibition of disposal or transport of sludge mixed with household solid waste; (4) requirement to obtain permission from MoE before the transportation of dry sludge to other areas for any purpose; and (5) requirement to obtain permission from MoE before discharging factory wastewater into sewerage or public water bodies.

I**nstruction No. 177 on Sludge Management at Factories/Enterprises** (Ministry of Environment, 2000) responded to improper management of some garment washing factories-enterprises that were required to comply with technical and environmental standard guidance, e.g.:

- notifying MoE before desludging septic tanks or wastewater treatment systems
- drying or compressing sludge for proper temporary sludge storage
- reporting sludge volumes and their location to MoE every three months

In addition, the Instruction specifically prohibits the disposal or transport of sludge mixed with household solid waste, as well as the desludging and discharging of septic tanks or wastewater from treatment systems intended for garment washing into public sewage or public water bodies, and the requirement to obtain permission from MoE before the transportation of dry sludge to any other areas for any purpose.

Declaration No. 83 on Licensing Sarom Trading Co. Ltd. To construct an industrial solid waste dump in Phum Chambok (Kingdom of Cambodia, 2002) provides licenses to Sarom Trading Co., Ltd. to construct an industrial solid waste dump located in Phum Chambok, Khan Kombol, Srok Angsnuol, Kandal Province, and requires the company to comply with the **Law on Environmental Protection and Natural Resource Management** (1996), and **Sub-decree 72 on Environmental Impact Assessment Process** (1999).

Declaration No. 156 (Kingdom of Cambodia, 2002) provides licenses to Sarom Trading Co., Ltd. to construct an industrial solid waste dump and operate waste collection and transportation business, as well as to monopolise the storage of industrial waste in Kandal Province. The company is licensed to legally carry out this waste collection business for a period of 10 years.

Declaration No. 148 on Collecting and Transporting Industrial Solid Waste in Phnom Penh (Kingdom of Cambodia, 2002) provides licenses to Sarom Trading Co. Ltd. and Municipal Waste Control Excise, located at the Municipal Office for Public Work and Transport, to collect and transport industrial solid waste from enterprises/factories to the dump at the site of Sarom Trading. In addition, it also specifies the types of industrial solid waste permitted at this dump, e.g.:

- semi-dry muddy waste removed from effluent treatment pool
- coloured fibres and pieces of fabrics
- plastic waste containing PVC
- rubber waste and vulcanised rubber containing polymer-butilin
- batteries and battery waste
- ash residue after incineration of medical waste
- waste from electrical lighting and devices
- waste from paint, lacquer, and packaged materials
- insecticide waste used in agriculture and in packaged materials (must be placed in a rubber tub before being dumped)
- waste from the production and utilisation of printing ink

- Expired goods or goods that do not meet required standards
- Film negatives
- Expired medicines and waste resulted from medicine production
- Waste containing asbestos

Instruction No. 11 on Solid Waste Management at Factories, Enterprises and Companies (Ministry of Environment, 2003) aims to distinguish and strengthen the implementation of **Sub-decree 36 on Solid Waste Management** (1999) and **Declaration No. 148 on Collecting and Transporting Industrial Solid Waste in Phnom Penh** (2002). MoE has given its guidance to factories and enterprises to segregate their waste into two types: (1) solid waste generated from kitchen and offices of factories, enterprise and companies (supposed to be transported by CINTRI Waste Collection Company); and (2) industrial solid waste including hazardous solid waste generating from the production chains of the factories, enterprises and companies (supposed to be transported by Sarom Trading Company in Kandal province) and dumped at the Sarom landfill.

Notification No. 12 on Stopping Trafficking or Providing and Burning of Industrial Waste (Ministry of Environment, 2003). Realising that some factories sell cloth scraps to contractors and that garment waste is being used as fuel for burning, thus creating air pollution with a damaging effect on the surrounding population, MoE has provided guidance as follows: (1) prohibiting the selling of industrial solid waste (cloth scraps, thread, plastic, etc.) to private contractors or middlemen without prior permission from MoE; (2) owners or persons in charge of the factories, enterprises, and companies.

Declaration 387 on the Launch of Standards of the Quantity of Toxins or Hazardous Substances Allowed to be Disposed (2015) launched standards concerning the quantified limit of toxic chemicals or hazardous substances contained in hazardous waste which may be disposed in sanitary landfills, as well as in the soil.

National Regulations on Wastewater

Sub-decree No. 27 ANRK.BK on Water Pollution Control (Kingdom of Cambodia, 2009) aims to control water pollution, by curbing and reducing water pollution at public water bodies to protect human health and conserve biodiversity. It has set the provisions on waste and hazardous discharges including standards/permits for effluent discharge from any source of pollution as well as the types of pollution sources requiring permission from MoE before discharging or transporting their wastewater.

Notification No. 141 on Water Pollution Control in Provinces/Cities (Ministry of Environment, 2001), in response to the improper management of septic tanks and wastewater treatment tanks of garment dyeing or washing factories/enterprises causing environmental pollution and public health problems, MoE has strengthened its pollution control on the garment dyeing or washing factories/enterprises including: (1) taking wastewater discharging samples from garment dyeing or washing factories/enterprises every 45 days; and (2) taking wastewater discharge samples from factories/enterprises, companies, hotels, hospitals and restaurants every 60 days.

Sub-decree No. 235 on the Management of Drainage and Wastewater Treatment System (Kingdom of Cambodia, 2017) aims to improve the management of sewerage and wastewater systems efficiently, transparently, and accountably to ensure the safety of public health and biodiversity conservation, including:

- enhancing the responsibilities of ministries, institutions, specialised organisations, sub-national administration and other stakeholders for the management of sewerage and wastewater treatment systems;

- transferring the operation and maintenance functions of the management of sewerage and wastewater treatment systems to the administration of municipality, city, district/khan;
- setting up necessary measures to improve the effectiveness and safety in the management of sewerage and wastewater treatment systems;
- promoting public awareness-raising and civil participation in the utilisation of sewerage service and wastewater treatment service; and
- promoting the participation of development partners to develop or invest in construction, operation and maintenance of the sewerage system and wastewater treatment system.

Chapter

05

Stakeholder Interviews

5. Stakeholder Interviews

The garment sector supply chain is complex and involves various sets of stakeholders in the different supply stages of the chain. In the case of Cambodia, as it is engaged in the bleaching/dyeing, finishing, and assembly segments of the textiles and garment supply chain, the major actors include garment designers, garment makers, and brands and retailers. Government ministries and international organisations work together to refine measures to enhance the sector's compliance with existing regulations. Moreover, because of the export orientation of the garment products from Cambodia, the actors in the international supply chain are able to significantly influence the sustainability drive within the sector. Industry associations play an important role in bridging the domestic and international actors in the sector. Finally, industrial waste treatment companies are involved in waste collection and treatment according to the regulations introduced by the ministries (see Table 3, preceding chapter).

This chapter presents interview results from eight different actors in the garment sector in Cambodia, including government ministries, international organisations, industry associations and private companies engaged in export and waste management. Interviewees were asked to provide their analysis of current issues, solutions, and opportunities and barriers to make the garment sector more sustainable.

5.1 Interviews with Ministries and International Organisations

5.1.1 Interview: Ministry of Industry, Science, Technology and Innovation

Current focus – In 2021, of the 1,835 large industrial factories registered in Cambodia across all sectors, 792 were garment and textiles factories. A further 3,144 small and medium-sized enterprises and handicraft producers were active in the sector. MISTI is focusing on promoting four key objectives for the garment sector:

- Transfer of Environmentally Sound Technology (TEST): since 2014, MISTI has focused their efforts on resource efficiency and clean production including the reduction of raw materials consumption, and especially hazardous substances using new/modern technology
- Setting up an information/database on the production chain
- Creating an environmental management system
- Promoting corporate social responsibility (CSR)

These improvements are supported by MISTI in cooperation with UNIDO, JICA and other development organisations, with assistance to the enterprises involved in handicrafts, dyeing and washing, garment factories, and various other producers in other sectors. Hundreds of companies have

been helped to reduce their chemical, water, and energy consumption, as well as their generation of solid waste and wastewater as well as greenhouse gas (GHG) emissions. They have also received assistance from MISTI to introduce cleaner production processes with new technologies as part of Green Industry work packages. About 70% of the industrial factories, enterprises and handicrafts which have received TEST support are garment and textile factories.

Laws and regulations – For laws and regulations related to solid waste and wastewater management, MISTI is responsible for the management and control of solid waste and wastewater management within compounds or facilities of the factories, enterprises, and SMEs under the control of MISTI, whereas solid waste and wastewater discharged from such sources come under MoE control (including sanctions or punishments). If a factory or enterprise is caught polluting, MISTI can only withdraw the company's license, and the MoE would be responsible for issuing warnings or fines. However, the management system is still missing a framework or guidelines to properly coordinate and monitor a collaborative approach between the two ministries together with the industrial companies for proper monitoring and enforcement of industrial waste regulations. In cases of improper management of waste inside facilities, MISTI is trying to improve the situation through the TEST method, including the promotion of cleaner production practices.

Implementation of laws and regulations – Legally, MoE is responsible for the management of natural resources and environmental protection. From the policy level to the implementation level, in terms of climate change, waste management or environmental protection, MISTI and MoE are cooperating to ensure proper implementation and compliance with laws and regulations. For instance, the ministries have joint working groups, from the implementation to policy level, including the National Council for Sustainable Development, Inter-ministerial Climate Change Working Group, and Inter-ministerial EIA Working Group, among others. These working groups assess investment projects for environmental protection and waste management, types of solid waste/wastewater, and reuse and recycling through technical inter-ministerial cooperation.

According to the Law on Administration of Factory and Handicrafts enacted by the National Assembly on 2 May 2006, MISTI governs the establishment of all factories or handicrafts in Cambodia and issues permits to factories with the approval of other concerned institutions. MISTI requires these invested companies to provide data on their investment capital, number of workers, yearly requirements of raw materials, energy, water consumption, and coal/fuel/electricity consumption as well as information about the environment inside and outside the facilities, such as estimated wastewater discharge volume (m3/month), and solid waste volume (tonnes/year or m^3/year). Companies must follow the standard discharge terms and conditions set up, for instance under Sub-decree No. 235 on the Management of Drainage and Wastewater Treatment System; Declaration No. 387 on the Launch of Standards of the Quantity of Toxins or Hazardous Substances Allowed to be Disposed (2015) and other related laws and regulations. In addition to the TEST method to promote green industry, MISTI also administers the National Productivity Centre of Cambodia (NPCC), which has been working with the Asian Productivity Organization led by Japan to promote green productivity through waste management, waste reduction, lean production, and clean production with technical support, capacity building and demonstrations to the private sector.

Industrial cluster priority – In addition to actively promoting green industry, green productivity, and green technology, MISTI also has prepared the Green Industry Award to encourage factories/enterprise to operate sustainably by reducing their environmental impact, which is supposed to be launch later by mid-2022 (it was conducted once before, in 2014, and a garment factory won the award). The winners will be prepared as showcases to share with others in the same industrial clusters including garment and textile clusters. The award is also planned to be promoted as a national programme to have larger impact in green industry promotion. Moreover, the Government is giving higher priority to more diverse industries like cement production, food processing, paper recycling or production, agro processing/industry, and technology.

Challenges – MISTI has only baseline data provided by factories/enterprises at the establishment stage and lacks reliable data on waste flows during the operation stage, such as the actual waste amount generated each year, how the factory manages their waste, or if they engage in recycling of materials. Arguably, the only reliable way to obtain quality data from the sector is consistent, robust, well-run industrial extension programmes that provide training, and build relationships with factories. Although MISTI has an Office of Industrial Environment under the Department of Technology and Industrial Safety, MISTI is not supposed to play the main role in industrial waste management, but rather plays its role in cooperation with the responsible institutions like MoE. Among other challenges, there has been the rapid growth of factories/enterprises. Also, MISTI has acknowledged the importance of behaviour change in their client enterprises as well.

5.1.2 Interview: Ministry of Environment

Laws and Regulations – Various relevant laws and regulations apply to solid waste management and wastewater treatment in the garment sector such as: (1) Declaration on Industrial Solid Waste Collection and Transport in Phnom Penh, No. 148 (2002); (2) Declaration 156 (Ministry of Environment 2002) on Licensing Sa Rom Trading Co. Ltd. to construct an industrial solid waste dump, and operate waste collection and transport business, as well as monopolise industrial waste storage in Phnom Penh and Kandal Province; (3) Instruction on Solid Waste Management at factories, enterprises and companies, No. 11 (2003); (4) Instruction on Sludge Waste Management at Factories/Enterprises (2000); and (5) Instruction on Factory Hazardous Waste Management, No. 87 (2000). The draft of the proposed new Environment Code has Book 6 on Waste and Pollution Management, which includes management of hazardous substances, waste management, and water pollution control, among others, although its passage is still uncertain.

The new policy on Urban Solid Waste Management (2020–2030) aims to establish and apply a modernised solid waste management system and holistic approaches, while considering the circular economy, financial resource feasibility, environmental sustainability, and social aspects. The policy is divided into 5 main sub-policies: (1) setting law and regulation, framework, work frame, role and responsibilities of ministries, institutes, units and persons who are the stakeholders in urban solid waste management; (2) setting up the implementation of the roles and responsibilities of capital city administration, municipalities and districts; (3) setting the appropriate techniques, technology, and infrastructure for urban waste generation reduction; (4) creating investment opportunities to support the private sector in providing waste management services; and (5) promoting awareness raising, extension and boosting public participation in solid waste management.

The Urban Solid Waste Management policy also highlights the roles and responsibilities of various ministries, including MISTI, that need to promote and support enterprises or manufacturers to reduce their urban solid waste generation through integration of the Clean Production Programme, the Environmental Management System (ISO 14001), and the Green Industry Plan with the urban waste recycling sector. The Ministry of Mines and Energy is to take the lead on a feasibility study on urban waste to energy, waste recycling and waste recovery, and promoting investment projects on waste for districts, municipalities or the capital city due to landfill challenges for waste disposal throughout the country.

Implementation of Laws and Regulations – Currently, MoE has been performing the regulation promotion and extension, while there are also external factors in addition to the above regulation enforcement internationally. Compliance also depends on the buyer requirement for the factories to comply with their environmental agenda to make sure products are suitable for the international markets. MoE is also responsible for environmental impact assessment which is set out in Chapter III of the Law on Environmental Protection and Natural Resource Management 1996 and **Sub-Decree 72 on Environmental Impact Assessment** (1999).

Industrial Waste Management – Since industrial waste requires a separate management system from municipal waste, MoE has allowed Sarom Trading Co., Ltd. to provide services to collect and transport such waste and dispose of it at industrial solid waste landfills since 2002. The Sarom Trading Company operates a solid waste collection and transportation service for 390 factories in Phnom Penh, Kandal province, Kompong Speu Province, Sihanou Ville and Takeo Province under individual contracts. Since Sarom Trading Company had insufficient capacity to cover Kompong Chhnang Province, the ministry decided in 2014 to allow another company, Kim Munna Company, to cooperate with Hour San Group Co., Ltd. to operate waste collection and transportation from factories in that province, which included establishing a new landfill site.

Every factory needs to apply to MoE for a solid waste and wastewater discharge permission/quota annually, costing about USD $125. Solid waste export has stopped since 2015 due to China's policy not to import waste. The recyclable waste is separated at source in the factories' storerooms for sale and the rest is for disposal, mostly cloth scraps, paper, and plastic. For wastewater discharge, MoE is regularly monitoring and analysing wastewater in the laboratory to make sure the water quality is within the standard allowance. In case of any pollution issues/complaints, MoE is responsible for performing awareness raising and education activities. It was acknowledged that some garment factories separate the waste into recyclable waste for sale, industrial waste, or domestic waste for disposal. Since 2020, MoE has been preparing training courses for footwear factories on promoting waste separation at source and installing more modernised automatic equipment for pollution monitoring for all product processes; with an initial focus on wastewater.

5.1.3 Interview: GIZ (FABRIC Asia)

GIZ is currently engaging with the public sector to develop new initiatives and activities in the garment sector focused on the potential for fabric recycling factories in Cambodia. As part of these efforts, GIZ is exploring how to support cooperation between these projects. GIZ is conducting a feasibility study on setting up a Fabric Recycling Facility for garment factories generating about 15–20% of total fabric waste. The stated goal is to produce a local fabric composed of recycled material in Cambodia.

There are several options for disposal of waste from garment factories, including: collection by Sarom Trading Company and disposal at the industrial landfill in Kambol District, Phnom Penh and recycling into other products such as hammocks and floor mats. Informal waste disposal services and practices also exist outside the regulatory system, including the illegal burning of garment waste for energy. It may also be possible to work with major housing and building developers to incorporate low embodied energy and high-performance building products that make use of recycled industrial waste from the garment sector. In terms of wastewater treatment, some large garment factories have their own laundry, dyeing, and wastewater treatment facilities. It is estimated that about 5–10 factories have such facilities; however, these are often not operating due to the high cost, insufficient availability of needed chemicals, or lack of monitoring. It is assumed that the associated water consumption is low, and thus the management of cloth scraps is a relatively larger challenge.

5.1.4 Interview: United Nations Development Programme (Cambodia)

UNDP, with the support of the Government of Sweden, has been assisting the government of Cambodia in developing a national Circular Economy strategy to tackle climate change, the degradation of natural resources and biodiversity, energy shortages, growing volumes of waste, and increasing air pollution while creating more and better jobs, and strengthening the competitiveness of its economy and industries (UNDP, 2020). In addition, UNDP and H&M have been working together to identify sustainable waste management solutions for the garment sector. During a 2018 meeting, which was attended by the Royal Government of Cambodia, garment sector representatives and waste and energy management experts reviewed the sector's waste management practices, their environmental impacts, shared best practices, and identified innovative solutions to manage waste (UNDP, 2018).

5.2 Interviews with Sector Representatives

5.2.1 Interview: Garment Manufacturers Association in Cambodia (GMAC)

Laws and Regulations – Garment buyers normally require the factories where they source their purchases to follow the laws and regulations of the countries in which the factories are located. GMAC has about 600 exporting factory members, with about 10% producing fabrics, washing, and laundry. The remaining 90% of factories contract third-party companies for washing and laundry services. The number of factories having a boiler system is uncertain. Current regulations are adequate, but reinforcement is needed with a more logical approach. For instance, factories should not have to pay Sarom Trading if their waste is being treated by other parties. GMAC reports that it always follows national laws, regulations, and conventions such as cooperating with SWITCH Garment and having their office based at GMAC Building as well.

Measures at the factories – While industrial waste is mainly collected by Sarom Trading, MoE also allows other companies to provide the services in areas where Sarom does not operate, including Chip Mong Insee Ecocycle. Incinerators installed in factories must have properly installed filters to control air pollution. Moreover, cloth scraps must be disposed of at the landfill, and should not have the buyer's brand visible. Normally the branded companies have their own compliance team to monitor the situation to ensure realistic, price, and quality, as well as to remedy any inappropriate cases. GMAC also promotes advanced measures and technologies to manage the industrial waste, with suitable costs for the treatment of pollution.

5.2.2 Interview: Li & Fung

Situation of Garment Sector – To measure sustainability, garment sector factories rely on a tool called the Higg Index (Sustainable Apparel Coalition, n.d.) which allows factories to input their own data related to water use, energy and GHG emissions, wastewater effluent, waste management, chemicals, and other emissions. Based on this index, the information and benchmarking from the factories can be compared using a similar methodology. Currently, Li & Fung is looking for solutions to keep improving the condition of the factories, and to enhance monitoring of clean water, GHGs, chemical management, and especially fabric scraps. The customers are interested to know what happens with fabric scraps, if it is chemically treated, burned, reused, or disposed to landfill. The company is looking for various programmes to make sure that the waste is properly managed, initially to see the possibility of fabric waste recycling without much processing to reuse or utilise the fabric scraps, or subsequently to see that fabric waste is properly disposed of and not used for open burning.

Challenges – Currently in Cambodia it is challenging to manage all types of waste, including industrial waste. Moreover, the garment sector is lacking a scalable programme. For instance, one factory may know someone who can treat or recycle its waste properly (e.g. waste to energy), but a factory nearby may not have access to that same information. As a result, the second factory may burn its waste or illegally dispose of it. Supporting factories to join a new initiative, especially if it involves more investment cost, is another challenge for garment factories. From observation, some factories have access to waste collection services and may use the services, while others have little waste and are located in rural areas, so they may dispose of the waste by themselves, use open burning, or use the waste as fuel for boiler machines at their factory. By law, however, it is not allowed to burn fabric waste and, of course, the law is enforced if there is huge impact.

Sustainability – Li & Fung has been operating in Cambodia for more than 20 years. To encourage factories to do something more for sustainability, Li & Fung needs to find local programmes and partners to help provide flexibility and information for the factories they use in Cambodia. The company is willing to adopt better practices in all 15 countries in which it operates and is preparing

a sustainability strategy for their products as well as for waste management. The company is very interested to learn about SWITCH-Asia's waste management research and the outcome of the project to learn if there is any fabric waste recycling in Cambodia at the moment, especially transforming old cloth scraps into new fibre. They regard waste-to-energy as the last option, although it is better than disposal at the landfill or open burning. Normally, the brands would like to see the possibility of fabric recycling or reuse and enable the factories to up-cycle or down-cycle the fibre.

Implementation of Laws and Regulations – To improve sustainable waste management in Cambodia, the Government has implemented a fee for plastic bags at supermarkets. The success of this programme suggested that further regulation could improve the effectiveness of waste management systems in the industrial sector. Implementation, reinforcement, and education of the existing policy is especially important so that garment factories are clear on the ways in which they are required control their waste. Currently, every six months, factories need to apply for new permits on their solid waste and wastewater discharge or to renew the permit on time. However, some factories do not like to do this due to some cost or payment. In addition, during inspection, for example, some issues are noted during the inspection mission, but there is no follow up to see if the issues have been resolved or improved. Such weak enforcement is not very effective and there is no follow up action with technical expertise/solutions to assist factories in achieving compliance.

5.3 Interviews with Industrial Waste Management Companies

5.3.1 Interview: Sarom Trading Co., Ltd.

Current State - Sarom has been collecting industrial waste in Phnom Penh Capital City, Kandal Province, and Kampong Speu Province from various sources including shoe factories, beverage, garment and textile, and laundries. Of this collected waste: (1) about 30% is from small scale factories on a once per week collection schedule (1.5 tonne or 5 m3 truck); (2) about 30% is medium scale factories on a twice per week collection schedule (1.5 tonne or 5 m3 truck); and (3) about 40% is large scale factories on a daily collection schedule exempting national holidays (1.5 tonne or 5 m3 truck).

The seven-hectare industrial landfill area is in Kob Ambel village, Sangkat Kambol, Khan Kambol, Phnom Penh City Capital, and it may run out of its disposal capacity soon. For factories with canteens, food waste is supposed to be collected separately from industrial waste, and most recyclable waste is separated at source (such as paper, plastic, and metal). From the garment/textile factories, most of the waste is cloth scraps and thread and about 80% is reused into new products such as hammocks or floor mats, although some is burnt for energy illegally. From the 10–20 laundry and dyeing factories serviced, about 5-10 m3 of sludge is collected once per month. The current laws and regulations for industrial waste only cover collection, transportation, and disposal. Sarom used to operate a waste incinerator, facilitated by MoE together with Chip Mong Insee Cement Corporation, for waste-to-energy; however, the proper regulatory framework for waste to energy is not yet clearly set up.

5.3.2 Interview: Chip Mong Insee Cement Corporation

Current State – Cambodia generates approximately 10,000 tonnes of domestic and 3.65 million tonnes of industrial waste per year, and 90% is dumped in open sites or burned in the open. Chip Mong Insee's Ecocycle Facility, located in Touk Meas District, Kampot Province, has been operating its co-processing technology since 2019 to handle industrial waste management, providing a sustainable, environmentally friendly solution for industrial waste management in Cambodia. The plant has full

capacity to handle industrial waste of around 75,000 tonnes per year with 100% material and energy recovery by using the cement manufacturing process to destroy the waste while simultaneously manufacturing clinker in a single combined operation.

Chip Mong Ecocycle targets various waste streams such as garments and footwear, plastic, expired goods, paper, fly ash, waste with visible branding, rubber, oil waste, and some hazardous waste such as agrochemicals, pesticides, industrial sludge, paint, PCB waste, etc.

Chip Mong Ecocycle's timeline towards environmental sustainability is as follows:

- Dec 2019: Operation start-up; biomass feeding with rice husks and sawdust
- Jan 2020: Non-hazardous waste/secured waste disposal
- April 2020: Further enhanced collection and storage facility
- June 2020: Hazardous waste services started: secured a contract with the country's biggest sludge generator to handle their hazardous waste flows; 425 tonnes of pharmaceuticals disposal
- July 2020: Contract signed with Sihanoukville Special Economic Zone (SSEZ)
- Sep 2020: Achieved the highest monthly rate of hazardous waste disposal to date at 385 tonnes/month
- Early 2021: Operating waste collection facility in SSEZ

Chip Mong invested USD 5 million and was working with more than 70 industrial factories by June 2021, enabling replacement of 10% fossil fuel by using waste and providing a sustainable solution for 30,000 tonnes of waste per year, with GHG reduction of 36,000 tCO2e. Moreover, Chip Mong is working across Cambodia in places such as Phnom Penh Special Economic Zone, Bavet Special Economic Zone, and factories in Kampong Speu. Chip Mong works mainly with companies with a sustainability agenda who are generally obligated by their buyers (e.g. Adidas, Nike) in the EU or US to prioritise sustainable operations and outcomes. The challenge is to convince smaller firms to adopt sustainable waste disposal practices because of the high cost involved, even though the cost in Cambodia is 3 times lower than in Vietnam. As such, Chip Mong works mostly with large factories seeking environmental compliance, because they are better able to absorb the cost of treatment and disposal. The rates start at USD 80/truck/trip for non-hazardous waste (depending on location) but increases for hazardous waste and sludge.

Collecting payment from customers is quite challenging for Chip Mong, and legal support or a revised regulatory framework are needed to make it feasible for smaller firms to be able participate in Cambodia. The existing regulations need to be enforced (including through punishment mechanisms) and incentives must be provided for eco-recycling by Chip Mong in addition to what is required by external buyers using the Higg Index score. Currently, Chip Mong is providing treatment and disposal for a large garment factory with fabric dyeing and washing in Bavet Special Economic Zone, including about 100–120 t/mo of sludge. Normally only companies that produce fabric have sludge from their dyeing and washing activity, and they supply the dyed fabric to the garment factories.

The features of cement kiln co-processing are: (1) there is complete destruction of waste materials; (2) flame temperatures range between 1800–2000 °C, while material temperature remains at 1450 °C; (3) formation of dioxins and furans is avoided; (4) there is zero residue for landfill; (5) GHG emissions are reduced; (6) large capacity (30 t of waste/hour); and (7) the processing takes place in an alkaline environment with a self-cleaning process (using calcium oxide – CaO).

Chapter

06

Current Garment Sector Waste Management Practice

6. Current Garment Sector Waste Management Practice

6.1 Industrial solid waste management

According to the Sub-Decree No. 36 on Solid Waste Management (Kingdom of Cambodia 1999), material waste is classified into hazardous and non-hazardous, and divided into household and industrial in terms of source. The Sub-Decree defines 32 waste types as hazardous waste. Among the 32 types of hazardous waste, those originating from the garment sector are: (1) fabrics and textile products from textile and sewing factories; (2) wastewater sludge from factory production processes; and (3) chemicals, additives, residues from inks and dyes, dye containers and packaging from the garment sector. Hazardous waste is collected by Sarom Trading Company, which is contracted by the government to collect hazardous waste from the garment sector and other sources. Normally, waste collectors are responsible to designate their own landfills for dumping and operation in compliance with agreement and monitoring by MoE. The garment waste management flow in Cambodia is shown in Figure 5.

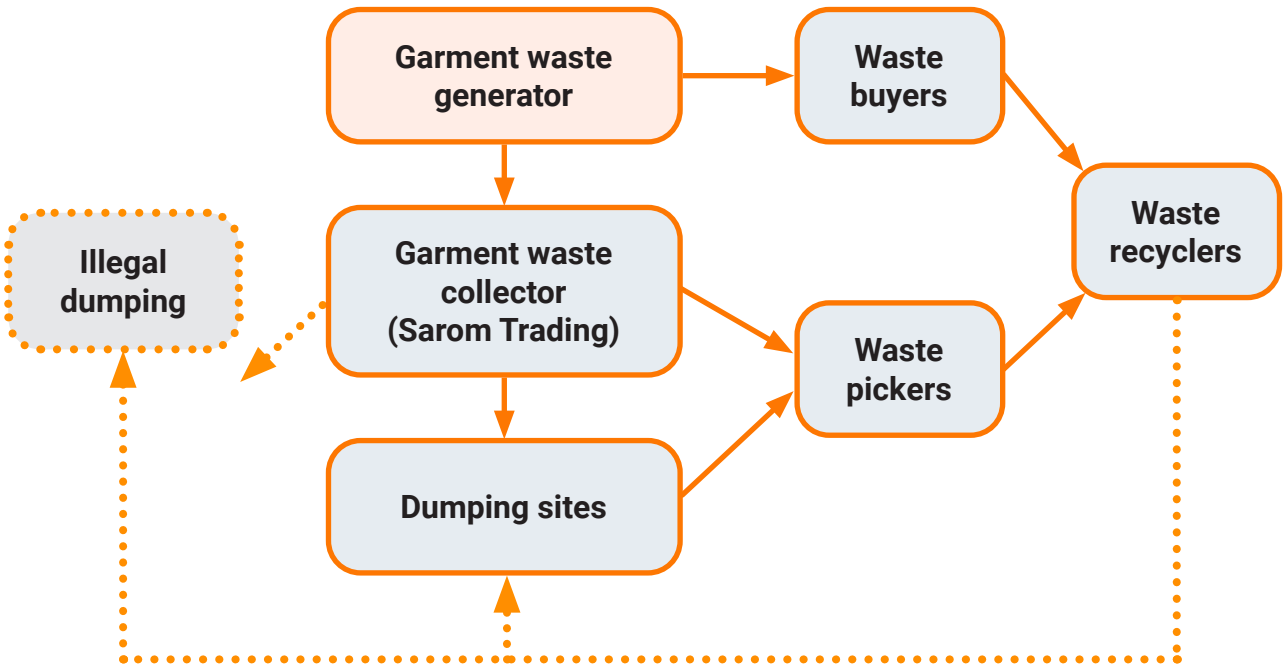

Figure 5. Typical garment waste management flow in Cambodia

Hazardous waste collection (see Figure 6) and disposal services (see Figure 7) are only available in the provinces of Phnom Penh, Kandal and Kampong Speu. There are a total of 400 factories in these three provinces as of 2020, but only 163 factories are contracted to use the services of Sarom Trading Company.[3] Waste buyers and waste pickers play an important role to recycle the waste generated by garment factories. Another problem is illegal dumping on vacant land or in water bodies.

Figure 6. Waste Storage and collection procedure from garment factories

Photo credits: MoE, 2009

Figure 7. Soil cover at the landfill

Photo credits: MoE, 2009

The total amount of the industrial waste transported to Sarom Trading Company's landfill during 2004–2019 is shown to fluctuate widely in Figure 8, based on data provided by MoE. These fluctuations seem to follow trends in the scale of production and on 3R policy in Cambodia's industrial sector, especially in garment and sewing factories. The downward trend around 2011 is mainly due to the promotion of 3R policy, particularly reuse and recycling activities (see Figure 9). The national strategy on 3R for waste management in Cambodia was launched by MoE in 2008 and supported by the UN Environment Programme (UNEP). Recyclable industrial waste such as scrap cloth was sold to waste buyers directly from the factories. Most of this waste material was exported to other countries like China (see Figure 10). Subsequently, while the scale of production increased,

3 Since Sarom Trading Company did not have sufficient capacity to provide services in Kompong Chhnang province, the ministry decided in 2014 to provide permission to another company, Kim Munna Company which cooperated with Hour San Group Co., Ltd. on waste collection and transportation from factories in Kompong Chnnang, including the establishment of a new landfill site. In 2019, six collectors (Sarom Trading, Oeung Vuoch Leng, Leng Bopha, Kim Munna, Sok Rasin, and Sanya Pich) provided industrial waste collection services in Cambodia, while Sarom Trading Sarom Trading covered 76% of the total industrial waste.

the international market for exported textile waste was shrinking. As a result, more and more of the waste ended up in landfill (see Figure 11), reaching a peak in 2014.The second downward trend around 2017 is considered to be due to the unstable political situation in Cambodia, which caused some factories to close down in 2016 (Khmer Times, 2016). It should be noted that waste generated by 'cottage factories' is not included in these figures.

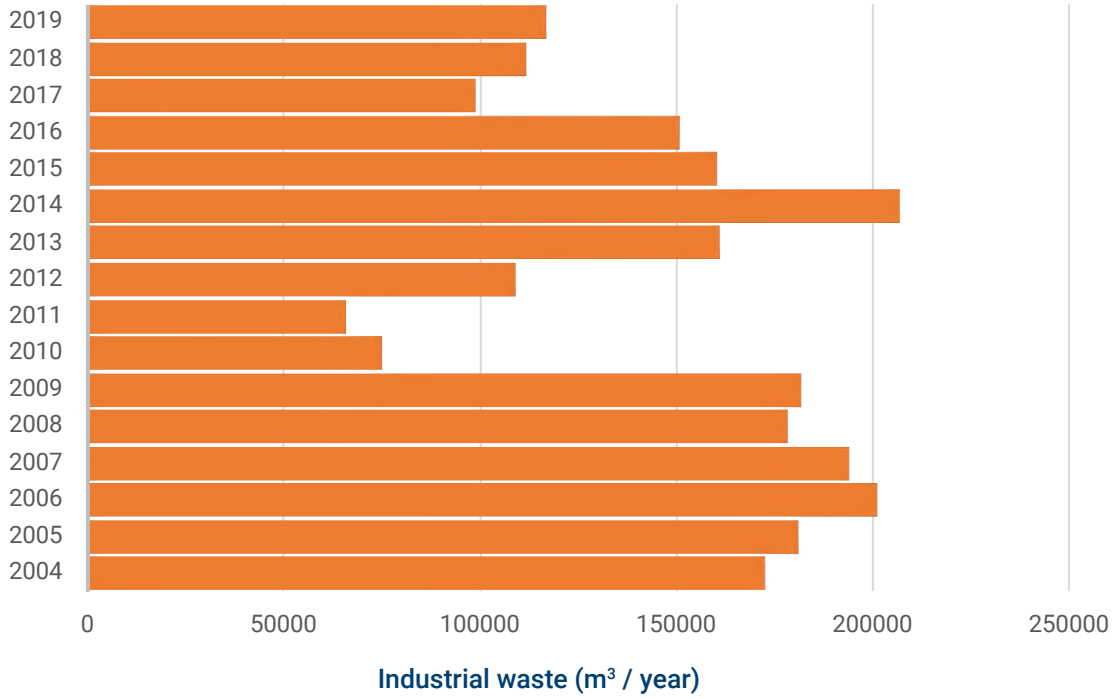

Figure 8. Total amount of industrial waste

Data provided by MoE

Figure 9. Waste storage and separation at garment factories by 3R activities

Photo credit: MoE, 2009

Figure 10. Garment waste prepared for export

Photo credit: MoE, 2008

Figure 11. Garment waste is mixed, collected and dumped at Sarom's landfill site after there is no more international market for waste export

Photo credit: COMPED, 2016

Based on an interview in 2021 with Sarom Trading Company, it has been estimated that the total amount of garment industrial waste collected and transported by Sarom Trading Company in Phnom Penh, Kandal province and Kompong Speu province is around 140 tonnes/day or 3,640 tonnes/month or 43,680 tonnes/year based on the assumptions of the average capacity of truck (5m^3 and 1 tonnes/truck). The average number of trucks making the trip to the landfill was four trucks per month for a small garment factory (30%); eight trucks per month for a medium garment factory (30%); and daily trips (except festival/holiday) for large garment factories (40%). The total amount of solid waste collected and transported to dump sites was approximately 1,089,429 tonnes (averaging 2,985 tonnes/day) in 2014 (Jain, 2017). Thus, garment sector industrial waste accounts for roughly 5% of total solid waste sent to landfill in Cambodia.

The industrial waste collected by Sarom Trading Company (Figure 12) is composed of textile waste (approximately 55%), leather residues (16%), 'other' wastes (including sludge) 12%, plastic waste (6%), paper waste (4%), rubber (4%), glass (2%) and metal (approximately 1%). All this waste is mixed and is collected without source separation. Regarding the flow of waste treatment by Sarom Trading Company, 79% is by dumping (see Figures 13, 14, and 15), 3% is used for 'waste-to-energy', and 18% is 'recycled' (Table 4). The 'waste-to-energy' process is mainly done informally and illegally, by way of burning waste for energy in some production processes such as for steam ovens or brick production. The recycling process mainly reuses or recycles garment sector waste to make new

products such as mats and hammocks. Most of the waste collected from industry is disposed of at landfill sites rather than being recycled or reused.

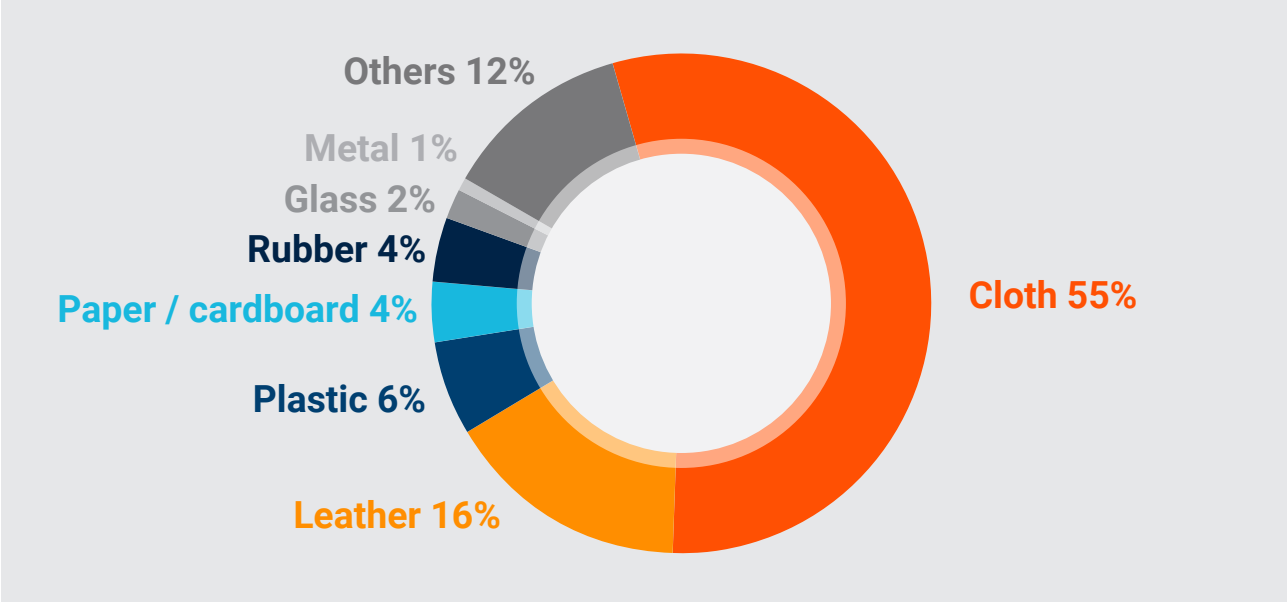

Figure 12. Waste composition of industrial waste collected and transported to Sarom landfill

Source: SWITCH-Asia SCP Facility, 2021

Table 4. Waste treatment flow by Sarom Trading Company

	Dumping	Waste to Energy	Recycle	Reuse	Illegal disposal	Open burning	Others
%	79	3	18	0	0	0	0

In addition, other provinces such as Kompong Cham, Svay Reang, Sihanou, and Kampot do not yet have collection services that separate industrial solid waste and municipal solid waste. Therefore, industrial waste, including garment and textile waste, is collected and disposed of in the same way as municipal solid waste.

Figure 13. Transportation of industrial waste from garment factories to dispose at SAROM Industrial Waste Landfill

Photo credit: COMPED, 2016

Figure 14. Sarom's Industrial Waste Transportation Trucks and Its Landfill Operation

Photo credit: COMPED, 2016

Figure 15. Garment waste is pushed into the pits. Some remains after burning at the landfill

Photo credit: COMPED, 2016

In addition to the environmental impacts of the garment sector such as water, air, and landfill pollution, GHG emissions and microplastics, the textile and garment manufacturing sector is also a source of hazardous waste that is dangerous to human health. Chemicals are widely used as essential substances in the textiles and garment manufacturing process. These include flame retardants, and perfluoroalkyl and polyfluoroalkyl compounds, which are used in waterproofing and stain-proofing. According to the US Environmental Protection Agency, all these chemicals can impact human health by disrupting hormones and weakening the immune system. Heavy metals used in dyes are also highly toxic and pose a risk of damage to the nervous system. The chemical of greatest concern is formaldehyde, which is used in anti-wrinkle treatments. The US National Cancer Institute states that formaldehyde is not only carcinogenic but also irritates the skin.

Regulations have been developed around the world to restrict the use of some of these chemicals, including the EU's Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) regulation and the US Toxic Substances Control Act (TSCA). While those wearing the clothing are minimally affected by these chemicals, the amount of exposure during the manufacturing process is extremely high and has a significant impact on people working in factories or processing industrial waste. In addition, many of the highly dangerous chemicals concentrated in the manufacturing process flow into rivers and reach the sea. If these are taken up by aquatic organisms, they can enter the food chain and cause human health problems. Therefore, the appropriate disposal and treatment of waste from textile and garment factories is very important for human health and wellbeing, as well as the health of local and global local environments.

6.1.1 Existing gaps in policy and practice and potential solutions

Based on the current state of policy relevant to the garment sector (see Chapter 3) and the results of interviews and analysis of official data (see Chapter 4), some key gaps in addressing issues relevant to SCP in the Cambodian garment sector have emerged. The gaps mainly relate to poor compliance and enforcement; lack of adequate monitoring and data collection; inadequate inter-sectoral coordination and cooperation; and insufficient incentives/disincentives from the global supply chains to change current practice. Below, these gaps are discussed in relation to three existing policy dimensions: industrial waste management, 3R policy, and circular economy.

Industrial Waste

Although there are many relevant regulations on waste management, implementation in practice has fallen short and lacks key aspects necessary to be effective in many places along the garment waste flow (Figure 16). For example, all types of collected waste are mixed and transported to landfill without appropriate treatment. Similarly, only about 20% of establishments comply with the legislation requiring waste generators to obtain a discharge permit and to report quarterly to MoE. As a result, very little reliable data exists; it is extremely difficult to account for the amounts and types of industrial waste and how they are being treated. Mandatory reporting with oversight could be considered as an option to remedy this lack of rigorous data. Another challenge for data is that statistics on the manufacturing sector are under the jurisdiction of the Development Council (for foreign investment) and the Ministry of Industry, Science, Technology and Innovation (for local capital), but there is no system for sharing information between these ministries.

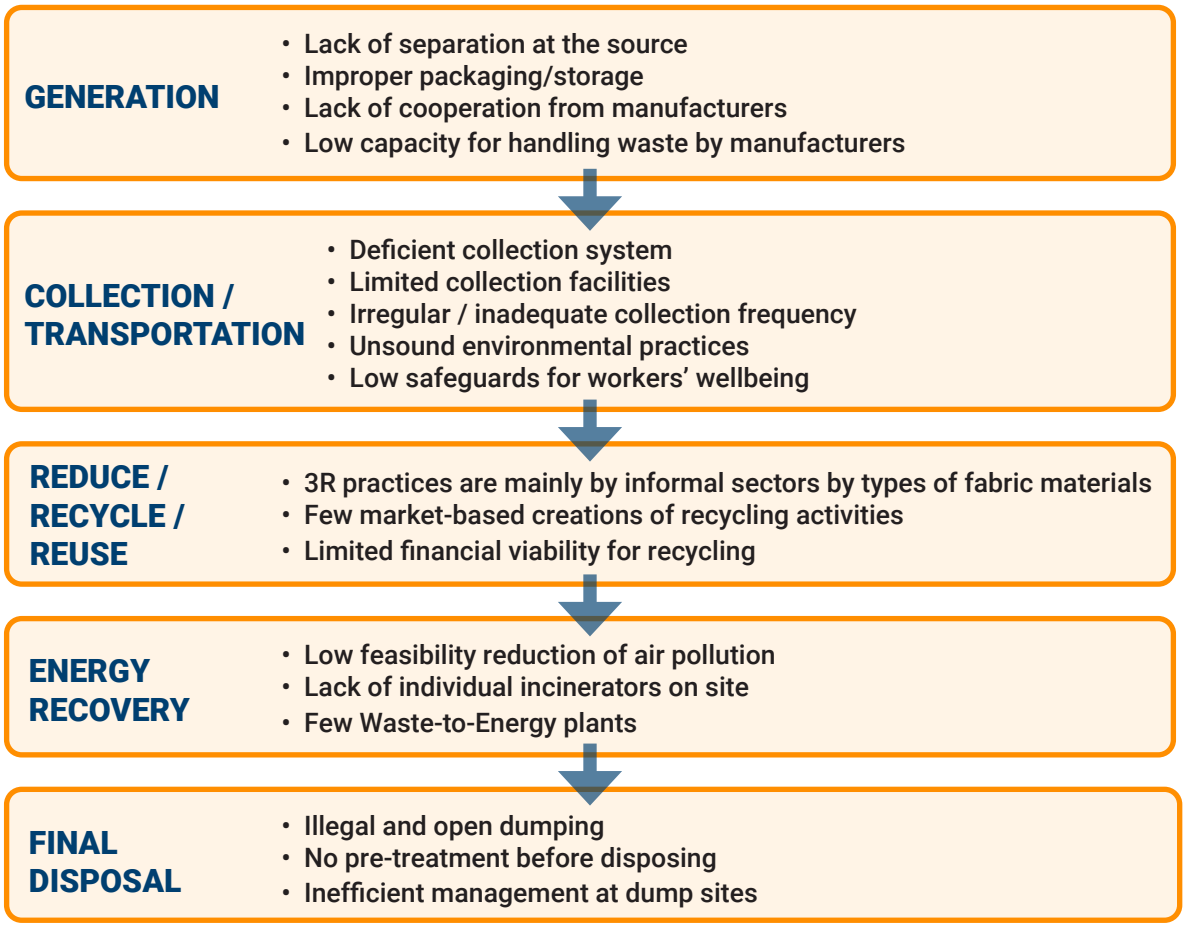

Figure 16. Challenges in the garment waste management system

To ensure that the regulatory system around industrial waste maintains legitimacy and efficacy, the operational framework of legislation and directives must be up to date and communicated clearly to local entities such as factories, support services (e.g. dyeing and laundry providers), and waste management companies. The objective should be the creation of an integrated sustainable waste management system with effective oversight that produces traceable, reliable data on waste flows. To this end, it is necessary to develop capacity across the waste management systems, including creating statistical information and manuals; regularly checking and evaluating improvements in waste management services; enhancing factory management's understanding of the waste management system and its maintenance; providing financial and technical support to bring waste management systems into compliance with regulations; continued training and capacity building for factory staff. In other words, it is important to build a system that intrinsically improves the management capacity of the organisation to make appropriate use of its human, physical and intellectual assets in the pursuit of a sustainable waste management system.

Case 1: Garment waste burning in brick kilns

The use of garment waste to fuel brick kilns in Cambodia is receiving considerable attention because textile offcuts are a readily available, cheap, and less environmentally regulated alternative to using forest wood as kiln fuel (Crang et al., 2020). Many factory owners are choosing to engage in this activity to reduce costs and enhance profit margins. According to a recent study in Cambodia, 23 kilns out of 465 (4.9% of all kilns) use garments as fuel (Parsons & Ly Vouch, 2020). However, the practice is predominant in areas close to garment manufacturing sites, particularly the peri-urban Phnom Penh industrial zone where most garment factories are located, and garment waste is accessible through the work of waste management intermediaries. There are no comprehensive studies available to understand the health and environmental impacts from the Cambodian brick sector; however, the 2018 'State of Global Air' report in India identified smoke emerging from kilns as the sixth-highest cause of respiratory-related deaths in the country (Health Effects Institute, 2018). In addition, some garment factories also have their own boilers to burn their textile waste on site.

3Rs Policy

The national strategy on 3Rs for waste management in Cambodia was prepared by the Ministry of Environment in 2008 and supported by UNEP, defining the 3Rs as follows: 'The 3R initiative is a new concept for Cambodia aiming at managing waste complying with the environmental and economic bases.' But as yet 3R activities are limited and the main actors in recycling are found in the informal, largely urban sector. Many of these actors function because of an excess of labour, along with a large and mainly poor population group coming from rural areas, and although these people contribute to a certain extent in terms of resource recovery and employment, they are unable to escape poverty because of continuing work conditions that are both labour-intensive and inadequately paid. In addition, environmental pollution and health hazards are caused by the handling of materials containing hazardous substances due to inadequate technology and equipment and lack of controls (Crang et al., 2020). There is a need to integrate valuable material recovery activities by the informal sector into the formal waste management system (waste reduction, recycling, and urban sanitation) to create a sound culture of recycling in the garment sector.

It is important to note that textile products are relatively difficult to recycle compared to other recyclable resources. The following conditions must be met for textile waste to be recycled: the identity and material of the waste must be clear; it must be free from contamination, made of a single material, have a consistent shape, and must be available in sufficient quantity and on a regular basis. However, there are many cases where these conditions are not met. For example, the fibres of various materials may be mixed or the material is unknown. The shape of the waste may be irregular, as is the case for bags, cloth scraps, strips, and continuous and discontinuous materials, causing problems for feeding the materials into recycling equipment. Contamination of textiles waste by foreign matter or deteriorated material also prevents them being treated at a recycling centre. Finally, all the preceding factors can cause the output of the recycling process to become unstable relative to the input. The following quality control processes would be required to develop a robust recycling system:

1. A system indicating the type of material to be recycled must be in operation, which can be supported by using a single material upstream during garment product design and creating products that are easy to disassemble.
2. A crushing and grinding process can be introduced to ensure a consistent shape for textiles inputs for recycling.
3. A supply system for recycling equipment could be developed to ensure that producers have ease of access to the necessary infrastructure and equipment for recycling.
4. A system for removing foreign matter and contaminants from textile waste should be developed, but this may require the creation or adoption of new technologies and processes.
5. New additives could be introduced to improve performance when re-moulding from deteriorated fibre materials.
6. Simple cleaning technology can be implemented to make the entire process easier and reduce harmful effects on human health and the environment.

An additional 3R method to address some of the challenges associated with waste from the garment sector is to channel waste materials for up- or downcycling. Upcycled clothing takes old, worn out or damaged materials and transforms them into brand new pieces. Such upcycled garments are becoming increasingly popular in the contemporary fashion sector. Downcycling in the garment sector, on the other hand, takes wasted materials and transforms them into new products, often in other sectors. For example, cloth scraps and factory offcuts can be downcycled to make insulation materials or carpet underlay. These processes are supported by proposals in Cambodia's Nationally Determined Contribution to the Paris Agreement.

Case 2: Zero-waste fashion production: tonlé

The greatest innovation from the tonlé fashion label in Cambodia is its unique zero-waste design process and the use of garment waste produced by large companies. The company uses simple technological inventions and handicraft methods. The discarded jersey material from the remnant markets makes up 90% of the materials used by tonlé, while the remaining 10% is bought from local and sustainable suppliers. The designs depend heavily on the fabrics available, and the production team plans the upcoming collection only after the cloth has been purchased. While creating the perfect look, they also make sure to find a way to use every single piece of fabric. After the larger pieces have been cut out, tonlé employees cut the remaining cloth into strips. These strips serve as decorative elements, which explains why stripes are a reoccurring design element in tonlé collections. The remaining pieces are sewn back into yarn, which is then knit and woven into new pieces. Finally, the smallest scraps – which amount to about 2–3% of the original material – are mixed with recycled office paper and sticky rice and used for the hangtags. Using these practices, tonlé claims to have reduced their waste to zero. Although tonlé pays its employees higher salaries than most other textile factories, their

clothes are no more expensive than those of other labels. Currently, 30 employees work for tonlé. The company started off with two boutiques in Cambodia in 2013, and can now count on international stockists in Vietnam, Australia, the US, Canada, and several European countries (Source: tonlé, n.d.; Tea after Twelve, n.d.).

Circular Economy

The UN Environment Programme (UNEP) defines a circular economy as 'an alternative economic model for exchange and production that seeks to decouple economic growth from material dependency' (UN Environment Programme, 2018). In practice, circular-economy practice increases material efficiency by reducing resource waste and creating material loops that divert waste from landfills back into the production sector as new inputs. Cambodia's National Circular Economy Strategy and Action Plan was prepared by the National Council for Sustainable Development (NCSD) and Ministry of Environment in 2020, supported by UNEP, to tackle two fundamental environmental challenges: climate change and unsustainable use of natural resources. Environmentally safe waste treatment and high-quality, closed-loop recycling is much easier to attain if upstream businesses avoid the use of polluting, toxic materials and product designs that are difficult to deal with at the downstream stages, and if they adopt reuse systems for manufacturing inputs, limit the use of materials in general, and take other eco-design measures. However, the current garment sector supply chain in Cambodia is globally fragmented, with high levels of foreign investment (around 90%) and most of the garment units (approx. 65%) engaged in 'Cut, Make and Trim' (CMT) activities dependent on imported fabrics and accessories. Building a healthy supply chain should be a first step.

In addition, to promote the circular economy, it is essential to create an enabling environment for the garment and textile recycling business to thrive, and to implement extended producer responsibility (EPR) policy schemes, a concept that places certain responsibilities on the companies that produce goods. The OECD manual on EPR states that its main function is 'to transfer all or part of the cost or physical responsibility for waste management from local authorities and ordinary taxpayers to producers'. In other words, producers, rather than the firm or the consumer, bear the cost associated with the disposal of the products they make. By shifting the responsibility for the cost to the producers, they are incentivised to bring down the price of treating and recycling their product by designing for recycling, longer product life, and disassembly. If they pass on the full cost of end-of-life product treatment to the consumer by raising the price of the product, they may price their products out of the market and lose sales. To reduce the cost as much as possible, it is reasonable to expect that producers will switch to products and materials that are easier to treat and recycle. Thus, by implementing policies that support a circular economy such as EPR, upstream producers and suppliers can be incentivised to redesign their products and innovate new end-of-life solutions for their products (see Figure 17).

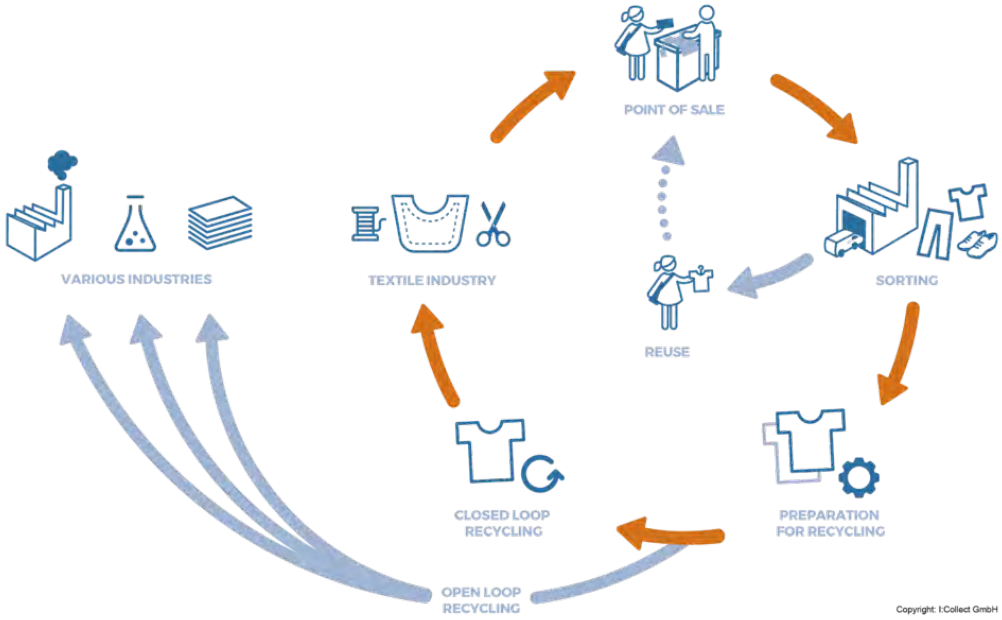

Figure 17. A circular economy model for garment sector

Source: http://www.soex.de/en/icollect/

6.2 Wastewater treatment in the Cambodian garment sector

As we have already seen, the garment sector holds the most important manufacturing share of GDP in Cambodia; however, it is also the highest generator of toxic chemicals that deteriorate and degrade the land, air and water. In particular, according to an Asian Development Bank report (2016), the garment sector is the single largest emitter of toxic discharges into bodies of water, accounting for almost 70% of total toxic pollutant loads from all sectors. The number of industrial factories, dominated by textile and apparel production, has grown rapidly in the last two decades. The same report indicates that the total number of spinning, weaving, and finishing textiles enterprises in Cambodia in 2016 was estimated at 270, accounting for 15.5% of industrial enterprises in the country. Approximately 56% of these firms operated in the capital city of Phnom Penh in 2014, in addition to other provinces such as Kandal (for wearing apparel, spinning, weaving and finishing textiles) and Kampong Speu (for footwear). In 2014, toxic chemicals released to the environment by the textiles and apparel factories were estimated as 201,054 mg/kg, which accounted for 98.56% of the total pollution load (203,991 mg/kg) from all sectors that year. It has also been projected that the total pollution from textiles and apparel factories will increase significantly to 682,620 mg/kg by 2030 (San et al., 2018). Along the textile manufacturing chain, wet processing generates the largest environmental footprint due to the intensive freshwater withdrawal during bleaching and washing, dyeing, and finishing processes. These processes also use large amounts of synthetic chemicals and energy to heat water and generate steam, and they discharge significant amounts of wastewater into local waterways.

6.2.1 Sustainable water use and management

The textile and garment sector is very water-intensive (see Figure 18). Fresh water is required and used in all stages in the apparel value chain, especially during the fibre producing stage (raw material production, especially water required for growing cotton), textile manufacturing (bleaching, dyeing, and finishing), and final consumption (use). To process 1 kg of textiles, approximately 100–150 l of water are required. With approximately 28 million tons of textiles being dyed each year, the apparel sector has an annual water footprint of more than 5 trillion l of water. In addition, consumer

laundering consumes around 1,650 l/k of textile (Maxwell, McAndrew, and Ryan, 2015). All of these stages together thus produce enormous quantities of wastewater. The environmental problems caused by textile wastewater are result from the increased biochemical oxygen demand for bacteria to break down the waste products, the volume of intensely coloured dyes, and the large quantity of suspended solids present in textile wastewater discharge, which thus often contains numerous pollutants such as inorganic compounds, dye waste, colour residues, catalytic chemicals, and cleaning solvents (Yaseen and Scholz, 2018). Because these wastewater pollutants are discharged into local waterways, the textile and garment sector is a contributor to the growing scarcity of clean drinking water in Cambodia.

Beside the very negative environmental effects, it is also very costly to properly treat textile wastewater to meet national standards before discharging the treated effluent into the environment. Thus, it is important for factories to have full knowledge of the best solutions to comply with regulations while reducing the costs associated with wastewater treatment and minimising the associated environmental impacts, either through 'end-of-pipe' wastewater treatment solutions or with a combination of cleaner production and more efficient water use during the production process.

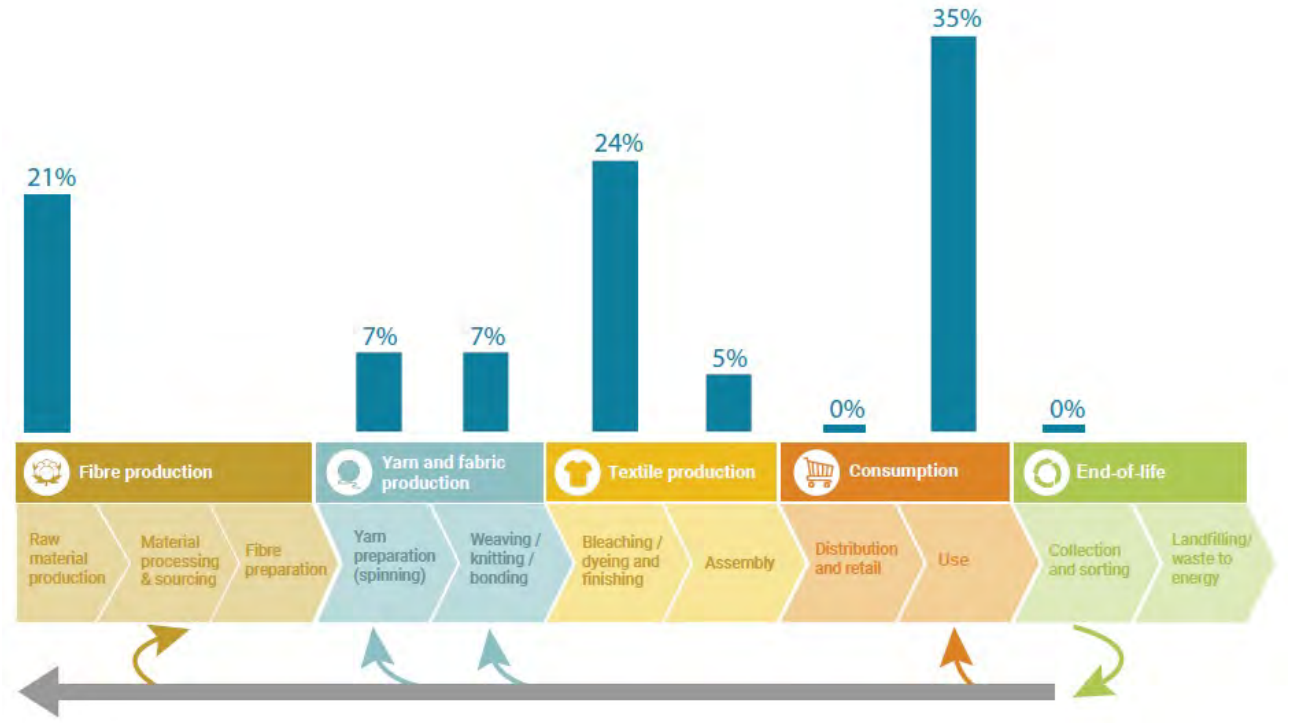

Figure 18. Freshwater is intensively used throughout the global apparel value chain, especially in the raw material production, bleaching/dyeing and finishing and use stages

Source: UN Environment Programme, 2020

One example of a successful wastewater management system is the H&M Group, which has developed a Water Stewardship Strategy and Water Roadmap to reduce water use throughout their value chain. The strategy employs an innovative and integrated approach, going beyond factory lines to address large-scale, local impacts on the environment and society during their entire supply chain. The roadmap represents a paradigm-shifting move towards integrated water management that evaluates water as a shared resource. For example, the company set ambitious global goals that 15% of the water used in their production processes will be recycled, and 5% of discharged wastewater will be reused within the facility. They have also begun implementing five new water recycling processes in textile and apparel production, which have gradually improved the quality of water effluent and created opportunities for water recycling in many of their production countries (H&M Group, 2020).

Table 5. Major focuses in the Water Roadmap 2018–2022 introduced by H&M Group

Source: adapted from H&M Group, 2020

Focus	Goal
Water Quantity	• Reduction of production water usage by 25% in comparison to baseline of 2017 for tier 1 and tier 2 (l/kg, l/pc, l/m) • Maximise the use of rainwater harvesting where feasible
Water Quality	• 100% Effluent Treatment Plant (ETP) functionality assessments to achieve green grading • 100% ETP discharged water quality are ZDHC wastewater compliant–Foundation Level ETP)
Water Circularity	• 15% of water will be recycled out of total production water consumption • 5% of discharge wastewater will be reused within the facility
Collective Action	• Build and enhance relationships in two prioritised driver basins stakeholders • Progressive support for science-based target for water
Communication	• 100% H&M group PO staff to receive basic water education via e-learning • Raise supplier awareness on water-related risks, mitigation and efficiency measures

Similarly, Levi Strauss & Co. uses a life-cycle assessment framework to strategise their sustainability efforts. The company has launched their 2025 Water Action Strategy, 'whose ultimate vision is to use only as much water as replenishes naturally' wherever they operate. As part of their 2025 commitments, the company aims to reduce water use in manufacturing by 50% in areas of high water stress using 2018 as a baseline. In addition, all key fabric and garment suppliers, which represent 80% of the company's production, will meet their new contextual Water<Less® targets by 2025 (Levi Strauss & Co., 2019).

In addition to the pollutants mentioned above, the textile and garment sector also releases a significant amount of microfibres, one of the most common forms of microplastics, into the environment during production, use, and end-of-life disposal. High quantities of microfibre were detected from a textile production wastewater treatment plant, even after 95% of microfibres had been removed, highlighting the problem of effective wastewater management in Cambodia (Xu et al., 2018). The problem of microfibres in wastewater treatment plants and discharge is well documented in many developed countries such as China, The Philippines, Indonesia and Vietnam. However, as with other forms of waste, there is currently a lack of reliable data and research for Cambodia in order to diagnose and assess the domestic impact of microfibres. Potential pathways of microfibre/microplastics release from textiles and their impacts are described in Figure 19.

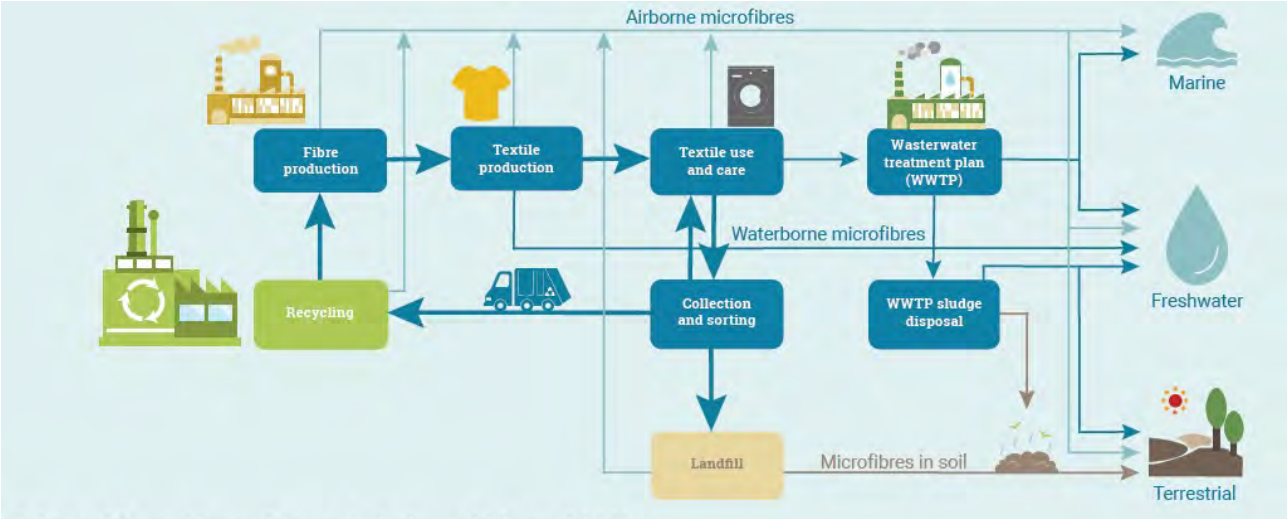

Figure 19. Potential pathways of microfibre/microplastics release from textile industries

Source: Adapted from Henry, Laitala and Klepp, 2019

Microplastics are ingested by plankton, allowing microplastics and toxic chemicals to move up the aquatic food chain into larger aquatic species and eventually humans. Although the effects of ingested microplastic on human health are not fully understood, they are known to travel through the human digestive tract and into the internal organs. In addition, microplastics may contain toxic contaminants (e.g. bisphenol A, phthalate plasticisers, carcinogens, polybrominated flame retardants, heavy metals), which are either derived from the plastic itself or absorbed from other wastes in the surrounding environment. Ingestion of these toxic chemicals can cause serious health problems including cardiovascular disease, diabetes, and cancer (Gallo et al., 2018). Consuming fish from waters polluted with microplastics increases the chances of human health complications. This is a critical issue for Cambodia, where fish comprises more than 60% of dietary protein intake, especially for rural people.

A new study conducted in the Chi River, a tributary of the Mekong River in Thailand, illustrates the risk. The study showed that many species of freshwater fish in the Mekong consume microplastics via aquatic habitats, diet and feeding strategy. The study also reported that up to 73% of the fish sampled presented microplastics in their stomachs, most likely ingested while feeding on zooplankton, aquatic invertebrates, smaller fish, and marine reptiles and mammals. This demonstrates the migration of microplastics up the aquatic food chain. As many of the eight varieties of fish sampled are consumed by humans, the risk for negative effects on human health is substantive. The researchers also believe that at least one variety of fish in the Mekong River may be threatened by the neurotoxic and oxidative damage associated with ingestion of microplastics (Kasamesiri and Thaimuangphol, 2020).

In addition, a recent study conducted at two major drinking water treatment facilities in Phnom Penh, Cambodia, found that there were still significant numbers of microplastics in the post-treatment water distribution system. The results showed that the microplastics counted at Water Treatment Plant (WTP) No. 1 were 1180±158 p/L at the inlet and 521±61 p/L at the distribution tank. In WTP No. 2, microplastics counted were 1463±126 p/L at the inlet and 617±147 p/L at the distribution tank. Overall, polyethylene terephthalate (PET) was the most common plastic found, with 28.8% and 26% in the inlet tanks, followed by polyethylene (PE) with 17.1% in WTP No. 1 and 20.8% in WTP No. 2. Other common types of plastic found were polypropylene (PP), polyamide (PA), polyester (PES), and cellophane, with all others accounting for less than 5% of total plastics found. This study establishes a baseline for the presence of abundant microplastics in the water sources for Phnom Penh's drinking water, namely the Mekong River and Tonlé Sap Lake (Babel and Dork, 2021).

6.2.2 Sound chemical use management

In addition to water, the garment sector commonly uses chemicals in most of the production processes, especially in fashion and design. Large quantities of diverse chemicals are required to produce textiles, including dyes; basic commodity chemicals such as oils, starch, waxes, and surfactants; and specialised chemicals such as flame retardants, dirt and water repellents, and biocides to reduce bacteria growth (UN Environment Programme, 2020). Most of the chemical-intensive process steps take place in the upstream supply chain, in particular wet finishing, printing, fabric finishing, pre-treatment and dyeing. Chemicals are also used to varying degrees in the garment assembly process, which often involves the use of stain removers containing volatile chlorinated solvents such as tetrachloroethylene and trichloroethylene, both classified as carcinogenic chemicals (GIZ, 2018). On average, 0.58 kg of various chemicals are required to produce 1 kg of textiles (Ellen MacArthur Foundation, 2017). Approximately 3,500 different substances have been identified as those used in textile production. Of the 2,450 substances analysed, 750 were found to be harmful to human health, of which 299 were considered functional substances with high potential risk to human health, i.e. substances intentionally added and expected to remain in the finished product at relatively high concentrations. Some 440 chemicals were found to be harmful to the environment, of which 135 were considered functional substances with high potential risk to the environment, with the same qualification as for human health risk in the preceding sentence (Swedish Chemicals Agency, 2014). It is thus clear that improper or poor management of chemicals, especially hazardous chemicals, in the textile and garment value chain can have significant harmful repercussions on workers' health, and also pollute surrounding water environments and ecosystems. Toxic residues in textile and garment products may also pose health risks for consumers. For example, many dyes contain heavy metals – lead, cadmium, mercury, hexavalent chromium – which are known to be highly toxic because of their irreversible bioaccumulative effects, and azo dyes are known to contain carcinogenic amines (Greenpeace International, 2018). The bleaching, dyeing, and finishing stages (wet processing) are considered 'hotspots' of carcinogenic human toxicity, along with the non-carcinogenic human toxicity hotspots in garments with a high proportion of synthetic fibres (UN Environment Programme, 2020). According to the Ministry of Environment (2009), few governmental institutions in Cambodia have sufficient ability for chemical assessment and management, or sufficient capacity to assess chemical hazards and identify their consequences. A similar situation is also applied to most industrial factories, including textile and garment factories.

Therefore, it is strongly recommended that the textile and garment factories develop a specific guideline for companies to use in chemical management, which will enable the selection and purchase of the best dyes and chemicals for the production process from companies that can provide material safety data sheets (MSDS) to ensure the production of safe and toxic-free garment products. This Guideline should also include detailed instructions on how to develop a prevention and response plan in the event that a chemical incident does occur. In addition, an established inventory system of chemicals used and stored in a factory is necessary to understand what chemicals are being used, conduct risk assessments, avoid holding unnecessary inventory, and provide information on the hazards of chemicals to employees or workers. Moreover, this inventory system would be regularly updated to include the addition of new chemicals and the removal of expired and obsolete chemicals.

Moving towards a sustainable and circular garment value chain which gradually facilitates greening the textile and garment sector in Cambodia will require both a holistic approach and changes at each stage in the value chain (e.g. the use of chemicals and hazardous substances in all stages, particularly in cotton cultivation and wet textile processing, should be eliminated; water resources should be used more effectively and efficiently; the release of microplastics and -fibres into the environment must be prohibited). Moreover, greening the textile and garment sector is not just about technology but also about setting long-term visions, goals, and specific targets for green transformation of the sector aimed at improving resource efficiency, reducing waste/wastewater discharge and microfiber release into receiving environments, transforming the ways in which clothes are being designed, manufactured, sold and used in order to minimise negative repercussions on the environment, and finally to improve efficient resource use along the entire value chain.

Some strategic approaches can be considered for greening the sector, including:

1. Promoting the implementation of cleaner production industrial symbiosis solutions in all textile and garment factories aimed at improving resource use efficiency (e.g. water, energy, raw materials and chemical use) and mitigating the adverse impacts on the environment incurred through production processes
2. Greening product designs (eco-design) and applying eco-labels for textile and apparel products (e.g. encourage to use organic fibres and natural dyestuffs, minimise the use of chemical, especially toxic and harmful chemicals)
3. Facilitating green distribution and logistics, especially raw materials and final products for minimising fuel consumptions and environmental impacts
4. Introducing environmental friendly practices based on circular economy approach (e.g. introducing 3R programmes; promoting consumption and production of textile and garment products through sustainable public procurement, marketing and lifestyle communication campaigns
5. Enforcing appropriate waste prevention and management policies in the textile and garment sector
6. Encouraging textile and garment enterprises and factories to apply environmental management standards in accordance with ISO 14000
7. Introducing smart technologies, especially in yarn production and quality monitoring, for improving sector productivity

Chapter

07

Best practices in other regions

7. Best practices in other regions

7.1 Lessons learnt from Vietnam

The textile and garment sector is an important sector in Vietnam, making a significant contribution to the country's economy. The total export value of textiles and garments reached USD 31.2 billion in 2017, accounting for 15% of the country's total export value and making these products the country's top exports. The sector currently has about 7,000 factories (mostly small), 84% of which are privately owned, and some 70% of which are garment factories (Pham and Vanderbyl, 2018).

In June 2020, the EU and Vietnam signed a Free Trade Agreement (FTA) and an Investment Protection Agreement, which will liberalise import duties imposed by the EU and Vietnam. EU import duties on textiles and apparel were removed immediately when the FTA came into effect in August 2020 (EY, 2020). These changes will make Vietnam an even more significant competitor to Cambodia in the garment sector.

It has been reported that more than 9 million tons of chemicals are used in the textile and garment sector in Vietnam, which makes the garment industry – especially during the dyeing phase – the second largest polluting sector in Vietnam (Vietnamnet, 2019). According to sector regulations in Vietnam, the treatment of textile wastewater discharged from textile and garment factories must comply with national technical regulations and effluent standards before being discharged into the environment. There are two reasons why it is difficult for many factories to meet these standards: they do not understand current regulations, and investing in and maintaining wastewater treatment facilities costs too much for them. But continued non-compliance with the country's mandatory requirements will not only exacerbate the water pollution problem in Vietnam, it will also pose a significant potential risk to the reputation of the entire textile and garment sector in the country (Pham and Vanderbyl, 2018).

To address these challenges, the WWF has been working with the Vietnam Textile and Apparel Association and its research partners to propose a Strategic Roadmap, which includes 12 major recommendations, timeframes (short-, medium- and long-term), and specific actions that highlight the need to:

- establish a textile sector water partnership to coordinate the sector's cooperation with the proposed multi-sector collective
- adopt water-saving practices and efficient management systems to better comply with brand requirements, be more environmentally friendly, and facilitate comparisons against the environmental performance of other sectors
- adopt best practices in chemical and wastewater management to improve surface water quality

- conduct capacity building activities to equip relevant stakeholders in the textile and garment sector with the necessary knowledge of how to adopt water-saving practices
- develop a smart water-use programme for the textile and garment sector to promote efficient water practices and technology countrywide (Pham and Vanderbyl, 2018)

The characteristics of the textile and garment sector in Cambodia are similar to those in Vietnam, as the garment sectors in both countries face the same challenges in promoting the shift to a green textile and garment industry, particularly in terms of chemical and environmental impact management as well as efficient use of resources (e.g. water, energy, raw materials). These recommendations are thus highly applicable to Cambodia.

7.2 Sustainable textiles initiatives from the global community

As discussed in preceding chapters, there are many ways in which the textile sector contributes to the generation of negative environmental degradation through material waste flows, wastewater and toxic chemicals. Much of the growing unsustainable consumption and production patterns in the textile sector can be linked to fast fashion, which has emerged as one of the top concerns for achieving sustainable development in the textile sector. 'Environmentally friendly' textiles in the context of sustainable consumption and production, including from the perspectives of climate, waste, circular economy, and chemicals are now being widely discussed in developed countries and the global community. Recently, many initiatives on sustainable textiles have been created and accelerated at both the public level in developed countries (discussed below) and at the private level by multinational companies (see Table 6). These initiatives focus on promoting sustainable production and improving socio-ecological conditions throughout the entire supply chain. Therefore, shifting the textiles sector further towards sustainability that will maintain production practices in line with purchaser requirements is a highly relevant objective for future action in textile-producing countries like Cambodia. A few major examples of such sustainability initiatives, drawn from the global public and private sectors, are presented below.

Table 6. Selected private initiatives for sustainable textiles

Note: The initiatives in the table serve as examples of private sector initiatives. Many additional efforts are underway.

Make Fashion Circular (Ellen Macarthur Foundation)		
Launch	**Objectives & Major Actions**	**Participants**
Originally launched as the Circular Fibres Initiative (2017) at the Copenhagen Fashion Summit, it has now entered the second phase: Make Fashion Circular (2018 Copenhagen Fashion Summit)	• Bringing together leaders from across the fashion sector, including brands, cities, philanthropists, NGOs and innovators • Stimulating the level of collaboration and innovation necessary to create a new textiles economy, aligned with the principles of the circular economy • By radically redesigning its operating model and transitioning to a circular system, keeping safe materials in use, the sector can unlock an enormous economic opportunity	57 companies and organisations in addition to Burberry, Gap Inc., H&M Group, HSBC, Inditex, PVH and Stella McCartney as Core Partners

The Fashion Pact

Launch	Objectives & Major Actions	Participants
Launched as a mission given to Kering Chairman and CEO François-Henri Pinault by French President Emmanuel Macron, the Fashion Pact was presented to Heads of State at the G7 Summit in Biarritz in 2019	• Committed to a common core of key environmental goals in three areas: putting a stop to global warming, restoring biodiversity and protecting the oceans	71 brands and companies from companies in the fashion and textile sector (ready-to-wear, sport, lifestyle and luxury) along with their suppliers and distributors

Sustainable Apparel Coalition

Launch	Objectives & Major Actions	Participants
In 2009, Walmart and Patagonia invited CEOs of leading global companies to meet to develop an index measuring the environmental impact of their products	• Produce no unnecessary environmental harm, and have a positive impact on the people and communities associated with this initiative • Developing a suite of tools for the standardised measurement of value chain sustainability: The Higg Index	More than 250 global members from multiple sectors within the apparel, footwear, and textile sector

Textile Exchange

Launch	Objectives & Major Actions	Participants
Founded as Organic Exchange in 2002 Expanded a focus from solely organic cotton in 2010 to diverse preferred fibres and materials portfolio as Textile Exchange, a global non-profit organisation that works closely with all sectors of the textile supply chain	• Drive an increase in the adoption of preferred fibres and materials • Increase integrity throughout the value chain via the adoption of standards and certifications • Enable collective impact and action across the sector • Raise awareness about the positive, meaningful changes accomplished • Use the Sustainable Development Goals as a common vocabulary and reporting framework • 45% reduced CO_2 emissions from textile fibre and material production by 2030	More than 500 active members

Roadmap to Zero Programme

Launch	Objectives & Major Actions	Participants

Initiated by the ZDHC Foundation [n.d.]	• To protect the planet by reducing the sector's chemical footprint • To enable brands and retailers in the textile, apparel, and footwear sectors to implement sustainable chemical management best practice across the value chain • To advance towards zero discharge of hazardous chemicals through collaborative engagement, standard setting, and implementation	More than 16 contributors within the fashion and footwear sector

7.2.1 The EU Circular Economy Action Plan and EU Strategy on textiles

Circular economy approaches are a central pillar of the European Green Deal to pave the way towards a climate-neutral, resource-efficient economy. As a part of the actions under the European Green Deal, the EU has formulated the Circular Economy Action Plan (CEAP) and identified textiles as a priority sector (European Commission, 2020). The EU Strategy for Textiles is now under development.

The aim of the EU strategy on textiles is to establish a comprehensive framework for creating the conditions and incentives necessary to boost the competitiveness, sustainability, and resilience of the EU textile sector, and to address its environmental and social consequences. The initiative will facilitate the following actions to make the textile ecosystem fit for a circular economy: sustainable production processes; sustainable lifestyles; tracking and controlling the presence of substances of concern; and ensuring coherence and complementarity with initiatives under the European Green Deal, the CEAP, the European Industrial Strategy, and the European Chemicals Strategy for Sustainability.

Other priority action areas of relevance for Cambodia include encouraging the optimal use of the recovery plan and sustainable investments, in particular in production processes, design, new materials, new business models, infrastructure and capacity; supporting technologies related to innovative textiles, tackling the release of microplastics, manufacturing, and recycling processes including through digitalisation (Interreg Europe, n.d.).

7.2.2 The Netherlands' policy programme for circular textiles

Another example that provides useful lessons is the Netherlands' Policy Programme for Circular Textiles (2020–2025) (Government of the Netherlands, 2020), which was adopted in April 2020. The programme aims to create a society where circular business models are the standard in the textile sector, and it can thus provide a useful example of potential objectives and strategies for developing sustainable, circular textiles industries. Among the stated objectives of the programme are the creation of production and consumption systems where textile and garment waste will no longer end up in landfills; clothing, textile and fibres will be used and reused; and products are designed for long-term use, and will contain recycled and/or long-lasting materials to make garments and other textile-industry products last longer.

Of particular importance for producers in Cambodia, the Netherlands' policy programme goes on to establish requirements stipulating how textiles sold in the Netherlands are to be produced in their country of origin. The programme stresses the importance of fostering production systems where health and safety standards, including decent wages, are in place in the countries where textiles are produced. Similarly, the policy programme establishes the need for production processes in factories to be clean, including rigorous waste management practices that minimise or eliminate negative impact on local environments including waterways. Businesses supplying apparel and textiles to the Netherlands must also be transparent about their production processes, waste management systems, and working conditions. To support the programme's objectives, the programme sets out the following targets:

- By 2025, the share of recycled (post-consumer)/sustainable material in textile products should be 25%; and 30% of (raw) materials and products sold in the Netherlands are to be recycled after collection, if reuse is not possible by 2025.
- By 2030, all textile products sold in the Netherlands should contain 50% sustainable material, and of that 50%, at least 30% is recyclate and no more than 20% is sustainable material. In addition, 50% of (raw) materials and products sold on the Dutch textile market are to be recycled after collection if immediate reuse is no longer possible.
- By 2035, the aim is to halve the ecological footprint of the textile sector in the fields of greenhouse gas emissions, water consumption, chemicals and microplastics.
- By 2050, the economy will be fully circular (source: https://www.government.nl/documents/parliamentary-documents/2020/04/14/policy-programme-for-circular-textile-2020-2025)

Through the policy framework for circular textiles, the Netherlands will also promote various initiatives at each stage of the textile life cycle. Initiatives in the design and production phases include application of extended producer responsibility, the Denim Deal (agreement with the denim sector to promote the use of recycled denim), and study of clothing labels and quality marks. Initiatives in the use phase include circular purchasing (from 2022 the government's objective is to purchase corporate clothing with a minimum of 10% post-consumer recycled content; from 2025, this ambition will be increased to 25%), and measures against fast fashion such as addressing fast line production and mapping of potential behavioural intervention methods targeting consumers. As it is likely that more countries will develop and implement similar regulatory policies in the near future, it is of critical importance for textile producing countries to anticipate and adapt to these changing market conditions.

7.2.3 UNFCCC Fashion Industry Charter

The international community has also taken steps to foster a sustainable textiles sector. One example is the United Nations Framework Convention on Climate Change (UNFCCC) Fashion Industry Charter for Climate Change (UN Climate Change, 2018), which was launched in December 2018 at COP24 in Katowice, Poland, with the vision to achieve net-zero emissions by 2050. It also includes a target of 30% GHG emission reductions by 2030 and a commitment to analyse and set a decarbonisation pathway for the fashion sector drawing on methodologies from the Science-Based Targets Initiative (SBTi; https://sciencebasedtargets.org/). The Signatories and Supporting Organisations of the Charter will work collaboratively through Working Groups on a decarbonisation pathway and reduction efforts on GHG emissions, raw materials, and energy, logistics, policy engagement, leveraging existing tools and initiatives, promoting broader climate action, and tackling emissions sources from brand and retailer-owned or operated facilities and processes.

7.2.4 Private Sector

Various collaborations among private businesses in the garment sector, especially in textile producing companies, have been established. Table 7 provides an overview of major private-sector initiatives for sustainable textiles. These are just a few examples, and there are other ongoing initiatives. Many companies have been very keen on sustainable production of textiles from the perspectives of climate, waste, circular economy and chemicals. All are highly relevant to the environmental management of the garment sector in Cambodia. Ensuring robust linkages between these initiatives and the garment sector in Cambodia is critical to improve sustainability of the sector.

As the initiatives in Table 7 emphasise, actors in the garment sector are increasingly being required to further improve their operations to more rapidly achieve a carbon-neutral circular economy, including the use of sustainable materials such as recycled content and environmental management at facilities. And international cooperation activities aimed at transforming the textiles sector will expand as momentum builds across the sector. As with initiatives by intergovernmental organisations, ensuring that Cambodia's garment sector develops robust linkages with these initiatives will be critical in improving the sustainability outcomes of the sector and ensuring preferred market access into the future.

Chapter

08

Recommended Actions

8. Recommended Actions

The preceding analysis of the textile and garment sector in Cambodia, and the regulatory environment in which it operates, demonstrates the essential role the sector plays in the Cambodian economy. A critical condition of the further development of this sector will be to ensure that growth is sustainable, taking into account resource use, proper management of industrial waste and wastewater flows, local and global environmental repercussions, national and global regulations and purchaser requirements, and the implications of sector activities for society, human health, and safety in the workplace. These developments will ensure that Cambodia's textile and garment sector remains viable both domestically, in terms of sustainably managed factories and waste flows combined with good working conditions and compensation for workers, and globally, by ensuring access to Western markets that increasingly demand that production practices comply with internationally accepted standards for production, waste management, labour, and environmental stewardship.

In this final section of the report a set of recommended actions are outlined that must be taken by policymakers to further develop the sustainability of Cambodia's textile and garment sector.

High-level Policies

Many high-level policies relevant to the textile and garment sector are either in place or under development in Cambodia and the international community. As these policies move forward, there are opportunities for Cambodia to enhance sustainability practices in the sector and contribute to global efforts to achieve commitments such as those included in the Paris Agreement.

Recommendation 1**:** To build on the SCP Roadmap, **a strategy and action plan** should be developed for the garment sector with a specific focus on waste management, to be endorsed by all the key stakeholders following a full consultation process.

Recommendation 2: By 2050 incorporate a garment sector **net-zero GHG emissions policy** into the next revision of Cambodia's Nationally Determined Contribution under the Paris Agreement. This policy can build on the existing Cambodia: Long-Term Strategy for Carbon Neutrality (LTS4CN), which currently does not include a focus on the garment sector.

Recommendation 3: **Monitor the implementation progress of the Urban Solid Waste Management Policy** (2020–2030) and conduct a thorough **mid-term review in 2025**, with appropriate remedial action as required.

Monitoring and Enforcement

Numerous well-formulated regulations are already in place in Cambodia that would significantly improve the performance of the textile and garment sector and mitigate the environmental degradation and health problems resulting from non-respect of the existing laws, but the problem remains weak monitoring for compliance and enforcement of regulations through penalties for violators.

Recommendation 1: The responsible Ministries should develop an effective cross-ministerial compliance **monitoring system** to include snap inspections, audits of documentation, enhanced monitoring, and enforcement of illegal waste disposal and treatment, as well as workplace health and safety regulations, and that rigorously imposes penalties on violators. The system should also track improvements in producers. **Enforcement is key**, as many actors in the textile and garment sector have expressed frustration at the lack of enforcement (specifically penalties for violators) of critical environmental and worker health policies.

Recommendation 2: Create a **shared database among Ministries** so that regulators can share information on the sustainability performance of textile and garment companies. Currently, multiple Ministries are responsible for monitoring factory compliance with domestic and international regulations, but they do not share their data. This separation creates barriers for sharing data across ministries and **results in unreliable information and regulatory blind spots**.

Industrial Waste Management

Effective waste management practices, including 3R policies, source sorting of waste, and proper disposal are essential to achieving a sustainable textile and garment sector that respects and cares for local and global environments as well as human health.

Recommendation 1: Require all waste sources from garment factories (including wastewater) to be covered by l**egally binding contracts with certified waste disposal companies**, and include a requirement for waste separation at the source to facilitate increased adoption of **recycling, re-use, and repurposing (3Rs) of waste**. Regulators should not only conduct routine snap audits of compliance, including documentation inspection, but they should also strengthen the monitoring and enforcement of illegal disposal and treatment.

Recommendation 2: Implement an **independently verified weight- or volume-based waste levy on garment factories**. Such a measure will incentivise factories to find and implement innovative ways to reduce the production of waste materials resulting from their activities.

Recommendation 3: Develop a **Guideline for chemical management** for use in companies, to enable the selection and procurement of high-quality, low-impact dyes and chemicals for use in textiles and garment production. Companies should be required to provide Material Safety Data Sheets to the government, ensuring the production of safe and toxin-free garment products. This Guideline should also include detailed instructions on how to develop a prevention and response plan to mitigate any unexpected event later on.

Sector Development

The government has a critical role to play in influencing the shape of future sector development by creating a regulatory environment that facilitates a transition to sustainable consumption and production patterns in the textile and garment sector. By means of strong regulations, monitoring and enforcement, the government can encourage sector actors to adopt more sustainable practices.

Recommendation 1: **Review the draft Environment and Natural Resources Code** to ensure that specific provisions that cover appropriate environmental management and education about awareness of the textile sector are not only **adequate**, but also **enforceable**.

Recommendation 2: Promote the implementation of **cleaner production solutions such as industrial symbiosis** in all textile and garment factories. These practices will help to improve resource efficiency and reduce the demand for raw materials (e.g. water, energy, materials, chemicals), which will in turn play a significant role in reducing the adverse environmental impact associated with production in the garment sector.

Recommendation 3: Engage with international alliances promoting sustainable supply chains, such as the Sustainable Apparel Coalition.

Sector Promotion

One of the best ways to promote the sustainable textile and garment sector in Cambodia is by meeting or exceeding global sustainability standards and communicating this information to buyers and end-consumers. Domestic markets can also be targeted in this way to build consumer knowledge and confidence in Cambodian products.

Recommendation 1: Adopt a **national certification and labelling scheme for the 'Made in Cambodia' brand**, to launch a minimum standard required by existing international labelling systems and emerging environmental requirements of export markets.

Recommendation 2: **Appeal to young consumers in Cambodia** by adopting or adapting some of the clothing practices in European countries, such as online markets for vintage clothing, subscription-based clothes lending services, clothes libraries, clothes donations, repair cafes, swap markets for clothes, etc.

Knowledge and Capacity Building

Because many producers lack the knowledge and capacity to set up and maintain sustainable consumption and production (SCP) practices, the government could step in to bridge this gap. Building knowledge and capacity in the sector to ensure sustainable consumption and production practices, such as deployment of circular economy and 3R practices, is an essential first step to achieving long-term sustainable development in the sector.

Recommendation 1: Deepen the capacity and effectiveness of the inter-ministerial Technical Working Group (TWG) on Sustainable Consumption and Production, especially as a **one-stop advisory services on SCP**, e.g. for technologies, management approaches, cleaner production, skills training, etc.

Recommendation 2: **Mobilise funding** to facilitate research/innovations on new SCP approaches applicable to the garment sector, possibly through corporate social responsibility funding.

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