APEC Workshop on Supporting MSMEs' Transition to Circular Economy in Textile and Garment Industries

APEC Small and Medium Enterprises Working Group

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Asia-Pacific
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Produced by
Ms. Pham Quynh Mai
Ministry of Industry and Trade
Viet Nam

For
Asia-Pacific Economic Cooperation Secretariat
35 Heng Mui Keng Terrace
Singapore 119616
Tel: (65) 68919 600
Fax: (65) 68919 690
Email: info@apec.org
Website: www.apec.org

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Table of contents

Contents

APEC WORKSHOP ON SUPPORTING MSMES' TRANSITION TO CIRCULAR ECONOMY IN TEXTILE AND GARMENT INDUSTRIES

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Workshop Summary Report

I. Introduction

On June 2025, the *"**APEC Workshop on Supporting MSMEs' Transition to Circular Economy in Textile and Garment Industries**"* was held in Hanoi, Viet Nam. The project was led by Viet Nam and co-sponsored by Indonesia; the Philippines; and Thailand. Speakers and participants came from the private sector, business associations, international organizations, research institutions, and APEC economies' relevant Ministries and government agencies.

Through sharing information, experiences, best practices, the "***APEC Workshop on Supporting MSMEs' Transition to Circular Economy in Textile and Garment Industries***" aims to identify and address challenges, provide capacity building for APEC member economies, especially developing ones to promote the transition to circular business model (CBM) for MSMEs in textile and garment industries.

II. Background

Textile and garment industries are estimated to become the world's third-biggest industrial industry and one of the most labor-intensive industries, directly employing at least 60 million people (ILO 2015), contributing significantly to job creation and poverty reduction. At the same time, it is estimated to produce about 8% of global greenhouse gas emissions through their life cycles (Quantis, 2018). The production of fibers and use of chemicals or additives in the industry can have huge impacts on land, water, energy and so on. The transition to CBM in textile and garment industries is increasingly encouraged and expected to be of great significance to sustainability.

However, MSMEs in the textile and garment industry might face a number of challenges in the transition to CBM such as lack of innovation and key

technologies, inefficiency and lack of systematic and industry-specific support policies and standards, incapability to promote consumers' awareness of green consumption, etc.

Addressing these challenges might require a holistic approach that involves collective efforts from the industry, governments, buyers and end-users through collaborative efforts, knowledge sharing, marketization of waste recycling, and so on, to enable a favourable environment for the transition to CBM in textile and garment industries.

This project is in line with the Bangkok goals on Bio-Circular-Green (BCG), which states one of its goals as "increasing cooperation to advance circular economy approaches, including through promoting CBM as well as exchanging policies and best practices, and sustainable production and consumption patterns".

This project is in line with the Putrajaya Vision 2040 (PV 2040) since it contributes to promoting "economic policies, cooperation and growth which support global efforts to comprehensively address all environmental challenges, including climate change, extreme weather and natural disasters, for a sustainable planet".

This project is also aligned with the SMEWG Strategic Plan 2021 – 2024, which states its vision as a "champion within APEC for the inclusive development of sustainable, resilient and innovative SMEs" through exchanging information, views, best practices, and analysis. Through the priority area of "entrepreneurship, innovation, and start-ups", this project contributes to exploring and promoting new business models – circular business model to pursue sustainable growth and development.

The project will contribute to promote capacity building for the APEC member economies in how to promote circular economy in textile and garment industries. In that sense, it contributes to APEC's capacity building goals of attaining sustainable growth and equitable development in the Asia-Pacific region as well as improving the economic and social well-being of the people.

III. Key Issues

1. Overview of textile and garment industries and MSMES' participation in the APEC region

Ms Marta Perez Cuso, Economic Affairs Officer, United Nations ESCAP: With a global workforce of approximately 300 million people and generating revenues exceeding USD 1.5 trillion annually, the textile and garment industry plays an important role in economic and sustainable development especially when embracing sustainability is no longer optional but a pressing necessity. Under this process, MSMEs are believed to play a crucial role and must be empowered to become agents of change.

The world has witnessed recent key trends that affect the global economic landscape, including growing commitment to environmental sustainability, increasing demand for ethical fashion, application of digital tools, and strengthened Environmental, Social and Governance (ESG) and sustainability compliance.

The speaker showcased a number of case studies cross the Asia-Pacific region, to exemplify how sustainability is being translated into impactful action. For example, in Sri Lanka, enterprises like MAS Holdings, a global apparel manufacturer, have made practical efforts to adopt clear net-zero commitments, incorporate renewable energy, and empower women in their operations. Selyn, a fair-trade social enterprise, has promoted high-end traditional handlooms while leveraging blockchain for traceability. Similarly, Kantala works closely with farmers and artisans to produce vegan leather handbags using regenerative and sustainable henna fiber. Other examples such as Rags2Riches (the Philippines), Crystal International (Hong Kong, China), Asia Pacific Rayon (Indonesia) also empower women artisans through upcycling textile waste into high-end fashion, promoting low-impact dyeing, water conservation, responsible sourcing, promoting biodegradable textile, leadership, and sustainable innovation, etc.

Despite this progress, MSMEs still face significant barriers in ESG reporting. These include limited awareness and understanding, restricted access to practical tools and guidance, and rising expectations from buyers and investors, and capacity constraints. Overcoming these challenges requires a multi-pronged

approach including focusing on (i) building capacity targeted to textile MSMEs; (ii) fostering South-South peer learning (cross-regional learning on ESG promotion); (iii) promoting working groups (action-oriented learning on ESG promotion); and (iv) facilitating value chain integration and partnership (through matchmaking platforms, value chain integration training, etc.)

It is emphasized that support SMEs can start from providing basic ESG toolkits and templates, as well as providing training, digital tools, mentorship, and tailored financing, etc., to bridge capacity gaps. ESCAP's Report initiative and its working groups serve as valuable models in this regard. Besides, fostering inclusive collaboration through promoting partnerships between MSMEs and large firms via shared certifications, innovation platforms, and matchmaking, etc., would be helpful to create a more equitable and resilient textile sector.

2. **Identifying challenges and approaches to promote MSMEs' transition to the circular economy models in textile and garment industries**

Dr Chanchai Sirikasemlert, Executive Director, Thailand Textile Institute: The global economy in general, textile and garment industry is experiencing a pivotal shift affected by emerging factors, which include technology advancement with the adoption of robotics, AI, and digitalization; trend and demand for sustainability as a core strategy (environmental consciousness has transitioned from a niche concern to a mainstream imperative; compliance with stringent regulations and consumer expectations is driving the industry towards sustainable practices); economic influences marked by shifting trade policies, economic fluctuations, and the need for strategic geographic diversification; rise of vertical integration; and consolidation and competitive reshaping.

In this context, Thailand has promoted the Bio-Circular-Green Economy (BCG) model as an important development agenda since 2021. The BCG model helps to leverages Thailand's biological and cultural diversity, combining it with innovation and technology to achieve sustainable, value-driven growth, which aligns with the UN Sustainable Development Goals (SDG) and the Sufficiency Economy Philosophy. In the textile and garment sector, this model is being applied across the value chain, from the upstream production of sustainable materials to downstream efforts in recycling and product innovation.

Thailand's textile industry promotes the transformation with an emphasis on promoting adoption of sustainable fibers such as hemp, pineapple leaves, banana fiber, etc. The industry also promotes upcycling and recycling techniques to reduce environmental impacts; focusing more efforts on design strategies that emphasize durability, repairability, and reuse; fostering the integration of recycled materials into new products; etc. Certification schemes such as OEKO-TEX, the Global Recycled Standard, and the Global Organic Textile Standard are promoted to build trust in green products and ensure compliance with international standards.

The speaker shared some successful case studies of promoting circular innovation. For example, SC GRAND pioneers in transforming textile waste into recycled yarns. WISHULADA, a social enterprise, uses waste to create meaningful artistic and functional products. United Textile Mills has invested in solar power and machinery to improve energy efficiency, waste reduction, and production sustainability.

Despite these efforts, Thailand textile MSMEs still face various barriers in adopting CBM. Among those is the lack of awareness and understanding of the circular economy concept and its benefits, which make many MSMEs perceive sustainability as a financial burden rather than a strategic advantage. To address this issues, more customized and targeted training programs, workshops, and best practice toolkits should be in place to support MSMEs.

Technological constraints remain another significant challenge. Many MSMEs lack access to advanced, resource-efficient technologies as well as lack experience in integrating in supply chain and promoting digital platforms, which make them have limited roles within the complex global supply chains and hindering them from networking in circular supply chains and green marketplaces.

Finance is another difficulty to Thailand MSMEs since limited access to capital and narrow profit margins make investment in sustainable technologies or processes become less attractive.

Market-related barriers are increasingly evident. Despite raised awareness recently, in practice, consumer demand for sustainable textiles still remains

limited. In this context, environmental certifications such as the Green Label, Circular Mark, and Carbon Footprint of Circular Economy Products, etc., are promoted as efficient tools to increase the awareness as well as marketing tools and mechanism to build consumer trust and prepare for Thai producers to compete in regional and global textile markets.

To address such challenges, a multi-faceted approach is required, including financial and technical support, regulatory reform, capacity building, infrastructure development, and digital innovation, and so on. Creating strong networks and fostering collaboration between MSMEs, large firms, academic institutions, and government agencies will also contribute to accelerating innovation and scale impact.

Dr Truong Van Cam, Vice Chair cum General Secretary, Viet Nam Textile and Apparel Association (VITAS), Viet Nam: Being a major export sector, the Vietnamese textile and garment industry plays a crucial role in the economy. In 2024, the industry employed over 1.8 million workers, providing a great deal of employment for the economy. More than 93% of textile enterprises are MSMEs. With their contribution, it is urgent to address its environmental and developmental challenges.

Viet Nam textile industry takes advantages of political stability, competitive workforce costs and a skilled workforce, as well as a range of free trade agreements such as the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP), EU-Viet Nam Free Trade Agreement (EVFTA), and Regional Comprehensive Economic Partnership (RCEP), etc., to enhance supply chain resilience and maximize trade benefits, facilitating the industry's growth and development. Besides, to promote long-term sustainable development of textile and garment industry, the Government has adopted the Textile and Garment Development Strategy to 2030 with a vision to 2035, as approved in the Decision 1643/QĐ-TTg.

However, the industry also faces a number of challenges. Increasing trends and demand for shift from fast fashion toward sustainable fashion compels companies to adopt stricter environmental standards. The release of international partners' regulatory requirements put pressure on Vietnamese textile export since they

require textile producers to demonstrate transparency and ethical compliance. Fashion brands are also forced to commit to carbon emission reduction targets in line with global climate agreements such as the UNFCCC Fashion Industry Charter for Climate Action.

Domestically, Viet Nam is under pressure to fulfill its climate commitments under the COP26 agreement, which includes achieving net-zero emissions by 2050.

It is recognized that promoting a circular economy in the textile sector requires a holistic approach. Promotion of technological innovations, such as waterless dyeing and renewable energy systems including rooftop solar and biomass would contribute significantly to the adoption of CBM. For example, sustainable wastewater treatment systems have been successfully deployed in industrial parks like Tam Thang and Bao Minh. However, these efforts also require substantial financial investment, especially in green transformation, digitalization, and CBM. The industry also needs to promote a highly skilled workforce capable of adapting to new production methods. Finally, strong partnerships among government, businesses, international brands, and development partners are vital to fostering a supportive ecosystem for sustainable and inclusive growth.

Mr Robert M. Young, Trustee/Board Member, the Philippines Exporters Confederation, Inc.: The Philippines' textile industry began as a cottage-type industry in the 1930s. At its peak, the industry used to contribute approximately USD 3 billion to the economy, employing over half a million workers directly and indirectly. However, the industry entered a long period of decline since 1990s due to reliance on imported power and the 1990s financial crisis.

Today, the Philippines promotes the industry's growth through key registered players and a vibrant but small cottage sector. The latter, composed of indigenous weavers and handloom communities, is increasing playing a more important role not only in economic growth but also in cultural preservation. The Government's agencies such as the Philippine Textile Research Institute (PTRI) have made more practical efforts to support the industry with a focus on innovation and indigenous weaving traditions. PTRI also supports research in sustainable yarns,

natural dyes, and biodegradable fabrics, aligning with broader sustainability goals.

In efforts to transition to CBM, the Philippines' MSMEs face a number of obstacles, including limited awareness as many businesses unfamiliar with principles like reducing waste, reusing materials; low consumer demand driven by limited awareness, fast fashion trends, misconception of sustainable products; financial limitation due to high cost of eco-friendly equipment and limited access to green financing; technological gaps with inadequate waste processing infrastructure; fragmented supply chains; and lack of consistent regulations and incentives; etc.

To address these issues, it is recommended that capacity building through workshops and formal education on circular economy principles should be promoted. Related themes of circular economy can be incorporated into the schools/universities' curriculum of fashion and textile design programs. More efforts on improving access to green finance including initiatives such as government-backed loans or tax incentives should be fostered. Besides, investment in innovation hubs and shared service facilities can help MSMEs to access advanced technology, enhancing the adoption of CBM and their competitiveness.

The implementation of the Extended Producer Responsibility (EPR), and standardized certification systems for sustainable garments would be efficient tools to build market credibility. Consumer behavior should be influenced through awareness campaigns and public promotion of sustainable fashion labels, trade fairs and e-commerce platforms, which encourage greener buying habits as well as to help elevate local brands.

In addition, collaboration and cooperation across the supply chain and ecosystem would be vital to help strengthen the network, sharing resources and experiences in transition to CBM. Among that, the models of clusters and cooperatives might be helpful to create inclusive and resilient circular supply chains.

3. Promoting innovation to promote the transition to circular economy models for MSMEs in textile and garment industries

Ms. Ma. Flordeliza Leong, Vice President, the Philippines Exporters Confederation, Inc.: The Philippines' textile and garment industry is being influenced by some global trends, including rising demand for eco-friendly textiles, adoption of circular fashion models and extended producer responsibility (EPR), increasing expectations for digital economy, and challenges in the secondhand clothing market.

In this context, MSMEs in the Philippines face several barriers to innovation, including limited research and development (R&D) capabilities, high costs of new technologies, lack of awareness, and insufficient collaboration with academia and technology providers. Additionally, risk aversion and a short-term mindset also might remain as an impediment to efforts of transition promotion.

Currently, the textile industry is leveraging indigenous materials such as abaca, piña, and bamboo. Initiatives such as the Bamboo Textile Fiber Innovation Hub in Abra and exhibitions like KatHABI showcase how traditional natural materials and modern design can elevate their presence and competitiveness.

Among the examples are Bayo Manila's TexRev program, which recycles textile waste into new yarns; Rags2Riches, a social enterprise creating garments from recycled materials while empowering communities; Piñatex, developing based on pineapples; and the Creatteevs program supporting marginalized sectors in textile entrepreneurship.

It is recommended that coordinated efforts at the levels of policy, industry, and capacity-building should be further promoted. Regarding policy, policymakers are encouraged to develop a circular economy roadmap, enforce EPR regulations, offer tax incentives, and create green funding mechanisms. The industry should prioritize investing in developing sustainable infrastructure, pilot new business models, and collaborate with MSMEs on R&D. Regarding capacity building, education and training programs should be accelerated to equip the workforce with circular economy skills such as harnessing digital tools such as AI, IoT, and blockchain, etc. Initiatives such as the Philippine Circular Textiles Accelerator

Program, partnership between MSMEs, universities, and incubators should also be strengthened to promote the CBM.

Ms Riene Mahardiani, CE and Founder, ZeeColl, Indonesia: While emphasizing the hidden cost of cheap and fast clothes, the speaker highlighted the value of local botanicals as an alternative material input for the textile and garment industry. Based on her own experience in running a women-led MSMEs in textile in Indonesia, ZEE Coll, they use only fresh, local Indonesian plants with the process of picking in just one hour and do not require shipping across borders. Based on a sustainable model employing skilled women artisans to make the crafting, they aim not to use synthetic chemical dyes but natural ones, which help to release no toxic waste into the land and water while still maintain vibrant, long lasting, natural colors.

Apart from applying local input, local wisdom and experiences and innovation to access the market, she is aware of the importance of raising awareness and consumers' demand for sustainable, eco-friendly textile products through enhancing the products into a new level of concept, which helps to recognize her brand in the increasingly competitive market. In her experience, it is emphasized that sustainable fabric is not expensive but honest. Nowadays, fashion does not only reflect trend and luxury but a movement and a legacy, which help redefine core values, redirect consumers' behaviors.

Mr Albert Tan Kim Teck, Vice President of the Textile, Apparel, Footwear & Travel Goods Association (TAFTAC), Cambodia: The speaker shares the story of Cambodia's textile and garment industry, which plays a central role in the economy. In 2024, Cambodia had 1,566 textile factories, employing over 924,000 workers. Cambodia's export increased significantly from USD 10.94 billion in 2023 to USD 13.53 billion in 2024, representing a 23.67% growth, accounting for approximately half of Cambodia's total export value and nearly 10% of Cambodia's GDP.

However, Cambodia remains heavily reliant on imported raw materials, especially from China (65%); Viet Nam (15%); and other economies. In addition, Cambodian MSMEs also face significant barriers in embracing circularity. Those include limited access to modern recycling and waste management technologies;

low levels of digital integration; difficult access to green finance; misunderstood perception of circularity; lack of awareness and technical expertise needed to implement circular approaches effectively; and so on.

Despite challenges, Cambodia has made great efforts in adopting CBM. The transition is supported by an evolving institutional framework and a range of development partner initiatives. For example, the Ministry of Environment and the Ministry of Industry, Science, Technology, and Innovation have actively promoted climate action strategies and green industry policy dialogues as well collaborated with international partners such as the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) and the European Union (EU) through the SWITCH Garment project.

In particular, the GIZ's FABRIC project was piloted with a focus on promotion of research, test cleaner production techniques, and development of efficiency strategies within textile factories. Among the achievement is that many factories can reduce their energy consumption by about 30% after installing solar panels and deploying more effective energy data systems, illustrating the tangible benefits that collaborative framework can contribute to technical upgrades and efficiency.

The EU's SWITCH Garment project has also made notable achievements. They focus on regulatory improvements, measurement and verification systems, energy audits, capacity-building initiatives, and financial access mechanisms specifically tailored for MSMEs to help businesses adopt circular practices such as renewable energy integration and efficient water usage.

It is believed that combination of technical support, financial access, and market-driven incentives has driven Cambodia's textile and garment industry to promising circular transformation in the long term as well as provide valuable lessons and experiences for the transition.

Mr Jumnong Nawasmittawong, ASEAN Federation of Textile Industry, National Federation of Thai Textile Industries, (NFTTI), Thailand: The speaker stressed on the importance of innovation in transforming traditional production into more sustainable, efficient, and environmentally friendly processes. Some innovations highlighted in the textile and garment industry are

waterless dyeing methods and the reuse of water in production, which significantly reduce water consumption. The speaker also mentioned the implementation of technology to promote sustainability and circularity such as the adoption of AI (improving efficiency in planning, design, and production through data-driven decision making); digital printing (greater precision reducing the use of dyestuffs and chemicals, hence reducing environmental impact); use of plant-base such as hemp and pineapple; adoption of biodegradable fabrics (promoting renewable, biodegradable resources, more natural dyes and chemicals instead of petrochemical-based alternatives); recycling of textile materials; and so on.

In addition, local business communities especially those promoting traditional craftmanship play a significant role in promoting circularity practices as they can combine traditional materials and techniques with innovation to create new, sustainable and marketable products. By integrating sustainable materials, traditional techniques, innovation, and digital solutions, textile MSMEs not only enhance their competitiveness, market access, and resilience but also reduce their environmental impact, and participate more efficiently in an inclusive and sustainable future.

Dr Nguyen Van Thong, Senior Researcher, Institute of Textile Research, Viet Nam: The speaker underscored the urgent need for Viet Nam to transition toward a circular and sustainable development model that balances economic growth, environmental protection, and social equity. In practice, many Vietnamese textile enterprises have been already adopting circular economy principles. For example, they undertake eco-design strategies to optimize resource use; adopt renewable energy sources such as rooftop solar and biomass; use sustainable or recycled materials aligned with international buyers' sustainability criteria. In some enterprises, they particularly apply water-saving technologies such as airflow dyeing, ozone finishing, modern chemical management systems to reduce hazardous substances, improving environmental impact. Textile waste management has also been applied through the use of advanced fabric-cutting technologies and sort textile scraps for reuse or recycling.

Some concrete examples of CBM adoption include An Phuoc and ECOSOI which develop natural fiber from rami, pineapple, and banana leaves; Faslink use

mint, coffee grounds, and coconut fiber; Thanh Cong Textile Group and Vinatex investing in rooftop solar, water reuse systems, recycled materials; Hoa Tho Corporation converting to biomass boilers and recycling 85% of its waste.

However, in practice, MSMEs still face challenges such as high upfront investment costs, limited access to recycling infrastructure, insufficient technical knowledge, policy bottlenecks in accessing green financing, and pressure to keep low cost, etc.

To address the above mentioned obstacles, a package of solutions are recommended including capacity building (through training, technical assistance, pilot projects); promoting access to finance (e.g.: green credit funds, tax breaks for recycled machinery, and government grants for energy and waste efficiency projects); enhancing collaboration and cooperation across supply chains (setting materials standards, investing in green infrastructure); facilitating public-private cooperation (increasing regulatory, consumer awareness, etc.), and so on.

The industry has also taken advantages of initiatives such as GIZ's "Waste No More" and Crystal International's "Second Life" project on addressing textile waste; CL2B's digital platform on waste traceability.

4. **Exploring mechanism to promote MSMEs' transition to circular economy models in textile and garment industries**

Ms Li Xiaochun, Member of the China National Textile and Apparel Council, Chairman of Changzhou Golden Spring Textile Co., Ltd., China: Founded since 2006, Changzhou Golden Spring Textile Co., Ltd., specializes in the design, development, production, and global sale of around 3,000 products, including home textiles, furnishings, baby products, automotive decor items, and high-end fabrics. The company has achieved annual sales close to CNY 200 million.

Golden Spring promotes innovation by investing in advanced research and development platforms. Among the efforts, the company built a dedicated R&D center for green textile manufacturing; collaborating with Chinese universities such as Donghua University and Changzhou University, which reflect the company's commitment to adopting CBM. In addition, the enterprise is also

reinforcing its technical leadership in areas like eco-design assessment, digital printing, and recycled material production.

Since 2020, the enterprise has invested in a solar power system with a generation capacity of 1.3 megawatts, producing 1.33 million kilowatt-hours annually and reducing carbon emissions by 1,200 tons per year. They also focus on further using biodegradable and functional fiber; recycling and repurposing waste wool, exploring waterless printing technologies, and reducing electricity consumption and wastewater emissions. Thanks to such efforts, the enterprise has contributed to conserving 90% of water and reducing 40% of electricity consumption in specific processes.

Recognizing the importance of digital transformation in promoting CBM and enhancing competitiveness, in 2023, the enterprise allocated over CNY 21 million for intelligent production equipment, smart environmental management, and MES (Manufacturing Execution System) implementation. They also equip automated systems to manage energy usage and optimize operational efficiency; integrating smart meters and the ERP platform to enable real-time tracking and control of energy, gas, and water consumption, further advancing resource management and operational transparency.

Dato Sri Tan Thian Poh, Chairman of the Federation of Malaysian Fashion, Textile, and Apparel (FMFTA), Malaysia: Malaysian MSMEs account for an overwhelming 96.9% of all businesses, with microenterprises representing nearly 70%, and small enterprises close to 29%. Medium-sized enterprises comprise only 1.8% of the total.

The successful transition to CBM in Malaysia is operated based on four key pillars: (i) policy and regulatory framework; (ii) financial support and incentives; (iii) technical assistance and innovation; and (iv) collaboration and partnership.

The Ministry of Investment, Trade and Industry (MITI) has released the 2024 Circular Economy Policy Framework, which identifies four pillars of implementation, including circular input (30% of virgin material reduction by 2030); efficient process (25% resource efficiency improvement); sustainable output (50% circular products by 2028); and socio-economic impact (with 100 thousand jobs by 2030). The New Industrial Master Plan 2030 (NIMP 2030) aims

to focus on advanced manufacturing and green technology development with an estimated investment of MYR 95 billion (equivalent to USD 22.4 billion for a 10- year period. The Government also provides financial support and incentives such as the Green Technology Financing Scheme (GTFS), which specializes funding for green technology adoption with favorable terms; tax incentive package with 300% tax deduction for green technology investment, 70% tax exemption for 10 years for pioneer status, and 200% R&D deduction for smart technology, etc.

Regarding technical assistance and innovation, Malaysia aims to provide capacity building and promote technology for 300 MSMEs by 2026 with an investment support up to MYR 200 thousand (equivalent to USD 47.1 thousand); as well as train technical personnels annually for CE principles, new technologies, and circular practices, etc.

Regarding collaboration and partnership, Malaysia has developed a Multi-Stakeholder Framework including establishing a circular economy council, consisting of 12 ministry representatives, 10 industry leaders, 5 academic experts. They also foster public – private partnership through promoting shared infrastructure such as the Klang Valley Textile Recycling Hub, innovation consortium to advance recycling and bio-materials development.

The speaker also shares some case studies of MSMEs leading the transition to circular economy through innovation and technology. For example, Kloth Care makes effort in collecting textile waste via over 150 community bins and generating income through upcycled fashion, corporate collaborations, and educational initiatives. Lifeline Clothing Malaysia operates eight facilities with a processing capacity of 120 tons monthly, utilizing AI to enhance sorting efficiency by 60%. Batik Boutique combines traditional batik art with eco-friendly practices, using natural dyes that conserve water and solar-powered production. Similarly, Kualesa has developed bamboo fiber technology that cuts water use by 70% compared to cotton. Their biodegradable products and carbon-negative manufacturing methods are reaching broader markets through retail partnerships.

These examples highlight Malaysia' potential in shifting toward sustainable transformation. It is also stressed that widespread adoption requires further supportive policies, financing, infrastructure, and technical resources. Through investment, collaboration, and community engagement, it can help businesses to drive a circular economy that is both economically viable and environmentally sustainable.

Ms Analí Ochoa, Director of Environmental Management, Ministry of Production, Peru: Peru underlines the importance of CBM adoption to revitalize micro and small enterprises (MSEs) in face with structural challenges in productivity and workforce absorption.

The textile and apparel sector is one of the most important sectors of Peru's manufacturing landscape, contributing significant role in local employment creation and manufacturing GDP. They have advantages in the production of alpaca fiber and organic cotton, with important textile hubs located in Lima, Arequipa, La Libertad (Trujillo), and Cusco. However, the sector also faces persistent challenges, such as high levels of workforce informality, limited traceability, and insufficient adoption of circular models.

The environmental impact of Peru's textile industry is significant with nearly 23,000 tons of waste are generated daily, which highlights the urgent need for systemic change through circular strategies.

In response, since 2020, the government approved a comprehensive Roadmap toward a Circular Economy in the Industry Sector, outlining four main approaches, focusing on sustainable production, responsible consumption, solid waste reuse, and financing for innovation. They also develop the Industrial Development Policy and the Competitiveness and Productivity Plan for 2024 - 2030. Circular economy principles are also strengthened in the Peru's Institutional Strategic Plans and Innovation Financing Agency (PROINNÓVATE).

Besides, capacity building is promoted to support MSMEs in adopting circular practices. For example, innovation centers for MSEs (CITEs) have incorporated CE into their service offerings, delivering more than 80,000 services per year. Over 400 MSEs have been technically trained, supported by more than 230

professionals from both government and academia. These efforts are reinforced by training programs embedded in public initiatives such as Tu Empresa, INACAL, and the CITE network.

To provide practical guidance, Peru has published dedicated toolkits such as the Circular Economy Guide for the Textile Industry and the Guide for Environmentally Sound Waste Management.

To sum up, CE has become an important part of Peruvian public policy, particularly in the strategy for the productive development of MSEs, which needs to improve its productivity and efficiency with a sustainable approach. There is public and private consensus on the importance of CE as a sustainable development strategy for the economy.

5. Identifying resources to strengthen capacity building and skills development

Ms Regina Leong, Group Chief Executive Officer, Trackland Sdn Bhd Group of Companies, Malaysia: In ASEAN region, economies like Brunei Darussalam; Cambodia; Indonesia; and Laos have adopted policy frameworks for circular economy implementation but at different levels. For example, Myanmar and the Philippines' adoption remain in the nascent phase, impeded by limited technical expertise, regulatory gaps, and weak financing mechanisms. On the other hand, Malaysia and Singapore have advanced further, developed structured programs and more supportive infrastructures for businesses.

In response to challenges such as lack of awareness, limited access to green finance, insufficient training, and underdeveloped supply chain collaboration, ASEAN has undertaken a number of regional and domestic initiatives such as the ASEAN Circular Economy Stakeholder Platform, GIZ's ReNew FABRIC project in Cambodia, and the UNEP InTex project in Indonesia, etc., which offer training, technical assistance, and policy development tools.

In Malaysia, specific financial schemes like the Green Technology Financing Scheme and tax incentives such as GITA and GITE aim to make green investments more viable. However, many MSMEs still face significant obstacles in accessing these resources due to eligibility criteria, application complexity, and the need for upfront capital. Besides, SMEs operate in price-sensitive

markets where buyers are unwilling to pay premiums for sustainable products. Grants and subsidies, though available, are often misaligned with textile needs or delayed in disbursement.

Beyond funding, capacity building remains a critical area. Through the Malaysian Green Technology and Climate Change Corporation (MGTC) and Human Resource Development (HRD) Corp, academic institutions and NGOs, training is provided to MSMEs, which offer general sustainability courses. However, only a few explicitly focus on circular economy principles tailored to the textile industry. The lack of localized, hands-on training, especially in areas such as eco-design, life cycle assessment, and supply chain transformation, limits MSME uptake. Moreover, the challenges compounds as Malaysian SMEs owners often have multiple roles, leaving little time for leadership training or staff development. Employees may not see value in sustainability, and when trained, often leave for higher-paying jobs elsewhere.

Another challenge includes the absence of homegrown raw materials, weak upstream sectors, and reliance on imports limit innovation and sustainable practices.

Regarding technology, machinery is often designed for linear production and lacks flexibility for circular processes. Upgrading is expensive, and Malaysia lacks domestic manufacturers of circular-ready equipment.

Finally, methodologically, many SMEs have already optimized existing waste practices and are overwhelmed by regulatory compliance and grant application requirements.

Based on the identified challenges, the speaker introduces the 5M model, including “Man, Money, Material, Machine, and Method”. “Man” needs new skills, mindsets, retention strategies. “Money” refers to upfront investment for long-term savings. “Material” refers to shift from virgin to recycled/sustainable inputs. “Machine” means need for different equipment for recycling/reprocessing. “Method” refers to complete process redesign from linear to circular.

To address such gaps and challenges in a systematic approach, it is recommended to develop a strategic framework to harness critical resources through

incorporating institutional infrastructure (e.g.: developing regional center/ CE center of excellence at economy level), certification programs, master trainers development); technology and knowledge (e.g.: developing technology aided training solutions, data & research center for progress tracking, supply chain empowerment program); and financial and policy support (training funds & financial support, employee retention policies, dedicated ministry, agency or department). Besides, an approach of promoting multi-stakeholder collaboration and cooperation is crucial, in which governments can enable policies and infrastructure; development partners can harness technical and financial support; and industry & MSMEs can take active roles in promoting innovation and collaboration.

Mrs Inés Pando, Director of Technical Cooperation and International Affairs, Ministry of Production, Peru: It is emphasized that international collaboration offers essential insights into best practices from around the world. Economies that have successfully implemented circular economy principles provide valuable lessons that can be adapted to local contexts. Through cooperation, Peru has been able to align their policies with global sustainability standards and engage with platforms that encourage innovation and policy development. A key outcome of such engagement is the establishment of Commission for a Circular Manufacturing Economy and Peru's Coalition of Circular Economy, which contributes to shaping Peru's "Roadmap for Circular Economy to 2030," a comprehensive framework guiding sustainable industrial transformation.

Despite such efforts, there are notable challenges in promoting international cooperation such as lack of coordination among international stakeholders; fragmented initiatives, insufficient integration across borders; regulatory difference between economies, particularly regarding environmental standards and trade practices.

Another challenge lies in the global supply chain itself as the textile industry involves multiple economies and actors across sourcing, manufacturing, and distribution, which makes it difficult to track, regulate, and implement cohesive circular strategies across all levels. Moreover, funding and investment gaps remain a persistent barrier. Peruvian MSMEs lack the financial resources necessary to upgrade their operations in line with circular economy principles.

Their limited access to green financing, international investment, and technology transfer hinders their ability to participate fully in sustainable industrial practices.

To sum up, the speaker advocates stronger mechanisms to promote cross-border synergies, harmonize standards, and develop inclusive financial instruments that enable MSMEs to innovate and scale circular practices. Underscoring the importance of international partnership and experience sharing while fostering context-specific solutions, Peru aims to promote sustainable transition in the textile and garment industry for the long-term growth and development.

IV. Discussion, Recommendations and Conclusions

Through the active sharing of information and experiences at the Workshop, speakers and participants exchanged views on how to promote MSMEs in textile and garment industry to adopt CBM. Recommendations are summarized as below:

1. Recommendations for MSMEs

- Raise awareness for MSMEs in textile and garment industry of the importance and benefits of adopting CBM as an intrinsic business strategy for long-term growth and development;
- Raise specific requests as well as actively seek support for technical and innovation assistance, especially customized programs for textile and garment MSMEs;
- Foster inclusive partnerships between MSMEs and larger firms through promoting and actively participating in shared certifications, innovation platforms, and matchmaking, which can accelerate sustainability outcomes and create a more equitable and resilient textile sector;
- Participate in capacity building activities/programs on adopting CBM in general, in particular, waste management and circular design, etc.

2. Recommendations for APEC member economies/governments

- Raise the awareness and understanding of CBM to inspire and promote the adoption of CBM in general, textile and garment industry in particular;
- Set up data analysis centres to provide support for MSMEs' adoption of CBM;
- Invest further in infrastructure and innovation (e.g.: establishment of digital centres, regional hubs for innovation, etc.,)

- Promote MSMEs' access to green loans, grants, tax reduction for eco-friendly textile products, etc., to facilitate their adoption of CBM as well as promote networking market platforms to enhance market access;
- Provide customized training, digital tools, mentorship, and tailored financing to MSMEs in textile and garment industries;
- Promote collaboration and cooperation between multi-stakeholders (including G to B, G to G) as well has harness roles of associations on MSMEs and CBM;
- Explore the models of clusters and cooperatives to harness and support MSMEs in pursuit of CBM and competitiveness;
- Enhance trust and transparency to promote MSMEs' adoption of CBM (e.g.: through promoting certificates, authentication, etc.,)

3. Recommendations for APEC as a whole

- Develop an APEC circular fashion innovation lab (including developing a directory of experts; compilation and sharing of local wisdom/knowledge/culture/indigenous; establishing a center of excellence, etc.,)
- Promote collaboration, cooperation for cross-border pilot projects in designing and recycling;
- Launch and sustain APEC circular awards to encourage and/or inspire the adoption of CBM in industries in general, textile and garment industry in particular;
- Develop an APEC digital platform for promoting CBM products and lifestyles;
- Support eco-label certifications.

Hereinabove are some recommendations from the workshop's participants and speakers that require further thoughts and discussions at the upcoming SMEWG meetings to transform into more concrete and practical activities.