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INTERNATIONAL COUNCIL FOR CIRCULAR ECONOMY
with
INDIAN PLASTIC INSTITUTE

Taking action against TAKE-MAKE-WASTE Economy

IN FOCUS
TÊTE-À-TÊTE WITH
NERIDA KELTON

International Council For Circular Economy

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EDITOR'S NOTE

Journey of a thousand miles begins with one step!

Dear Readers,

The tremendous response on the first edition of the journal was overwhelming to the young team at the council. It made us understand the sheer need of demystifying the puzzle of sustainability, circular transition, resource efficiency and green growth, while the industry continue to look at the profitable models.

This issue once again brings articles, research papers and information from various sectors. Nerida with me discusses the measures that the packaging industry could take to become more sustainable, Liz with her team discusses the socio-economic impact of textile sector and how the entire textile sector could become more inclusive and circular. Prof. Shanthakumar has discussed about the enablers of making the tannery sector circular. We are pleased to see the variety of approaches taken by different sectors . This issue also includes the review of Dr. Prasad's book.

With the fast changing policy landscape during the decade of action, collaboration and knowledge updation is the key to meet individual as well as collective cumulative goals.

We sincerely hope that you find this issue helpful to build your knowledge and understanding. As we keep growing, we invite authors, researchers and industry to share their insights with the community at large.

Shall be happy to receive your feedback!

Shalini Bhalla

Shalini Goyal Bhalla

> "With the fast changing policy landscape during the decade of action, collaboration and knowledge updation is the key to meet individual as well as collective cumulative goals.

CO-EDITOR'S NOTE

Dear Readers,

Seasons Greetings.

In the last year, there have been significant developments related to the environment, and the cause of the circular economy has only become more important. Europe has passed legislation around Packaging Waste management as part of the EU Green deal. Similar legislations are being considered in other parts of the world as well. While this has an impact on packaging, however, similar considerations are being made towards electronics, batteries, etc. as well. Future considerations must be made around product design, including recyclability, recycling, and circular economy.

This is the second issue of the Journal on Circular Economy; we cover articles about technology and the management of the circular economy. For any program to succeed, we need technology to implement and management for planning. A combination of both gives us in-depth learnings which we can leverage during development. We have an interview with Ms. Nerida Kelton, VP of the World Packaging Organization, sharing her thoughts on the importance of packaging sustainability and the work being done by the industry.

Over the last couple of years, all business forums used to have a separate session on environmental sustainability; however, we are slowly observing the same as a form of regular business. At this year's WEF 2023 at Davos Switzerland, all business leaders linked corporate performance with sustainability. In the coming years, we will see more reporting and investment toward environmental sustainability and circular economy.

We hope you find the articles learning and inspiring. I look forward to your feedback.

Sriman Banerjee

"Future considerations must be made around product design, including recyclability, recycling, and circular economy.

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READERS SAY

"In a circular economy mindset we care how we do our products and what we do with them. Journal on Circular Economy is an important forum for circular ideas to spread.

Ester Lovsin-Barle,
Head of Product Stewardship & Health,
Takeda Pharmaceutical Company

"Journal on Circular Economy is a unique Indian knowledge product at intersection of climate, sustainability and institutional innovation. A unique scholarship platform to find breakthrough ideas in an accessible format. Accomplished contributors further make the Journal a compelling reference to targeted circularity issues

Pooran Chandra Pandey
Resident Representative, Climate Scorecard

"Well-compiled journal on circularity, most relevant in current times

Kishore Sampat,
Former President – AIPMA

MS NERIDA KELTON

Executive Director, Australian Institute of Packaging (AIP)
Vice President, Sustainability & Save Food, World Packaging Organisation (WPO)

TÊTE-À-TÊTE

SHALINI GOYAL BHALLA
Managing Director
International Council for Circular Economy

IN FOCUS

Packaging has an important place in today's linear economy. How can packaging be transformed into circular to be more sustainable and reduce waste?

We often remind packaging technologists and designers that the true role of packaging is its functionality. First and foremost, packaging is designed to ensure that a product is protected all the way across the supply chain until it is purchased by the consumer. This includes the vital role that packaging plays in ensuring the health and safety of the products and consumers, that product waste is kept to a minimum and the efficiency of the packaging can withstand the rigors of transport.

The functionality of the packaging cannot be ignored when re-designing your packaging to meet the Sustainability targets. 'Sustainable Packaging', in the simplest of terms, is packaging that performs the primary role of functionality but is also designed with the lowest possible environmental impact when compared to an existing or conventional pack. Finding the balance between functionality, commercial reality, consumer demands, and environmental criteria is the real challenge.

Rethink Packaging Design: Use Less, Use Longer and Use Again

As natural resources are rapidly diminishing, pollution and GHG emissions worsen, oceans and waterways are filling up with packaging waste and integral ecosystems are becoming irreparably damaged, the world has been put on notice that the time for talk is over.

The time has come to rethink the way packaging is designed. This is an exciting time to take bold moves and rethink every aspect of how packaging is designed, used and ultimately provide long-lasting environmental value.

The change is being driven by consumers who want to see circular packaging that has designed out waste, is reusable, incorporates recycled content, is truly recyclable and all unnecessary packaging and problematic materials are eliminated.

This significant societal behaviour shift is a green light for Packaging Technologists and Designers to become even more innovative and creative by the redesign of packaging to be circular and not follow the linear model of 'take-make-dispose'.

Packaging Technologists and Designers can now design out waste at the beginning, to ensure the materials selected can be used repeatedly, are recyclable and regenerates natural systems.

A great place for Packaging Technologists and Designers to start is by implementing the Sustainable Packaging Guidelines (SPG's) into their design processes.

The 10 Sustainable Packaging Principles that make up the SPGs are:

1. Design for recovery
2. Optimise material efficiency
3. Design to reduce product waste
4. Eliminate hazardous materials
5. Use recycled materials
6. Use renewable materials
7. Design to minimise litter
8. Design for transport efficiency
9. Design for accessibility
10. Provide consumer information on sustainability

The goal of the SPG's is to integrate the Principles into the right business areas, to achieve the optimal outcomes for packaging functionality and to be able to meet country and global packaging targets.

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Life Cycle Assessment (LCA) can guide Sustainable Packaging Design

To optimise circular and sustainable design packaging technologists need to look at the potential environmental impacts of the product across its lifetime. Environmental impact categories can include carbon/greenhouse gas emissions, water depletion, mineral consumption, land transformation, eutrophication, toxicity, and many more and can be undertaken through a Life Cycle Assessment (LCA).

This assessment can look holistically at environmental impacts of products, and associated packaging, from raw materials, to production, through to household, and then at end-of-life.

Now more than ever science-driven information, that is derived from LCA, is such an important step in ensuring that your product and packaging have the lowest environmental impact wherever possible across the entire value chain.

When used in the packaging industry LCA can provide accurate data that can guide a business in the choice of materials, pack shapes and sizes, but also when looking to move to a 'more sustainable' material or pack. The recyclability of the packaging, the ability to re-use and refill the packaging and meeting global and regional Packaging Targets must also be considered and can be checked as a design choice with LCA.

Using LCA within this decision-making process ensures that the business has all available datasets in front of them to make informed choices. LCA can eliminate second-guessing and assumptions about 'Sustainable Packaging' choices and can provide concrete information that crosses all areas of the supply chain.

There are many interesting examples of circular economy in packaging, which of them are more promising?

Recycled Content

Incorporating Post-Consumer Recycled Content is such an important piece of the circular design puzzle as it means brands can reduce the percentage of virgin materials used in their packaging. This in turn will see less burden on natural resources and reductions in packaging going to landfill, land pollution and marine litter. Packaging that is circular by design also reduces carbon emissions and pollutants in the environment. I would strongly encourage companies that are meeting the Recycled Content targets to communicate this to customers on and off-pack. Marketing departments need to communicate how much material has been reduced through light weighting, how much virgin material has been saved through the new design, what percentage of Post-Consumer Recycled Content has been incorporated into the pack and whether the PCR is locally sourced. Customers want to see that the packaging they purchase is circular by design and the brands they are loyal to are lowering their environmental impacts wherever possible.

The technology to enable Food Grade Recycled Content is also evolving and there are many new innovations across the globe being launched each week.

The next progression for recycled content is through Advanced Recycling Technologies. A recent example of this is the KITKAT prototype recycled content wrapper (Nestlé Australia). The 30% recycled content KitKat wrapper was an

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Australian first, created to demonstrate the potential for advanced recycling in Australia using Australian post-consumer soft plastics. By demonstrating what is possible, the initiative aims to encourage industry and government to play their part in building a better future for soft plastic.

Nestle know that they alone cannot create this future at the necessary scale. The prototype wrapper was created by a coalition of companies in the Australian value chain who brought their individual expertise together to process collected waste soft plastic, convert it to oil, and produce Australia's first soft plastic food wrapper made with recycled content: the KitKat prototype wrapper.

To close the loop the wrapper was created by a coalition of companies with a shared vision: REDcycle and CurbCycle, collected households' soft plastic waste, some from REDcycle in-store bins and some from the kerbside collection trial (conducted by Nestlé, iQRenew and Curbcycle on the NSW central coast). iQ Renew sorted the collected soft plastics and created a processed engineered feedstock. Licella converted the plastic to oil using their Australian-developed Cat-HTR advanced recycling technology. Viva Energy Australia refined the synthetic oil. LyondellBasell made food grade polypropylene. Taghleef Industries created a metalised film. Amcor printed and created the wrapper and finally, Nestlé wrapped the KitKat – keeping it fresh and safe to eat.

The prototype KitKat wrapper was the first food grade soft plastic wrapper made in Australia with recycled content. The KitKat prototype wrapper showcased what was possible; supported by a call to arms to industry to get involved and ongoing advocacy continuing to spread the word and build support. In June 2022 in a global and Australian first, Nestlé is rolling out the first commercial scale recycled content soft plastic wrapper, with 45g KitKat bars to be packaged in 30% recycled content wrappers supplied by Huhtamaki.

Reusable & Refillable Programs

In an effort to eliminate single use plastics and reduce unnecessary packaging we are seeing a significant increase in Reusable and Refillable packaging programs across all corners of the globe.

Packaging Technologists need to ensure that the packaging materials and design selected can withstand multiple usage, on-going cleaning and sanitising, transportation and more. The packaging also needs to be durable, and yet aesthetically pleasing for the consumers, intuitively easy to refill and the packaging needs to be recyclable in the country in which it is sold.

Reusable and Refillable Packaging is one of the steps to meet global and domestic packaging directives and targets and to design out waste at the start of the design process.

Developing reusable packaging also enables brands to become more circular by design through:

- Designing durable packaging that can withstands multiple uses.
- The ability to design refillable packs that incorporate recycled content.
- Packaging that is designed at the start to be truly recyclable in the country it is sold.
- The ability to incorporate intuitive recycling labels such as ARL, OPRL and How2Recycle on-pack to effectively communicate to consumers the correct disposal of the packaging at end of life.

Refillable packaging also enables consumers to join a brand's journey towards more circular and sustainable

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business practices.
Brands, retailers and consumers are starting to agree that a shift towards more refillable and reusable packaging not only reduces the use of single use plastics, but also enables more recycled content to be used, enhances circularity of the packs which in turn will lower the environmental impact of the product and its packaging.

On-Pack Labelling Program for Correct Disposal of Packaging

We are seeing more countries introducing On-Pack Labelling Programs such as How2Recycle in the United States of America, the Australasian Recycling Labelling program (ARL) in Australia and New Zealand and the On-Pack Recycling Label (OPRL) program in the United Kingdom.

On-Pack labelling programs are evidence-based, standardised labelling systems designed to provide packaging designers and technologists and brand owners with the tools to inform responsible packaging design. On-Pack Labelling Programs are also to aid consumers to correctly dispose of packaging and the separable components in the right bin.
Once consumers become more aware of the symbols on packaging they will gain confidence in the program and recognise that the labels are an important link to country or regional recycling capabilities. In turn the use of the symbols on-pack should encourage consumers to become more active in disposing of waste correctly which will limit contamination in our waste streams and keep recyclable material away from landfill.

Which countries have progressed on circular economy for packaging and what are some of the success stories?

Most countries that are linked to the World Packaging Organisation are all taking great strides to lower environmental impacts.
When you live in a developed country it is all too easy to take for granted the availability of infrastructure, funding or technologies needed to become more circular. There are many countries who are starting at ground zero and we need to support their efforts and achievements and we also need to help guide them.
The WPO is a great network of countries across the globe that can share learnings, ideas and examples that will help other Members.
It is encouraging to see that more Governments are establishing regulations, levies and pledges to achieve circularity, reduce problematic materials and unnecessary packaging and lower environmental impacts through circular and sustainable design.
This is in the area of Extended Producer Responsibility (EPR), Eco-Modulation, Deposit Return/Container Deposit Schemes, Plastic Pacts, Single Use Plastic regulations, the European Green Deal, Certified Compostable Packaging and On-Pack Labelling programs that enable consumers to correctly dispose of packaging and its separable components correctly.

Global Packaging Design for Recycling Guide

A global 'Packaging Design for Recycling Guide' has been developed by the WPO, Circular Analytics, FH Campus University of Applied Sciences and ECR Community and is available on the WPO website for download. The Guide is now available in English, German, Hungarian and Polish.

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Design for recycling is part of circular product design and represents an important basis for holistic sustainability assessment. Accordingly, circularity means that the packaging is designed in such a way that the highest possible recycling of the materials in use can be achieved. The goals here are resource conservation, the longest possible service life, material-identical recycling (closed-loop recycling) or the use of renewable materials. Circular packaging should therefore be designed and manufactured in such a way that it can be reused (reusable solution) and/or that the raw materials used can be reused to a large extent as secondary raw materials after the use phase (recycling) and/or consist of renewable raw materials.

In order to be able to apply recyclable packaging design, a certain fundamental knowledge of sorting and recycling processes is necessary. Packaging must, therefore, be suitable for state-of-the-art sorting and recycling processes in addition to its basic functions (e.g., storage, transport, product protection, product presentation and convenience).

The 'Packaging Design for Recycling Guide' is a starting point to understand Best Practice examples using state-of-the-art technology that can then be applied and tailored to suit the recovery and recyclability capabilities and infrastructure on a regional and local level. The guide can be applied to products from the Food, Near-Food and Non-Food segments and is applicable to all primary, secondary and tertiary packaging; provided that product-specific regulations of the packaging system are observed.

The WPO sees this new resource as the first step to developing a consistent global notion of Circular Design Thinking for materials and Packaging.

This guideline is just the first step towards a common global understanding and harmonisation of circular packaging design. Further steps will follow to either establish, or improve, harmonised collection and sorting flows for packaging in many countries through the partnership with the WPO Member countries and ECR community members.

This new global guide is a successful solution that was born from international collaborative efforts between the packaging, consumer products and retail sectors.

The guideline will be continuously updated and adapted to changes in collection, sorting and recycling technology, as well as to future material developments.

WPO Waste Stream Mapping Guide

As a second part of this project the WPO launched the first 21x country Waste Stream Mapping Guides and the How to Use Guide in May 2022. They are now available on the WPO website www.worldpackaging.org/wpo/45/

The Waste Stream Mapping Guides are essential global decision-making tools that will enable anyone to access current information on technically recyclable packaging across the world. They will help those involved in the development of packaging to not only plan in accordance with regional technical recyclability, but to also improve the design at the start to meet the regional requirements, or limitations, for collection, sorting, recovery and recyclability. Using these tools at the start of an NPD process will also bring significant opportunities to eliminate non-recyclable packaging before it is placed on the market.

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The Waste Stream Mapping Guides also come with a 'How to Use Guide' for the Global Packaging Design for Recycling Guide so that they can be used hand-in-hand when packaging is being designed. These guides will also be extremely useful to assist companies who are exporting their products and are unsure as to what is technically recyclable, conditionally recyclable or non-recyclable in the country in which the product will be sold. This information will help them to meet the packaging design parameters for that country to ensure recyclability.

What are the challenges to the circular economy?

Every country and region around the world differs in their approach to circularity and rightly so as government regulations and guidelines vary across all corners of the globe.
What is important is that we see more harmonisation and consistency of global standards where possible, a sharing of knowledge and technologies across countries and more implementation of on-pack recycling labelling programs such as the OPRL, How2Recyle and the ARL. We need to see consistent icons and logos globally so that consumers can embrace their role in recycling and recovery.

How do you see Multi-Layer Packaging, and finding the balance with the circular economy?

There are two sides to this. The first is the move across many countries to establish return to store soft plastics programs and even trialling kerbside collection to assist collection of these materials. This enables the materials to stay out of landfill and be able to be reprocessed into roads, patios, furniture, bollards etc.
A circular by design shift is also happening where we are seeing increased development of advanced recycling facilities across the globe to be able to capture and reuse the materials to put back into more packaging in the shift.

future. A great example of this is the Nestle Kit Kat Wrapper that now has 30% recycled content.
There are also advancements in shifting towards mono material packaging – wherever suitable and fit-for-purpose for the products. This is happening at a rapid pace. We have seen moves in categories such as coffee where barrier and integrity are critical, and they have shifted to recyclable mono material packaging. Amcor also have some wonderful examples within their portfolio of this

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What are some of the new innovations in packaging material and format toward the circular economy?

Depending on which product type and category you work in there are changes and improvements happening.
Everything from incorporating recycled content, to ensuring that the materials are recyclable and recoverable in the country in which the product is sold in, to packaging that minimises food waste, to new developments in mono materials to reuse and refillable solutions. At the end of the day we want to see packaging designers, technologists and engineers across the globe looking at designing out waste at the start and ensuring that the packaging has the lowest environmental impact as possible. They are all steps towards a circular economy.

How do you see Multi-Layer Packaging, and finding the balance with the circular economy?

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About Nerida Kelton

Nerida is the Executive Director for the Australian Institute of Packaging (AIP) and Vice President Sustainability & Save Food, World Packaging Organisation (WPO). She has worked in the Packaging industry for over 25 years, with over two decades working for the AIP; the peak professional body for packaging training and education in Australasia.
Nerida is passionate about educating the industry on the important role that packaging plays in minimising Food Waste and how designing Save Food Packaging can make a difference. She is the lead for the Save Food Packaging Consortium project within the Fight Food Waste Cooperative Research Centre and was the packaging representative on DAWE's National Food Waste Strategy Steering Committee. She is also one of the creators of the annual Xmas Foodbank hamper program which is designed to help those who are vulnerable and in need. The volunteer program has packed over 14,0000 hampers to the value of over $1 Million AUD over the last 11 years.

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TOWARDS THE CIRCULAR ECONOMY - TANNERY SECTOR IN INDIA

TANNERY SECTOR

ABSTRACT

India has emerged as the fourth largest exporter of leather goods in the world. The leather sector generates waste in every part of the process and the environmental issues includes resource depletion, biodiversity loss, and air, land, and water pollution. With an increase in the depletion of natural resources and pollution, India in early 2015 constituted apex policy body National Institution for Transforming India (NITI) Aayog to have action plans that completely focus on transforming India towards the circular economy practices to achieve its development goals for the period of 2015-2030 focusing on the 6-R's (reduce, repair, remanufacture, refurbish, reuse, and recycle). Clean technology approaches and zero liquid discharge (ZLD) have been employed in the tannery sector to minimize the waste generated in the tannery. This article aims to highlight these approaches that have been implemented by the government of India to achieve circular economy goals without compromising leather production in the tannery sector.

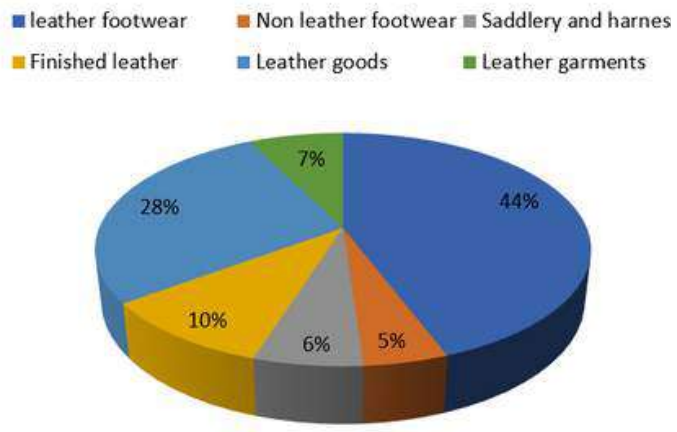
Keywords: Tannery, ZLD, Cleaner technology, CETP, Circular economy

Leather industry in India

The increase in population had led to an increase in demand for leather products which resulted in the exploitation of natural resources and this rapid industrialization resulted in resource degradation and pollution. There is a need of converting a linear economy into a circular economy (CE) in the industrial sector for a sustainable cleaner approach to meet the demand without exploiting natural resources. The concept of CE was first introduced by two environmental economists Pearce and Turner in 1990. During the 20th Century, the rapid increase in population caused an increase in demand for meat which led to an increase in the supply of animal skin which made leather the most traded commodity. This process ended up in the generation of large quantities of waste but the end-of-life management of this waste is limited to incineration and landfill. The leather sector is the most polluting sector in India because a lot of chemical processes are involved during the conversion of skin and hide into the leather (Ricky et al., 2022).

India is the second largest producer of leather in the world which accounts for 13% of the world's total leather production. Figure 1 depicts the overall leather market in India. The annual production of leather in India is 3 billion sq feet. Between 2021 and 2022 India exported leather and leather products of value US $ 4.87 billion. In India, around 44% of the tanneries, namely 934, are located in Tamilnadu, with 60% of the national production (Namasivayam, 2005).

TANNERY SECTOR



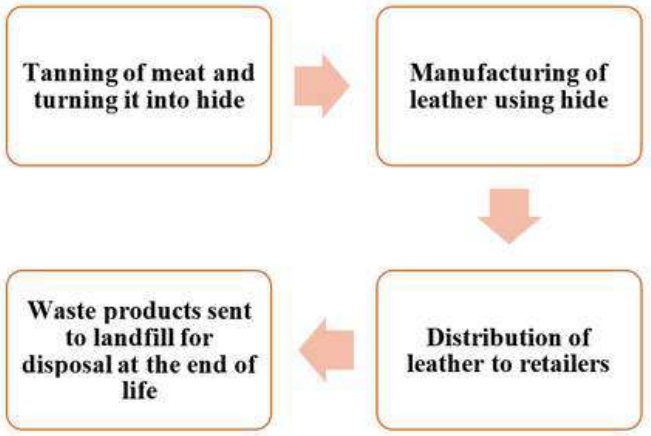
Leather Market in India

As the production of leather is increasing every day the waste generated from these sectors also increases resulting in the deterioration of the environment. This article aims to give the readers an overview on the steps implemented by pollution control board in India to counteract the waste generated from the leather industry by implementing the circular economy concept for sustainability and protecting the environment. Special emphasis was given to the ZLD concept as the success of CE in the tannery sector lies in the extraction and reuse of water from the wastewater through ZLD from the tannery sector with the generation of minimum waste.

Waste generated from Tannery

The production of leather involves various steps as shown in Figure. 2 in which a lot of chemicals are involved and hence the waste generated from the tannery industry is complex and contains nitrogenous compounds, chromium, organic and inorganic compounds, and suspended and dissolved solids.

During the life cycle of leather, waste is generated in each stage. The effluent from rawhide processing have byproducts that contain compounds of trivalent chromium (80-100 mg/L) and sulfides (1800-2000mg/L), organic and other compound resulting in high BOD (3000-3500 mg/L) and COD (5000-550mg/L) (Hansen et al., 2020). Tannery wastewater (TWW) has serious impacts on soil (reducing soil fertility, and leaching chromium into the soil thus altering soil microbial communities) and when it reaches water bodies it can create huge foaming blocking sunlight penetration. Also it increases the salinity of water due to high salinity affecting the aquatic life and the human health to those who utilize these polluted water (Saxena et al., 2017). Sophisticated technologies are required to treat this waste produced. To control the waste generated by the Tannery Industry CE with the 6-Rs concept is necessary.



Life cycle of leather

6-R's in the tannery sector

3R (Recycle, remanufacture and reduce) creates a closed loop focusing on the material, and another 3R (repair, reuse, and refurbish) focuses on the usage of the product (Moktadir et al., 2020). The tannery sector generates 550 million m3 of wastewater per year and is responsible for chromium pollution (Bień et al., 2017). Studies have shown that chromium pollution can be avoided using titanium (Mutlu et al., 2014). Titanium waste from the

TANNERY SECTOR

metal industry can replace chromium thus reducing pollution as well as proving a loop in the circular economy by recycling, reusing, and reducing the pollutants. Waste minimization is an important process in the tannery sector as the industry generates waste in every part of the process. The following approaches can be adapted to reduce recycle and reuse the waste-

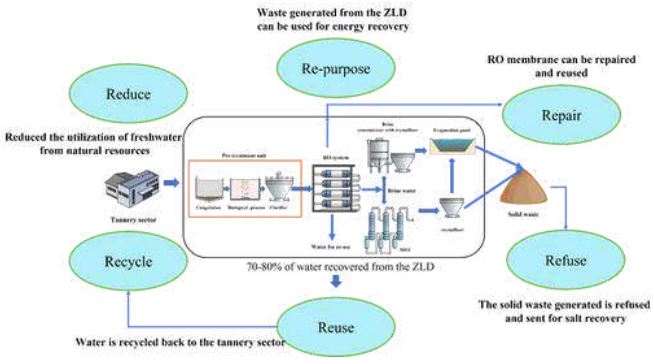
6-R concept applied in ZLD for CE

1. Soaking and washing-to reduce the processing time enzymes can be added to improve the water uptake.
2. Dehairing bath-the wastewater from the dehairing bath can be reused after passing through a simple filtration system.
3. Tanning using sulphonic aromatic acid in place of formic and sulphuric acid can increase the tannery process by 42% economically.
4. Tanning bath-recycling from the chrome tanning bath can reduce the usage of chrome as well as reduce the chrome concentration in wastewater.

In a developing country like India where the population is high, water consumption is the major issue, freshwater demand is increasing day by day and water consumption in tanneries can be reduced by 67% by a cleaner technology approach (Ricky et al., 2022). Treatment of TWW is a multistage process (primary, secondary and tertiary treatments), where the effluent is treated to reduce the pollution load. The treated water can be recycled back into the tanneries for non-potable purposes. Discharge standards are set by the pollution control board for the safe disposal of treated wastewater into the environment. To meet the standards small-scale tanneries in India are connected to Common Effluent Treatment Plants (CETP) as they cannot afford to set up their effluent treatment plant (ETP). The treated wastewater is recycled back to the companies for reuse.

Zero liquid discharge – a way towards recovery of water

ZLD was established to reclaim the water from the wastewater by removing all the dissolved solids. The recovered water is reused in the industry thus preventing natural resource depletion. The growth of the ZLD system is expected to increase 12% annually, reaching a 2.7 billion USD market value by 2030. In practice, CETPs have been supplemented with advanced water recovery methods such as reverse osmosis (RO) and multiple effect evaporators (MEE) (Buljan et al., 2017). Tannery wastewater (TWW) has high TDS due to the usage of salts in the tanning process. RO, a membrane technology that has been adapted to recover high-quality permeate water can be reused in tanneries. RO technology removes 98% of salt in the water and rejected water contains high dissolved solids (15-25 g/L) (Afonso et al., 2004). Water from the RO reject water is also recovered by MEE leaving the salt as solid waste. The next figure depicts how the 6R concepts have been applied in the design of ZLD process.



6-R concept applied in ZLD for CE

ZLD process has huge capital and operating cost, but the system recovers 75% of the water and recycles it back for reuse, thus reducing the demand for freshwater. Due to high capital costs, the government of India plays a major role in achieving ZLD. The funding structure of ZLD projects in India is, Government of India (50%), State government (15%), and CETP shareholders (35%) (Buljan et al., 2017).

TANNERY SECTOR

Challenges in achieving the circular economy

- Industries need to be trained and a network of tannery clusters to be created to deliver the skill sets for implementing a cleaner technology approach and ZLD.
- Implementing circular economy concepts regionally is a big challenge as India is a country of different regions, proper framework should be done based on the regional scale.
- The cost of sustainable products is high.
- There is a need to redesign, upgrade and integrate the new technological approach into the conventional treatment methods so that more water can be recycled back into the industry.
- The salt disposal would bring in additional costs that would make the whole ZLD system approach much more cumbersome. The capital investment and the cost of operation challenge the sustainability of the whole system.

Conclusion

India is facing many challenges such as urbanization, climate change, resource depletion, pollution, and an increasing population with acute poverty and it is estimated to become the 4th largest economy in the world in two decades. To face these challenges without compromising the circular economy goal is a great task. The right policy framework and systematic choices can help India move in a positive direction. It is estimated that following a circular economy path would benefit 40 lakh crore financially and greenhouse gas would be 44% lower in 2050 providing health and economic benefits to the citizens of India. With support from the Indian government, the tannery sector has set up ZLD in CETP with a special focus on recovering the water from the waste generated in the sector and if it is implemented, monitored, and maintained properly in all the tannery clusters then it will spur innovation and stimulate green investment which will help the country to face the challenges to meet the demand globally without compromising the natural resources.

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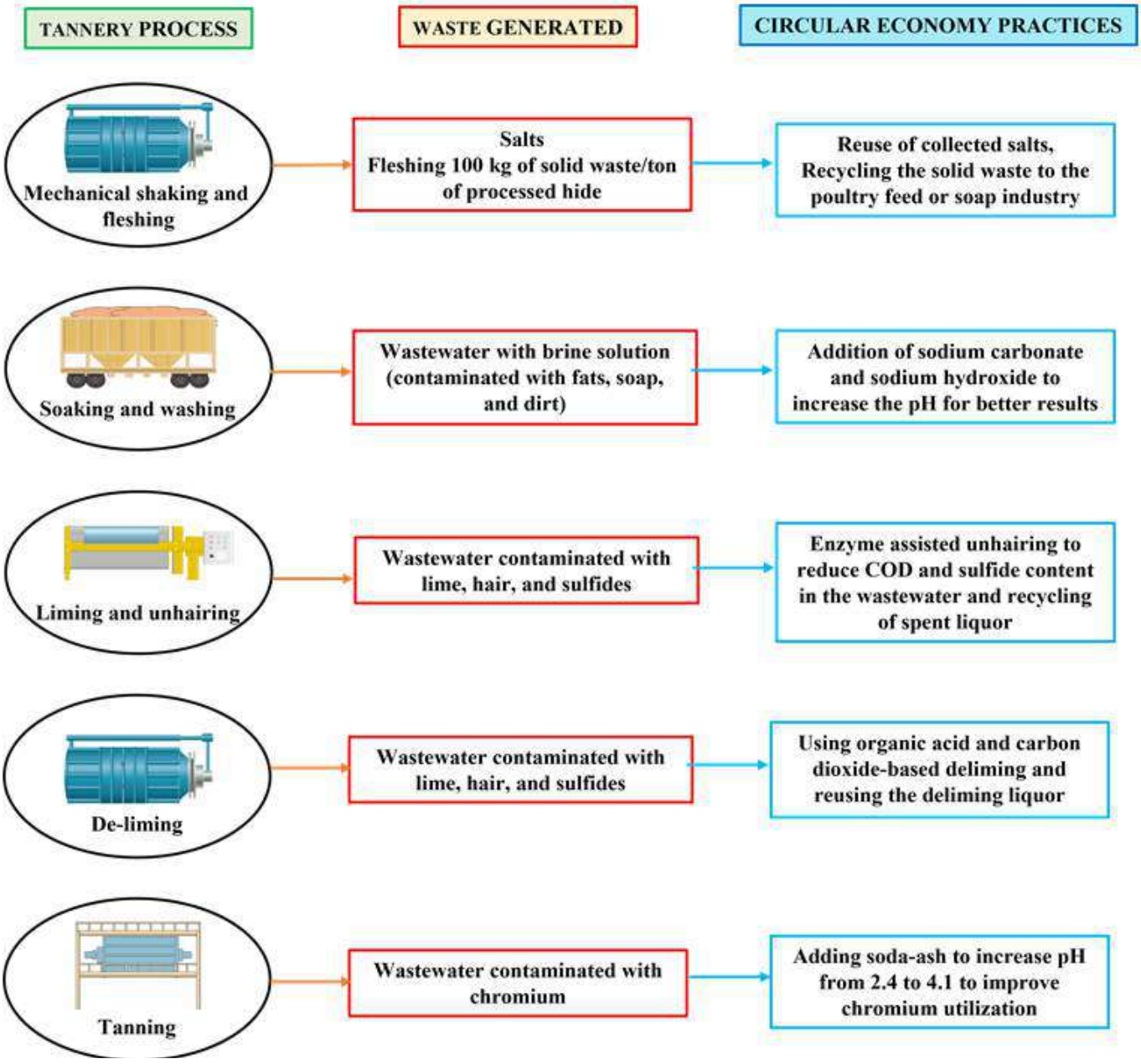
TANNERY SECTOR



CIRCULAR ECONOMY PRACTICES IN THE TANNERY SECTOR

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A literature Review

Sriman Banerjee & Riley Shelton

ROLE OF SOCIAL IDENTITY IN SUSTAINABLE PURCHASING DECISIONS

REVIEW

ROLE OF SOCIAL IDENTITY IN SUSTAINABLE PURCHASING DECISIONS

A literature Review

Sriman Banerjee & Riley Shelton

Introduction

Climate change is a crucial issue facing the world, with global temperatures increasing to impact the melting of the polar caps and rising sea levels as deliberated at the Conference of Parties COP 26 UN Climate change conference at Glasgow in 2021. One of the scientific causes identified for climate change is carbon. Most of the carbon is linked to the manufacturing of daily use products, also called consumer products, i.e., personal products, food, beverages, electronics, pharmaceuticals, appliances, etc. Over the years, there has also been a trend toward society's consumption of products being based on convenience, such as Keurig coffee pods. Consumption is linked to sustainability and is defined by the industry as a normative concept that stresses intergenerational equity and is commonly considered to have three dimensions: environmental, economic, and social. The idea of sustainability can guide decisions at all scales: global, national, and individual consumer levels. As in groups of individuals identifying themselves as sustainable, social identity has evolved in the last few years.

This drives the research question; how do consumers perceive sustainability in purchasing decisions? Several pieces of research have been conducted on consumers and sustainability, with the initial ones published in the early 1970s when the impact of climate change was first discussed at the UN. Since then, recent research shows that 86% of consumers want to make the world more sustainable (Smet et al. 2022).

In this paper we will study the relation between social identity, sustainability and purchasing decisions.

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Social Identity

Social Identity constitutes part of an individual's self-concept derived from the knowledge of membership in a social group (Tee et al., 2013). The formation of social identity goes hand in hand with the acceptance of a leader. A leader can influence the social scene, resulting in the individual depersonalization and assimilation of a personal mindset and expanding it beyond personal to share similarities with a social group's philosophy.In 2016, Solinger et al. mentioned the importance of moral leadership and cited an example of a leader challenging an organization's modes of thinking, e.g., sustainability. Today, we see this more and more in societies where leaders take moral grounds and drive sustainability, leading to individuals practicing the same at the workplace and home.

Many corporate leaders have taken a position on environmental sustainability and notable amongst them was Paul Polman of Unilever, which led to influencing other leaders and corporates in the area.

Sustainability

It is essential to recognize John Elkington's Triple Bottom Line: People, Planet, and Profit regarding sustainability in economics. These subjects face many overlaps. An excellent example of a company with a triple bottom line approach is home goods store Ikea. In 2016, when the company sold over $37 billion in goods, it saved $1 million by recycling waste into its products. Products are manufactured in a way that generates carbon, impacting climate change. As stated previously, most carbon is linked to manufacturing these daily used products (consumer products).

Because of these close ties within the triple bottom line, society has found itself facing what Horst Rittel coins as a wicked problem: A problem that lacks clarity in its aims and solutions.

The concept of sustainability comes with a caveat and is related to geography, culture, individual preferences, and hygiene. We often see some of these factors in play. To cite an example, in Switzerland, there is a preference for using sustainable products due to culture and leading a simple life.

Purchasing Decision

The purchasing decision is heavily influenced by the information brought forth to the consumer making the purchase (Bhargava et al., 2016.) With an ever-present rise in personalized information, as Bhargava defines as the "Cue the cloud effect," products are always available, and purchasing decisions are always on a consumer's mind. We see an upward trend at retail by consumer product companies regarding the use of sustainability claims to grab consumers' attention and persuade them to make the purchase.

Social Identity, Sustainability & Purchasing Decisions

We will discuss and provide examples of linkages between social identity, sustainability, and purchasing decisions during the paper, with convenience being the moderator.

Over the last decade, there have been a lot of innovations, and corporates have been offering sustainable product alternatives; some examples are:

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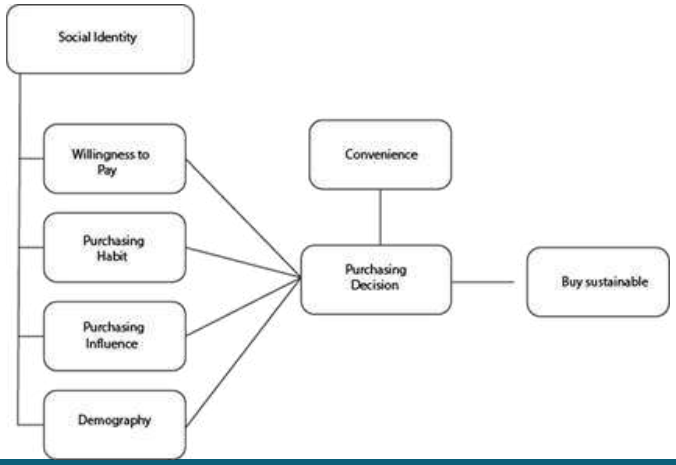
- **Reusable shopping bags:** While this has been there for quite some time, however majority of the shoppers end up using one-time shopping bags either made of plastics or paper. It can be explained that this is due to the convenience factor one may receive from not having to carry the reusable bag to the store in most parts of the world. At the same time, there can be exceptions, as in Switzerland, where one can observe that the majority of the people use reusable bags.
- **Reusable coffee cups:** Starbucks and Dunkin Donuts have been promoting these cups for years, but consumers still prefer the takeaway paper or Styrofoam cups. This is since there is an out-of-pocket price for a reusable cup and the inconvenience of carrying the used cup around the whole day.
- **Reusable water bottles:** Steel bottles have been there for decades. However, bottled water sales have doubled in the last four decades. This can be attributed to convenience and hygiene as you are confident the water in the bottles is filtered and clean.
- **Reusable lunch wraps:** The product was developed as a sustainable solution. However, the sales have not picked up due to cost and the hassle of washing it before the subsequent use.

We see four factors influencing social identity (1) Willingness to pay, (2) Purchasing habits, (3) Purchasing influence, (4) Demography.



There are factors currently driving consumers' product purchasing linked to sustainability. Four main themes emerge, (1) Willingness to pay (Walker et al., 2021), (2) Purchasing influence (Tee et al., 2013), (3) Purchasing habit formation (Chetty et al., 2016), and (4) Demographic (Bertrand et al., 2016). Convenience seems to be a moderator for the consumers in all the themes. Other factors, including culture and experience, are seen at intervals in the above themes. As an example, drinking from a straw which is more experiential, provides a burst of flavor and taste.

Willingness to pay

According to Walker (2021), purchase decisions at retail are based on several factors, and one of them is disposable income, which drives the willingness to pay. It may also be noted that in the initial days of receiving a paycheck, the readiness is higher and declines towards the next pay cycle. A person's purchasing intentions are heavily influenced by their willingness to pay for a product, as concluded by Auliandri et al. (2018). With recent peer pressure from society, individuals have been evaluating sustainable options. However, the chances are linked to convenience and willingness to pay. People feel compelled to shop sustainably, but when it came to acting upon the verbal commitment, it was very rarely followed through, as mentioned by Walker et al. (2021). Here one can take the analogy of organic food, which, although healthy, comes at a cost. The total organic food sales in the US is 5.7%, and only 12% of the population is consistently purchasing, as per the Deals on health report of 2022. We have not seen many consumers always buying due to the price being, on average, 10-20% higher. To provide an example of sustainability, electric cars are environmentally sustainable; however, they are 25% higher in cost and inconvenient to charge,

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leading to lower uptake, and we also see the convenience factor coming in. On the other side, we have an example of solar panels, which are expensive and inconvenient, but we see an upward trend.

Purchasing Influence

Researchers frequently underestimate the importance of purchasing influence. Historically, most of it was limited to advertising; however, with the rise of "YouTube" and "Tik-Tok" influencers, we see influencers swaying purchase decisions. Individuals want to buy products that offer benefits and social status beyond their price range based on what they see higher-income households indulging in, Chetty et al. (2016). Purchasing influence plays a crucial role in buying sustainable products and is also a bit of peer pressure in not being left behind or not being with the trend. Sustainability is one of them which has caught this trend, and we see products/ packaging marketed and or influenced as sustainable. However, Purchasing Influence has its limitation due to willingness to pay and convenience for a particular class of people. For example, if sustainable products are only available at "Whole Foods," and the store is not within driving distance, i.e., convenience, it may not work out.

Purchasing habit formation

Here is an interesting observation made by Chetty et al. l (2016), which mentions moving from ritual to habitual purchasing. A ritual is something done to prepare for action, while a habit is made repeatedly to perform the action itself. If we use the analogy to purchase, the ritual would be to buy a particular product, i.e., toothpaste for brushing, and the habit would be to buy a specific brand or attribute. In the case of sustainability, the ritual may still be toothpaste for brushing, but the habit may be purchasing the product having sustainable packaging. Buying sustainable products needs to be a habit and is a growing trend. However, this is also being driven by convenience, i.e., if a sustainable product is unavailable at the point, one tends to purchase what is available instead of waiting. Today the only sustainable packaging available for toothpaste brands is "TOMS," which has a 100% recyclable tube as claimed by Colgate. When it is not available, individuals buy what is there.

Demographic

Demography is a vital part of any research paper as individuals of different ages, sex, culture, geography, and socioeconomic conditions tend to demonstrate the reason for a particular behavior. If we take age as an example, there are three generations with varying influences and motivations for purchasing products. While we have an age group between 18 to 25 vying to be sustainable, disposable income is limited. With the age group, 65 to 85, the consumption and purchase are less due to concerns about future financial health as per Barron's report in 2017. The research done in China by Zhang et al. in 2018 mentions that countries with an aging population see a lower consumption reflected in their GDP, leading to a positive impact on environmental sustainability. The group having higher disposable income and consumption is 25 to 65. Also, there are two different consumption classes, non-rich and high-income households, as Bertrand et al. (2016) mentioned. One group may have lower consumption over the other due to factors impacting age or disposable impact, i.e., non-rich and high-income households.

Coming back to the question, how do consumers perceive sustainability in purchasing decisions? We observe that self-identification is a critical factor in how the

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four themes influence purchasing goods. Today, we see this more and more in societies where leaders take moral grounds and drive sustainability, leading to individuals practicing the same at the workplace and home. Solinger et al. 2016 mentioned the importance of moral leadership and cited an example of a leader challenging an organization's modes of thinking, e.g., sustainability. Paul Polman, CEO of Unilever, is one of the leaders driving sustainability in the consumer products industry. We see the impact and interest of the same with more corporates coming forward. For example, all Fortune 500 companies have a carbon reduction target and signed up for net-zero emissions by 2040. Given their size and influence, many of these companies are taking climate action quite seriously; 30% of the group have either achieved a climate goal or are publicly committed to doing so by 2030—a significant increase from just 6% in 2016, as noted by the visual capitalist in 2021. This also leads to the theme of purchasing influence and following affect the action of a leader, as cited by Tee et al. l (2013). For sustainability to be successful, one of the factors considered is followership and social identity theory. Influencers play a vital role in motivating a change, i.e., the theme of purchasing decision moving from a ritual to a habit. One of the study's main conclusions by Bartels et al. l (2011) is that people who identify as environmentally friendly consumer groups also seem to feel more attached to consumers who buy organic food products.

Conclusion

While there has been a lot of research done on sustainability and its impact, the reality is this has not been seen translated into purchase habits at retail. The four main themes, (1) Willingness to pay, (2) Purchasing influence, (3) Purchasing habit formation, and (4) Demographic, have an influence on the consumer deciding to buy sustainable products with the moderating factor of convenience. Social identity plays an important part where certain groups of people like to be associated with sustainability and be seen as individuals contributing to a better environment. The group of individuals considered behavioral green as mentioned by Jennings (2007) today forms a small portion of society. Further understanding is required of what would drive individuals towards being sustainable and whether it is an incentive or a law.

Future Research

Society today runs on a consumption-based economy. Therefore, there are elements of the economy linked to sustainability. While humanity has the power to change consumption methods and establish an eco-friendlier environment, individuals and society are not. Some elements prevent sustainable products from being the main driving factor for consumer purchasing, as reflected by Chetty in 2016. While all the above themes are valid, some are more valid than others, and there is scope for future research areas addressing the drive and motivation to be sustainable. Researchers have been evaluating one concept at a time. There is a scope to assess a correlation between the themes and the moderating factor of convenience leading to consumer hesitancy to move towards more sustainable products.

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TRANSITIONING TO AN INCLUSIVE CIRCULAR TEXTILE AND APPAREL VALUE CHAIN IN INDIA

THE FASHION

ABSTRACT

The Indian textiles and apparel industry, while being a major contributor to India's GDP, exports and employment, is laden with various environmental and social challenges including but not limited to textile waste in landfills, pollution and greenhouse emissions, high degree of informality and non-standard forms of employment. Businesses today are moving away from the linear model and transitioning towards the circular economy to achieve sustainability compliant with environmental, economic, and social considerations. However, CE's social dimension is not clearly stated and in the absence of a framework, it cannot be effectively measured and scaled up. This paper introduces a social impact assessment framework for circular economy tested with over 100 workers and 40 managers to provide evidence of the current social impact of circular strategies in the Indian context. It identifies the positives and negatives of different circular strategies and suggests recommendations for circular businesses to maximise their social impact.

Keywords

Textiles and apparel value chain, circular economy, environmental challenges, social impact, social impact assessment framework, just transition, gender equality, inclusiveness

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Global textile & Apparel Value Chain and India's Position in it

The global textiles and apparel (T&A) value chain is a composition of at least three main industries operating across multiple geographical locations, as shown in figure 1 i) Textile, where raw materials (fibre, yarn, and fabric) are created, ii) Apparel, where raw materials are processed into clothing and distributed to end consumers and iii) Recycling which involves different stages of collection of used textiles, sorting, recycling, and final disposal (Thangavel and Duraisamy 2014). Globally, it employs 9.3 per cent of the working population and creates a source of livelihood for millions of workers (De Souza et al., 2010; Franco, 2017; Ozturk et al., 2016; World Bank, 2013).

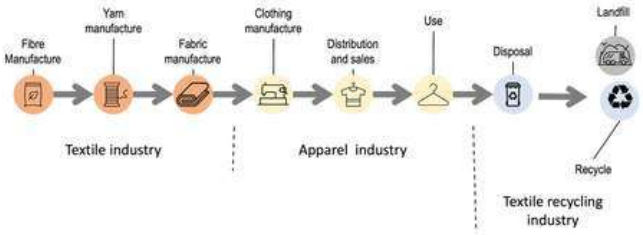

Figure 1. The Textile and Apparel Value Chain
Source: Suarez-Visbal et al 2022

India's textile and apparel industry forms 11 per cent of the country's total exports basket (Raichurkar and Manickam 2015). The Indian T&A sector, currently sized at USD 108 billion, is expected to grow to USD 141 billion by 2021 (CITI, 2018; Baskaran et al., 2012; Verma, 2002), making it the fifth-largest exporter of textiles and apparel in the world (UN Comrade and Wazir Analysis 2021). The existence of over 3000 spinning and composite mills across India explains why it is an outsourcing hub for the global T&A value chain (CITI, 2018; Baskaran et al., 2012; Verma, 2002). It is also the second-largest employer in the country after agriculture. It is a direct source of employment for 45 million people and indirectly for around 60 million people.

Additionally, Panipat, globally known as the Handloom City in the textile recycling sector, has become a hub for the recycling industry. This industry currently employs around 20,000 people and brings over $62 million in annual revenues (Sikka et al., 2018). While Panipat may be helping in managing the discards of the planet; on the other hand, the textile-recycling business in India abounds with unattractive features.

Environmental and Social Challenges in the Sector

Despite being recognised as one of the most economically relevant sectors, the T&A sector exhibits severe environmental problems. More than 1 million tonnes of textile waste, mostly from households, makes its way to landfills every year (Bairagi, N. 2017). The environmental problems range from overexploitation of resources (such as water in the extraction and manufacturing phase), soil and water pollution and greenhouse emissions. Water pollution is caused by the discharge of untreated effluents and the release of microfibers during the washing stage of synthetic garments. These microfibers can eventually enter the human food chain via fish consumption, creating a human health issue (Mers, T. 2020). Additionally, soil pollution and greenhouse gases are created in textile landfills (EPRS, 2017; UN, 2018).

Apart from the environmental concerns, the T&A value chain is also laden with critical social impacts. According to the International Labour Organization (ILO) (2015), most workers at the manufacturing stage work under questionable conditions, where penalties for not meeting production targets, verbal abuse, and excessive overtime are common. Workers have a limited representation at the factory level. The most vulnerable workers often lack formal contract

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agreements as some industry segments are highly informal. Most of the time, formal workers receive only minimum wage, which is insufficient for a decent standard of living (Suarez-Visbal et al. 2022a, ILO, 2015).

Similarly, in the recycling industry, there is a high level of informality and non-standard forms of employment (Priya, S., & Gupta, S. 2020). Most of these industrial units run in sweatshop conditions for workers. They are constrained to subsist on rock-bottom exploitative wages and work in an environment riddled with severe occupational hazards (Sikka et al., 2018). Also, the use of child labour is common (ILO, 2015).

The T&A value chain is also highly feminised, where 60% of those employed are women (Fotedar, E. & Nirupama, V. 2021). However, they are often the earners of lower wages and the most vulnerable jobs. Owing to their unequal status in Indian society, women usually make a cheaper source of labour since their income is a secondary contribution to the household income (Fotedar and Nirupama 2021). They are also deemed submissive, resulting in women dominating the frontline workforce in garment factories while men hold supervisory roles (Fotedar and Nirupama 2021). The situation is not any different for the end-of-life and recycling sectors. Despite being the backbone of India's waste management value chain, waste workers/recyclers are often unorganised, disempowered and mostly poor (Shukla, 2020).

Circular Economy as a Sustainable Alternative to the Linear Apparel Value Chain

In an attempt to adopt a new framework to achieve sustainability compliant with environmental, economic, and social considerations, businesses in India and across the world are adopting the Circular Economy as a new production paradigm (Henry et al., 2020). The Circular Economy helps reduce environmental impacts by minimising resource flows (input of raw materials and output of waste) via the implementation of different circular strategies (EMF,2017). These Circular strategies (CS) close the loop of materials with different processes where the shorter the loop, the higher the product value retention (Kirchherr et al., 2017). These circular strategies in the T&A sector are identified in figure 2, with an R and a number that illustrate the implementation hierarchy. The smaller the number, the higher the priority (Guldmann, 2016; Stahel, 2016; Jung & Jin, 2016; Accenture, 2019). While economic and environmental dimensions have been addressed by different businesses, the social impacts of CE (e.g., decent pay, gender equality, labour conditions) are low (Elia, Gnoni, and Tornese 2017; Millar, McLaughlin, and Börger 2019; Suarez-Visbal et al.;2022b).

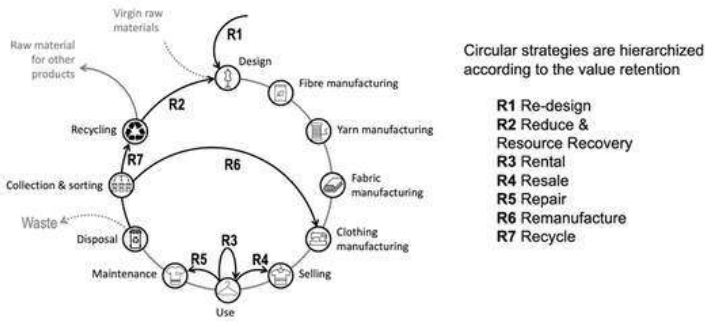

Figure 2. The circular Strategies used in the textile and apparel value chain

Source:: Source: Suarez-Visbal, Stuckrath, & Rosales Carreón. (2023). Circular Economy: An overview of global trends, challenges, and opportunities. In Accelerating Sustainability in Fashion, Apparel & Textiles. Manuscript submitted for publication

While there are many social impact considerations, CE's social dimension has been defined in literature mainly by the number of jobs created (Millar, McLaughlin, and Börger, 2019). This is not a well-rounded definition since it does not consider the type of job, its quality, and the potential individual and community impacts or trade-offs between different kinds of workers (Suarez-Visbal et al., 2023). Until not long ago, there was no framework to assess the social impact of CE (Millar, McLaughlin, and Börger, 2019).

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Suarez-Visbal et al. 2022(a) recently presented the SIAF-CE♀♂ (Social Impact Assessment Framework for Circular Economy) (see figure 3 left-side), a first attempt to construct a social impact assessment framework for circularity. It takes workers' perspectives to address critical issues in the T&A value chain, such as gender inequality, inclusiveness and just transition. The SIAF-CE♀♂ measures 15 composite, multi-attribute, qualitative indicators within three dimensions; the quality of job dimension (QOJ), the wellbeing /sustainable livelihood dimension and the gender equality and inclusivity dimension (GE&I). This framework was developed to help businesses, NGOs, and government officials to i)collect relevant gender-disaggregated data of the workers; ii) track, document, and monitor the development of different circular jobs and iii) identify measures to improve the quality of life of workers in the T&A value chain.

Suarez Visbal et al. 2022(b) used the SIAF-CE♀♂ to provide evidence of the current social impact of circular strategies in the Indian context (see figure 3 right-side). With a sample of over 100 workers surveyed and 40 managers interviewed in India, they developed an inventory of circular jobs with respective demographic (annexe 1). They found out that India's Circular Economy is replicating low working conditions prevalent in the traditional T&A sector, as it is showing the low quality of jobs with low wages and job security indicators (especially for female workers). They also brought evidence of the significant disparity between male and female workers for the same position when different circular strategies are implemented. Additionally, they corroborate that informality plays a critical role for workers in repair (R3) and resale (R4). Furthermore, both male and female workers in these circular strategies (CS) have the lowest social security level and the lowest earnings. They also have the lowest access to financial assets in the livelihood dimension, as their earning and saving capacity are hampered due to the low income generated. These findings suggest that informal women migrant workers active in resale (R4) and recycling (R7) are the most vulnerable workers as they do not have minimum rights guaranteed and have the lowest voice and bargaining power. Even though they seem to consider working conditions as high due to the great flexibility in organising their workload, this perception might be shadowed by the lack of comparison with other types of working conditions and the fact that overtime is also significant in this group of workers.

Another interesting finding is that resale (R4) and rental (R3) based on internet platform models have the highest earning quality among the different circular strategies compared, true for both male and female workers. However, the rank on position and the pay gap amongst gender for the same position persists (Suarez-Visbal et al., 2022b). These findings show that a just and inclusive transition of the Circular Economy is imperative in the sector. If CE is expected to follow the new economic and societal model, businesses and policymakers must work hand in hand to establish a stronger definition of social consideration for the Circular Economy.

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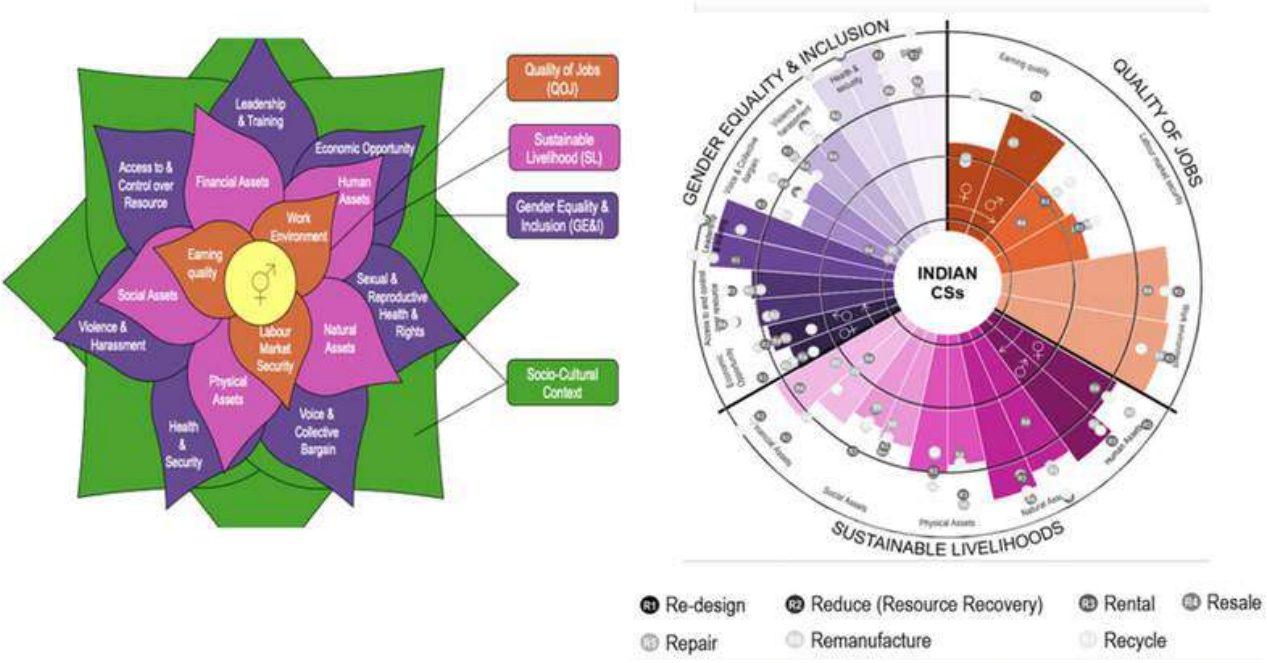

Figure 3. (left-side) The SIAF-CE and its indicators. Figure 3 (right-side) visual representation of SIAF-CE results in India
Source: The social impacts of circular strategies in the Apparel Value Chain; a comparative study between three countries (Suarez-Visbal et al., 2022b)

Conclusion & Recommendations

The Circular Economy represents a great opportunity for countries like India to reduce their environmental impact while creating economic gain. However, so far, its social impact remains low. To have a positive social impact, socio-economic considerations must be fully integrated creating circular jobs with good quality for the workers, their families and their communities. This should be accompanied by offering at least equal access to opportunities and inclusion to a variety of workers.

As a pivotal player in the global T&A, India must be mindful of the potential trade-offs that can be produced if circularity is applied in other segments (consumption countries) of the global T&A value chain. For an inclusive circular transition of the sector, businesses adopting circular strategies should:

1. Conduct Circular Impact Assessment

- Conduct circular assessment for the business (including social and environmental considerations) that helps management to identify (high-hierarchy circular strategies) and potential hotspots and trade-offs of their current model.
- Collect data using a social impact assessment tool (such as the SIAF-CE or any other) to understand the social gaps and opportunities to improve the quality of life of their direct and indirect workforce and establish workers' collective KPI.
- Report on environmental and social impacts associated with circular strategies/practices identifying existing commonalities and potential collaborations.

2. Redesign the Business Circular Hierarchy

- Ensure via training & capacity building that, both the upper management and operations, are aligned to the definition of circularity, and its goals.

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- Support the creation of a workers' committee that allows voicing their opinion on decisions that concern them.

3. Improve Social Impact by:

- Revise workers' contracts to guarantee equal working conditions for male and female workers for the same job is respected and enforced.
- Ensure access of workers to social security governmental schemes in hard times.
- Privilege fixed extended contracts over short, highly fluctuating hours-based jobs.
- Collaborate with local and community NGOs to reduce the vulnerability of informal workers by transitioning to more community organised jobs, and formalised jobs, that offer more security.

4. Stakeholder Mapping and Collaboration

- Align and develop collaborations with direct and indirect upstream and downstream stakeholders of the respective value chains, including international brands, governments, NGOs, and local vocational training centres to address collectively the most pressing social and environmental impacts of circularity.
- Together they should plan ongoing skills training for their employees (especially for women workers) in areas such as machine operation and communication and IT as a preparation for the advancement of automation and possible shifts in employment demands.

About the Author

Lis Suarez-Visbal is an Ashoka fellow, a system-thinker, consultant and a Doctoral Researcher at the Copernicus Institute of Sustainable Development, Utrecht University. She has a MSc in sustainable Business and Innovation and specializes in the intersection of Circular Economy and social impact with a gender lens. She has over 16 years of experience leading initiatives connecting producers and consumers, governments, and academic institutions to co-create more sustainable industries. She has work in various countries including Canada, The Netherlands, Spain, Colombia, Bolivia, Ecuador, Mali, Thailand & India. She founded and directed for over 13 years FEM International and ETHIK Eco design hub, two pioneer organizations established in Montreal, that contributed to build a more sustainable and conscious fashion culture with high-school students, academic institutions, businesses, and consumers alike.

ANNEXE 1

CURRENT CIRCULAR JOBS INVENTORY WITH DEMOGRAPHICS IN INDIA

CIRCULAR STRATEGY	JOBS	SOCIO-DEMOGRAPHICS/GENDER BASELINE						
		CONTRACT	GENDER	AGE	EDUCATION	MIGRATION	MARITAL STATUS	CHILDREN
REPAIR 	Self-employed (informal worker) (tailor, sewing machine operator, dry cleaner, repair worker, cobbler)	67% men no contract 88% men overwork 100% women no contract 100% women work part-time	82% men 18% women	27% 19-35 55% 36-60 18% 51-65	27% of primary school 46% of secondary school 9% university 18% others (not educated)	0%	100% married or de facto with children	9% 1 child 27% less than 3 64% less than 5
RENTAL 	Management (Manager, HR Manager)	75% men permanent contract 100% men overwork 100% women permanent 100% women overwork	75% men 25% women	100% 19-35	100% university	0%	25% married or de facto with children 50% married or de facto with no children 25% single	75% no child 25% one child
	Floor Staff (Sales Assistant, Tailor, Logistics Clerk)	60% men permanent contract 100% men overwork 100% women permanent contract	67% men 33% women	100% 19-35	50% university 50% secondary school	0%	33% single 17% married or de facto with no children 50% married or de facto with children	50% no child 17% one child 33% less than 3 children
RESALE 	Self-employed (informal worker) (Shopkeeper, independent repairer)	100% men permanent contract 100% men overwork 100% women no contract 100% women overwork	44% men 56% women	11% 19-35 22% 36-50 67% 51-65	22% secondary school 78% other (no education)	0%	89% married or de facto with children 11% single	11% no child 44% more than one child 33% less than 5 children
	Floor Staff (sales assistant, technician, logistics clerk)	90% men permanent contract 10% men yearly contract 100% men overwork 100% women yearly contract 100% women overwork	91% men 9% women	55% 19-35 45% 36-50	36% secondary school 55% University 9% Technical degree	0%	64% married or de facto with children 9% married or de facto with no children 27% single	36% no child 18% one child 36% less than 3 children
REMANUFACTURE 	Design + management (manager, designer)	100% men overwork 75% women permanent contract 25% women yearly contract 100% women overwork	60% men 40% women	40% 19-35 60% 36-50	40% university 60% secondary school	0%	60% married or de facto with children 40% single	40% no child 60% less than 3 children
	Floor Staff (sewing machine operator, technician, logistics clerk, tailor, thread clipper)	50% men permanent contract 75% men overwork 54% women permanent 46% women no contract	38% men 62% women	46% 19-35 43% 36-50 5% 51-65	2% primary school 46% secondary school 15% university 21% other (no education)	46%	10% single 72% married or de facto with children 3% married or de facto with no children 6% divorced with children	55% more than one child 30% less than 3 children 15% less than 5 children
RECYCLE 	Floor staff (logistics clerk, clipper)	100% men permanent contract 100% men overwork 100% women permanent contract 100% women overwork	17% men 83% women	67% 19-35 33% 36-50	33% primary school 33% secondary school 17% technical degree 17% other (uneducated)	0%	83% married or de facto with children 17% married or de facto with no children	50% more than one child 17% less than 3 children

Source: The social impacts of circular strategies in the Apparel Value Chain; a comparative study between three countries (Lis Suarez-Visbal et al. 2022b)

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PRACTICING CIRCULAR ECONOMY

Prasad Modak

CRC Press

BOOK REVIEW

Prof. Pradip Kalbar,
Associate Professor, IIT-B

'PRACTICING CIRCULAR ECONOMY'

BY DR. PRASAD MODAK

Circular Economy (CE) is an umbrella framework that gives impetuous to different resource effciency strategies such as reduce, reuse, recycle, recover, etc. There has been substantial growth in the concept of CE, and many interpretations and approaches have emerged to implementation of CE in many sectors. Hence, there was a need for the book which could elaborate on the existing and futuristic practices and models of CE.

The book “Practicing Circular Economy” from Dr. Prasad Modak very aptly fills this gap. The book covers all the essential aspects of CE. The book starts with the first chapter on current global challenges related to sustainability and introduces CE. Important issues such as ecological footprint, resource consumption, and decoupling challenge are discussed in this chapter. Subsequently, key concepts and programmes in the environmental management domain that led to CE development are discussed in Chapter 2. The chapter is beneficial for both the novice in this field and those who know the domain but can refer to all the key concepts chronologically presented in the second chapter. Chapter 3 presents important tools and methods such as Material Flow Analysis, Life Cycle Assessment, and Systems Dynamics required to plan, implement and monitor the CE. Then Chapter 4 describes 12Rs of CE using case studies representing different geographies, scales, and diverse sectors.

BOOK REVIEW

Chapter 5 and 6 describe two main strategies for achieving CE. In Chapter 5 how product durability can be extended through reuse, repair, and refurbish. This chapter also emphasizes the role of behavioral changes in society and industry to extend durability through case studies. In Chapter 6 strategies for closing the loop are outlined with case studies. The chapter explicitly discusses the required infrastructure and economic instruments needed to enable CE using the closing the loop strategies. The role of informal organizations in recycling of waste streams is also discussed.

Selected sectoral initiatives and national as well international case studies are then discussed in Chapter 7. The CE opportunities and changes in critical sectors such as textiles, steel, and agriculture are discussed. Chapter 8 covers Innovative and emerging business models that can accelerate the implementation of CE, which is an important aspect of CE. Chapter 9 focus on financing options for CE and pinpoints the importance of innovation. This chapter is useful for practitioners and entrepreneurs to plan innovative CE initiatives.

Chapter 10 describes the required governance structures for CE, which is really useful for policymakers and governing bodies. Key policies and regulations to push CE in various sectors are described using exciting case studies. This chapter also highlights the need for policy impact assessment using tools such as Life Cycle Sustainability Assessment or System Dynamics.

The last Chapter 11 provides further insights and outlines a way forward for planning, strategizing and implementing CE. The importance of measuring the CE and different metrics that can be used are described in this chapter. The connection between CE and UN Sustainable Development Goals is also highlighted. The chapter ends with the impact of COVID-19 on UN-SDGs and how CE can help to rejuvenate the economy in such a global pandemic situation.

Overall, each chapter in the book is structured very well, with boxes highlighting key information on the chapter topic or describing case studies. Also, each chapter provides activities for class work and additional readings that perfectly align with the teaching needs of graduate programmes in any university. The book is also highly recommended for practitioners and policymakers to understand the CE and initiate innovative CE programmes.

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ROLE OF DEPOSIT RETURN SCHEME IN CIRCULAR ECONOMY

THE POLICY

What is DRS

DRS (deposit return system) is a waste collection method involving a monetary incentive in the form of a deposit which is added to the product price and fully reimbursed when a product or packaging is returned by a user.
Deposit system is often applied to products and packaging that represent hazards to the environment due to littering or the presence of hazardous substances. Thanks to the monetary incentive, the collection based on a deposit exceeds the result of ordinary collection methods.
An important packaging group which benefits from applying a DRS as a collection method are beverage containers. While DRS for refillable bottles is an obvious choice because the owners of the reusable asset would like to guarantee high returns, it is particularly important for the single use segment due to the significant risk of litter or non-circular treatment of disposal methods (downcycling, landfilling, incineration).

Background

Deposit system for single use beverage containers was established in Sweden in 1984 as a policy instrument targeting lightweight packaging in order to prevent the littering risk. While more and more beverages are placed on the market in single use containers, light plastic bottles and metal cans in particular, many countries have decided to apply DRS. Deposit added to the price of the beverage motivates consumers to bring their packages back and min 90% collection rates are achieved.

Benefits

- Maximized collection rates
- Closed loop recycling
- Circularity
- Low carbon footprint

Originally planned as an anti-litter measure, DRS for single use has become an effective tool for high quality material recycling, nowadays referred to as closed-loop-recycling. Maximized collection of clean secondary materials enables efficient reprocessing into new packaging. It is said that DRS secures min 80% recycled content for plastic bottles and 90% recycled content in aluminum cans. Maximized collection and high quality recycling benefit circularity defined as long term preservation of the materials. Once injected into the system, packages are collected and recycled over and over again and the lifespan of the material is extended to its maximum.
In the era of climate crisis it is also important to underline the positive impact on reduction of climate footprint. Compared to curbside collection methods (collection directly from the households), DRS based on return-to-retail represents 30% saving (data for plastic and metal).

Packaging legislation in the EU

The revision of the Packaging and Packaging Waste Directive (PPWD) offers an opportunity for sustainable packaging solutions to advance towards circular economy objectives.

THE POLICY

The European Commission plans to turn this directive into regulation. Yet, the legislative proposal which was expected by July will be pushed back to 16th November 2022.

The EU PPWD defines the essential requirements for packaging design and composition and sets out packaging collection and recycling targets. In 2018 the European institutions revised the Directive introducing new packaging recycling targets for 2025 and 2030 and the obligation on MS to adopt waste prevention and reuse measures.

The 2020 Circular Economy Action Plan stated that by 2030 all packaging should be recyclable and reusable by 2030 and open to consideration other measures such as the reduction of (over)packaging and packaging waste, drive design for reuse and an EU-wide labelling among other aspects. The legislative proposal is expected to go beyond recycling and announce new measures to boost prevention and reuse, and new economic measures to improve collection such as Deposit Refund Systems (DRS).

What could be expected with the revision of the PPWD:

- **Waste reduction measures for key products such as packaging:** ease the access to drinking water including water fountains in cities.
- **Measures to reduce (over)packaging**
- **Mandatory deposit return system (including for plastic bottles) and minimum requirements:** with the objective to reach the 90% collection target of plastic bottles set in the SUP Directive. Deposit schemes adapted to the EU single market.
- **On refillable bottles:** DRS could shift to getting the plastic back to refilling them (for reuse)
- **Ensuring high quality recycled material:** Ensure that recycled PET is not downcycled. According to the ZWE report, new bottles placed on the EU market contain an average of just 17% of recycled PET. To promote the uptake of recycled content in packaging a mandatory recycled content targets could be set for (all plastics) packaging.

ABOUT US

About International Council for Circular Economy

ICCE is one of the largest international network for professionals, corporates, and organizations working in the Circular Economy. Their mission is to accelerate the transition to a circular economy that is restorative and regenerative by design. ICCE aims to build a resilient and thriving local network by providing expertise to design and strategize circularity emanating from the grassroots level. They envision to redefine lives by embracing and spreading change globally to make the dawn of a new circular era. ICCE has been launched in 2020 to accelerate the transition to a Circular Economy In India. ICCE is a global thought leader, establishing the circular economy on the agenda of corporates, decision-makers across the business, government, and academia. A member of Ellen MacArthur Community, they have partnered with European Environmental Bureau, REVOLVE Circular, PREVENT Waste Alliance, ISO, BIS, OCCE, Close the Loop along with other major organizations working towards boosting circularity. ICCE bridges this gap and establish strong connections amongst the circular economy community, to share best practices and try our best to have an impact at a local and global level simultaneously. We facilitate

·Planning Circular economy strategies
·Knowledge share through workshops and webinars
·Supporting organizations to implement circular practices

About Indian Plastic Institute (IPI)

Indian Plastics Institute is a technical professional Body registered in April 1985 under the societies Registration Act 1860 and subsequently under the public trust act 1950. IPI was formally inaugurated on 6th May 1985 after taking over the Plastic and Rubber Institute, London (PRI) Indian Section (Plastics) as of 30th April 1985, which established in June 1963 as an Overseas Section of Plastic Institute, London. Today, IPI is a strong Professional Body of Industrialists, Plastic Technologists, Academicians, Economists and Students, spread over 14 Chapters across India and 2 Overseas Association partnerships with Sri Lanka & Nepal. We are engaged in Education, Training, Manpower Development and Dissemination of Knowledge on the latest technological developments in the world wide Plastics Industry. The contribution of IPI within the context of the Indian Plastics Industry is quite unique. Organizing Technical programme throughout the Country, including Conferences, Seminars, Lectures and Workshops, in addition to its Educational Programme and Activities are no meager achievement.IPI play a vital and complementary role to universities and other educational institutes in drafting course curricula, providing “Visiting Faculty” facilities through its members and arranging industrial training for students. In keeping with this IPI is represented on the Governing Council of Central Institute of Plastics Engineering & Technology (CIPET). IPI also represented in Bureau of Indian Standards(BIS) for promotion of standardization and testing and quality control procedures.

CONTACT US

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