



The Circular Economy: Could it provide opportunities for greener and better jobs?





November 2021









# The Circular Economy:

# Could it provide opportunities for greener and better jobs?

This Discussion Note<sup>1</sup> is part of the Solutions for Youth Employment (S4YE) Knowledge series focusing on the Circular Economy and the jobs created within value chains as they become more circular.<sup>2</sup> The objective of this Discussion Note is primarily, to stimulate discussions among teams, public and private stakeholders, in a way that embeds the jobs agenda within the environment agenda. Both are closely entwined. The Note introduces the concept of the circular economy and discusses how a shift from linear to circular value chains could impact jobs. We suggest a framework to identify job rich nodes in a circular value chain-especially through key elements like reuse, repair, and recycling. The note also highlights the importance of addressing the quality of jobs within the circular economy, especially from a developing country context. In fact, the shift to an environmentally friendly and circular approach could help provide new opportunities to improve the quality of jobs in developing countries and integrate workers currently in informal, low quality, low productive jobs into better jobs connected with value chains. But this integration will require intentional and adequate policies. How can we move towards win-win solutions that are better for both, the environment, and workers in developing countries?

The Note shows that the shift to the circular economy has potential for job creation- activities like waste collection, recycling, repair, and remanufacturing are more labor intensive and could be important segues to job creation. Recycling, Remanufacturing and Reuse provide more entry level opportunities and these jobs are important for youth to access productive employment opportunities, especially for low skilled workers and job seekers from vulnerable communities. However, in the developing world, employment in labor intensive circular activities (recycling, reuse, and waste sorting) are often clustered in the informal sector which is characterized by low quality, low paying jobs with hazardous working conditions and exposure to toxic materials.

From a skills perspective, adoption of circular approaches brings to light the importance of skilling, upskilling and digital skill acquisition. Circular jobs are likely to demand multidisciplinary skills and deep technical/industry skills. Equitable access to reskilling, upskilling and digital skilling programs can help improve access to better quality jobs within the circular value chains and help in a just and equitable transition to the Circular Economy. The shift to more circular approaches calls for policies that ensure that the jobs created are not only good for the environment, but also good for workers.

This Note will serve as a prelude to further industry specific deep dives that study circularity from a jobs perspective.

<sup>&</sup>lt;sup>1</sup> The team would like to thank Ian Walker (Manager, Jobs Group) for his guidance. We are grateful to Grzegorz Peszko (Lead Economist, Environment, Natural Resources & Blue Economy, World Bank) and John Anagnostou (Senior Industry Specialist, IFC) for their substantive inputs and feedback. The Note benefitted from several discussions with partners. We would like to thank Caspar Edmonds (International Labor Organization), Prof. Giorgos Demetriou (Circular Economy Research Center), Julia Bakutis (H&M Group), and Patrik Lundström (Renewcell) for providing their valuable insights.

<sup>&</sup>lt;sup>2</sup> This Note follows the definition of circular economy as defined by the Ellen McArthur Foundation (EMF). The EMF defines the circular economy as a system that is "restorative and regenerative by design, and aims to keep products, components, and materials at their highest utility and value at all times. A circular economy is a continuous positive development cycle that preserves and enhances natural capital, optimises resource yields, and minimises system risks by managing finite stocks and renewable flows."



# 1. INTRODUCTION

As the world emerges from the grasp of a global pandemic that entailed major disruptions to production and consumption cycles, most economies are forced to bring to light conversations regarding a more green, inclusive, and resilient recovery. For a few economies, post pandemic stimulus packages are increasingly "greener" and policy makers are beginning to look beyond traditional economic parameters (like GDP) towards a more economically and ecologically sustainable growth path.

There is a pressing need for economies and businesses, especially in the developing world, to rethink the existing ecosystem of production and consumption. The Linear Economy (LE), the model that currently prevails in our societies, almost didn't evolve since the first Industrial Revolution.<sup>3</sup> LE sets in place a system of "take-make-dispose"- where materials and resources are extracted from nature and the final product is ultimately discarded. The system does not allow for regenerative processes and hence, is unsustainable in the long run. As a result, the existing linear system propagates detrimental levels of waste buildup across all regions of the world. A regional comparison shows that North America produced about 0.8 metric ton per person in 2019, the highest per capita municipal waste generated across regions (Figure 2). The World Bank predicts that in the absence of appropriate urgent action, global waste will increase by 70% on current levels by 2050.<sup>4</sup>



Figure 1: Waste generation is predicted to increase across all regions over time

Source: World Bank Survey: Urban Development Series- What a Waste 2.0

https://en.beecircular.org/post/linear-economy-an-unsustainable-posture-for-our-planet

<sup>&</sup>lt;sup>3</sup> Linear Economy- An Unsustainable Posture for our Planet

<sup>&</sup>lt;sup>4</sup> Kaza, Silpa, Lisa Yao, Perinaz Bhada-Tata, and Frank Van Woerden. 2018. <u>What a Waste 2.0: A Global Snapshot of Solid Waste</u> <u>Management to 2050</u>. Urban Development Series. Washington, DC: World Bank. doi:10.1596/978-1-4648 -1329-0. License: Creative Commons Attribution CC BY 3.0 IGO





#### Figure 2: Per Capita Municipal Solid Waste Generation By Region in 2019



Source: World Bank Group What A Waste Global Database



The shift to the Circular Economy (CE) could help address the problem of waste build-up. CE aims at extending the life cycle of a product by incorporating methods of re-use, re-manufacturing and/or recycling of products.<sup>5</sup> At its core, the circular system inspires us to re-think traditional dynamics of production and product design and encourages a re-adjustment towards waste eradication within value chains.

Several countries, especially in the global north, are introducing regulatory frameworks and policy shifts to make the transition to more circular practices. For instance, in 2015, the European Union (EU) introduced The Circular Economy Action Plan that places CE as a development priority as a part of the EU industrial strategy. The EU has taken a particular approach to circularity, with expectations to increase competitiveness, promote economic growth and create jobs while reducing environmental impacts and resource dependency.<sup>6</sup> The action plan also aims to develop an ISO standard for the CE that will standardize the measurement of various parameters of circularity across industries. Some developing countries are also introducing CE legislation. China, for instance, recently released The Development Plan for Circular Economy as a part of their 14<sup>th</sup> Five Year Plan Period that is poised to achieve considerable CE goals by 2025. The Plan aims to develop the circular economy through various initiatives, such as promoting recycling, remanufacturing, green product design, and renewable resources.<sup>7</sup> The Government of India has put in place a sustainable product policy initiative for the electronics and e-waste industry focusing on material acquisition, design and production, consumption, end-of-life management, recovery and re-utilization of secondary raw materials.<sup>8</sup> In Africa, 31 countries have come together to form the African Circular Economy Network (ACEN) with the goal of to building a restorative African economy that generates well-being and prosperity inclusive of all its people through new forms of economic production and consumption which maintain and regenerate its environmental resources.<sup>9</sup> Legislative and regulatory changes, especially in the developed world, will stimulate changes across global value chains, which will have a subsequent effect on the product and labor markets of the developing world. Recent discussions on possible waste dumping by developed nations have raised the risk of misuse of regulatory arbitrage that could have an adverse effect on the developing world.

From a jobs perspective, circular approaches like reuse, repair and recycle are labor intensive and could provide an opportunity to stimulate creation of more jobs. In developing countries, however, circular concepts of cost efficiency (frugality) and extending the life cycle (use) of a product are often enmeshed in their socio-economic functioning. It is not so much the concept of circularity that needs an introduction in these economies, but instead the focus would be on addressing the low quality of jobs often clustered in the informal sector, associated with circular activities like waste management, recycling, repair and reuse.

9 www.acen.africa

<sup>&</sup>lt;sup>5</sup> Closing the loop- the circular economy, what it means and what it can do for you

https://www.pwc.com/hu/en/kiadvanyok/assets/pdf/Closing-the-loop-the-circular-economy.pdf

<sup>&</sup>lt;sup>6</sup> Martin Calisto Friant, Walter J.V. Vermeulen, Roberta Salomone, Analyzing European Union circular economy policies: words versus actions, Sustainable Production and Consumption, Volume 27,2021

<sup>&</sup>lt;sup>7</sup> https://knowledge-hub.circle-lab.com/organization/4485?n=African-Circular-Economy-Network

<sup>&</sup>lt;sup>8</sup> Ministry of Electronics and Information Technology Government of India Policy Paper: Circular Economy in Electronics and Electrical Sector

https://www.meity.gov.in/writereaddata/files/Circular\_Economy\_EEE-MeitY-May2021-ver7.pdf



We should be cautious not to conflate jobs that are "good for the environment" with "good for workers".<sup>10</sup> While the Circular Economy may create several "green/er jobs"<sup>11</sup> that bolster the transition to environmentally sustainable industries, these jobs inherently may not be of a better quality. For instance, many early-stage CE activities like waste collection and sorting, and recycling in developing countries, while labor intensive in nature, create jobs that often expose employees to hazardous working environments, with exposure to toxic materials, and provide little to no social protection. Another example would be the activity of Cobalt mining in the Democratic Republic of Congo (DRC). Cobalt is a key metal used in the production of electric batteries, which eventually is used in electric cars. While the electric car industry may be classified as a green and clean industry, the act of cobalt mining is essentially a "brown job" in a "green industry".<sup>12</sup>

The objective of this Note is to discuss the multifaceted nature of the job's implications of a CE. The Note explores how new job opportunities are likely to emerge in a circular economy, and how developing countries would need to use this trend to also increase the quality of the new jobs, and design policies that are not only good for their environment but also good for workers.

#### 2. WHAT IS THE CIRCULAR ECONOMY?

**Operating in contrast to the LE, the CE is restorative and regenerative by design, and places emphasis on improving material efficiency- reducing waste through material reuse and recycling.** CE aims to solve the problem of resource scarcity while prioritizing environmentally sustainable practices. A circular approach can re-fashion waste into input resources (or raw material) that is fed back into the system. Circularity can be expanded to include broader resource efficiency and industrial ecology approaches, durable consumer goods, renewable energy, increased energy efficiency and elements of the shared economy.<sup>13</sup>

The definition of CE has been evolving, as technological advances bring in novel, ecologically viable practices of production and material use. The Ellen MacArthur Foundation defines the circular economy as looking beyond the current take-make-waste industrial model and redefining growth to focus on

<sup>13</sup> Effects of Circular Economy on Jobs- IISD and SITRA

https://www.iisd.org/system/files/2020-12/circular-economy-jobs.pdf

<sup>&</sup>lt;sup>10</sup> "Not All Green Jobs are Safe and Clean", Sarah O'Connor, The Financial Times https://www.ft.com/content/111f9600-f440-47fb-882f-4a5e3c96fae2

<sup>&</sup>lt;sup>11</sup> The term 'green jobs' can refer to employment in a narrowly defined set of industries providing environmental services. However, it is more realistic to think of jobs along a continuum, getting more people into better jobs (as compared to the binary good versus bad jobs). The continuum is especially relevant in low- and middle-income countries where informality is high. This starts with a basic question: what constitutes a better job? For a worker, does it primarily mean higher wages or better working conditions, or both? For economic growth, does it mean higher productivity? Does it mean more jobs at lower quality vs. fewer jobs of higher quality? The Jobs Group has been re-thinking and adapting its approach for the green transition, along two lines: •Green Continuum: As there is a continuum for job quality, so, too, is there a continuum related to a job's environmental quality (that is, is the job better or worse for the environment).

<sup>•</sup>Dynamic Process: As the starting point is low, so the transition will be long (that is, green and green job characterizations vary widely and will evolve).

<sup>&</sup>lt;sup>12</sup> The greener jobs transition can be assessed along two dimensions: a transition from a lighter shade to a darker shade of green and a transition from worse to better jobs. The problem is the trade-offs, as not all green jobs are considered "good" and not all brown jobs are considered "bad." The challenge is managing the trade-offs (as they appear) and the transition to better/greener jobs. That is, the value is not attached to a color but to the environmental sustainability of the capital on which the jobs depend. Many jobs depend on the sustainability of the capital–not the capital produced.



positive society-wide benefits.<sup>14</sup> It entails gradually decoupling economic activity from the consumption of finite resources and designing waste out of the system.<sup>15</sup> This makes CE a dynamic concept, not only in definition but also in scope.

At its core, the CE model's philosophy is simple- today's products are tomorrow's raw materials. It operates as a closed loop model with minimal waste and sustainable growth targets. Unlike in the LE, where products are manufactured, used, and disposed, the CE encompasses a system where products are not disposed but instead, repurposed in existing or processed form and injected back into the manufacturing process as raw materials. It thus, reduces the need for new inputs of materials and energy, while reducing environmental pressures linked to resource extraction, emissions, and waste. This goes beyond just waste, requiring that natural resources are managed efficiently and sustainably through their life cycles. When this practice is set in motion and scaled, it creates a resource efficient loop, or "circle", where materials and resources re-enter the manufacturing process in a continuous flow over time. This reduces the need to extract new resources, thereby setting in place a relatively more sustainable production - consumption cycle. Even though population pressure and per capita demand will always need new materials to enter the cycle, an increase in repurposing of waste within the circular system will reduce the rate at which new resources are demanded, and the amount of waste that is produced, in comparison to the linear model.



#### Figure 4: Comparison of Linear Economy (LHS) and Circular Economy (RHS)

<sup>&</sup>lt;sup>14</sup> Ellen MacArthur Foundation, "What is a circular Economy? A Framework for an economy that is restorative and regenerative by design" <u>https://www.ellenmacarthurfoundation.org/circular-economy/concept</u>

<sup>&</sup>lt;sup>15</sup> Ellen MacArthur Foundation, "What is a circular Economy? A Framework for an economy that is restorative and regenerative by design" <u>https://www.ellenmacarthurfoundation.org/circular-economy/concept</u>

#### Box 1: Circle Economy in ancient societies

The concept of Circular Economy is not new and in fact, has its origins firmly rooted in ancient history. Ancient cultures understood the importance of expanding the life cycle of basic products and had extensive systems of reuse and recycling engrained in their daily lives. Polish scientists found tools in Dubai made from copper, bronze and iron refashioned from broken ceramic vessels.<sup>16</sup> Instead of discarding the broken ceramic vessels, they were modified and used as tools. The Romans also had a widely used system of sorting trash. According to American academic, Prof. Allison Emmerson, mounds of rubbish found preserved in Pompei after the eruption of Mount Vesuvius in 79 AD were actually staging grounds or cycles of use and reuse.<sup>17</sup> The Journal of Archaeological Sciences found evidence of glass recycling in the Byzantine times. Archaeologists working at the ancient city of Sagalassos, now part of Turkey, found glass chunks, fuel ash slag and kiln fragments, that indicate glass recycling.<sup>18</sup>

## 3. THE SHIFT TO CIRCULAR ECONOMY: OVERALL TRENDS

Over the past decade, circular economy has grown in importance as businesses and countries both realize the need to re-invent their way of production and consumption. Changing consumer needs, resource shortage and technological breakthroughs are a few of the major drivers behind the recent emergence of the circular economy.<sup>19</sup> Industry sentiments are seeing a shift in favor of adopting Circular economy practices. During a 2019 survey, respondents from the aviation and rail manufacturing supply chain industry revealed their investment motivations and decisions in circular economy practices.<sup>20</sup> Roughly 30 percent of surveyed people in Asia and Australia region stated that they invest in circular economy practices because it is the right thing to do and there is a financial return on this decision.<sup>21</sup>

Businesses and economies are increasingly seeing the benefits of re-purposing products and injecting them back into the production cycle – known as "secondary raw materials"- in the form of reduced costs involved in procuring new raw materials. In one year, 50%-75% of used resources are returned to the natural environment as waste.<sup>22</sup> This constitutes a lost profit that could be returned to the economy, resulting in savings of USD 1 Trillion a year in secondary raw material usage by 2025.<sup>23</sup> In China, applying circular economy practices at scale in key industries could save businesses and households close to USD 10 trillion (16% of China's projected GDP) in 2040.<sup>24</sup> Economies and industries are increasingly looking to

 <sup>&</sup>lt;sup>16</sup> World Economic Forum <a href="https://www.weforum.org/agenda/2020/05/circular-economies-ancient-history-recycling/">https://www.weforum.org/agenda/2020/05/circular-economies-ancient-history-recycling/</a>
<sup>17</sup> The Guardian: Pompeii ruins show that the Roman reinvented recycling

https://www.theguardian.com/science/2020/apr/26/pompeii-ruins-show-that-the-romans-inventedrecycling?CMP=Share\_iOSApp\_Other

 <sup>&</sup>lt;sup>18</sup> World Economic Forum <a href="https://www.weforum.org/agenda/2020/05/circular-economies-ancient-history-recycling/">https://www.weforum.org/agenda/2020/05/circular-economies-ancient-history-recycling/</a>
<sup>19</sup> Closing the loop- the circular economy, what it means and what it can do for you

https://www.pwc.com/hu/en/kiadvanyok/assets/pdf/Closing-the-loop-the-circular-economy.pdf

<sup>&</sup>lt;sup>20</sup> <u>Future of Supply Chain 2019</u>; Gartner Publication September 2019; 1,374 respondents; clients and practitioners in aviation and rail manufacturing supply chain functions; Online survey

<sup>&</sup>lt;sup>21</sup> <u>Future of Supply Chain 2019</u>; Gartner Publication September 2019; 1,374 respondents; clients and practitioners in aviation and rail manufacturing supply chain functions; Online survey

<sup>&</sup>lt;sup>22</sup> Closing the loop- the circular economy, what it means and what it can do for you

https://www.pwc.com/hu/en/kiadvanyok/assets/pdf/Closing-the-loop-the-circular-economy.pdf <sup>23</sup> Ellen McArthur Foundation <u>Towards the Circular Economy vol.3</u> (2014),

<sup>&</sup>lt;sup>24</sup> Ellen McArthur Foundation, The Circular Economy Opportunity for Urban and Industrial Innovation in China (2018)



capitalize on these savings, and this can be reflected by an increased trade in recyclable raw materials (Figure 5) and an increase in circular material use rate.<sup>25 26</sup>

**However, the trade of recyclable raw materials reveals a concerning trend.** There is growing concern about the exports of waste from developed to the developing countries. This raises concerns of waste dumping, where developed countries redirect their waste streams to developing nations with weaker regulatory frameworks. For example, while increasing exports out of the EU may herald the development of raw material processing and remanufacturing hubs in developing countries (specifically, countries importing the materials exported by EU), it does not necessarily entail creation of good quality jobs. Waste collection, sorting and recycling in developing countries often entails low quality jobs where workers operate in unsafe working environments and are exposed to toxic waste. Global waste trade regulations and multilateral treaties like the Basel Convention<sup>27</sup> are needed to ensure consent driven ethical transboundary management of waste and warrant that waste streams are managed in an environmentally sound manner. These frameworks will help regulate cross-boundary distribution of waste.





<sup>25</sup> Commission Staff Working Document: <u>Measuring progress towards circular economy in the European Union – Key indicators</u> <u>for a monitoring framework</u>. Eurostat Data- study of select economies and five classes of materials-plastic, paper and cardboard, precious metals, iron and steel, copper, aluminum, and nickel.

<sup>26</sup> Circular material use rate measures the share of material recycled and fed back into the economy - thus saving extraction of primary raw materials - in overall material use. The circular material use, also known as circularity rate is defined as the ratio of the circular use of materials to the overall material use. A higher circularity rate value means that more secondary materials substitute for primary raw materials thus reducing the environmental impacts of extracting primary material.

<sup>27</sup> The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal was adopted on 22 March 1989 by the Conference of Plenipotentiaries in Basel, Switzerland, in response to a public outcry following the discovery, in the 1980s, in Africa and other parts of the developing world of deposits of toxic wastes imported from abroad. The overarching objective of the Basel Convention is to protect human health and the environment against the adverse effects of hazardous wastes. Its scope of application covers a wide range of wastes defined as "hazardous wastes" based on their origin and/or composition and their characteristics, as well as two types of wastes defined as "other wastes" - household waste and incinerator ash. The provisions of the Convention center around the following principal aims:

a) the reduction of hazardous waste generation and the promotion of environmentally sound management of hazardous wastes, wherever the place of disposal; b) the restriction of transboundary movements of hazardous wastes except where it is perceived to be in accordance with the principles of environmentally sound management; and c) a regulatory system applying to cases where transboundary movements are permissible.

<sup>28</sup> The indicator is part of the Circular Economy monitoring framework. It is used to monitor progress towards a circular economy on the thematic area of 'secondary raw materials'. In a circular economy, residual materials are recycled and re-injected into the economy as new raw materials - then called 'secondary raw materials'. This may have several benefits, both reducing wastes and increasing the security of raw materials supply. An accurate picture of the European raw materials sector must include the movements of raw materials originating from waste, i.e. secondary raw materials, crossing European boundaries both as imports and exports, as well as of intra-EU trade. Many non-hazardous waste streams are regarded as valuable resources because they are potentially an important source of raw materials. Overall, cross-border movements of



Source: Eurostat and World Bank Staff Calculations

An important driver of the shift is an increase in competitiveness and innovation in the CE space. Innovation plays a key role in the transition towards a circular economy, in the development of new technologies, processes, services and business models. A good example would be to look at patents related to recycling and secondary raw materials. Patent statistics are one of the indicator families widely used to assess technological progress in a specific industrial sector.<sup>29</sup> They are widely accepted as output-oriented indicators on innovation.





Source: Eurostat and World Bank Staff Calculations. Actual number for China is 4891.85 patents. Number for China has been scaled down for presentation purposes.

In China, the number of patents related to recycling and secondary raw materials has increased by 4891 in a span of 15 years (2000-2015). China and Korea are leading when it comes to patents related to recycling and use of secondary raw materials. China used to be the leading importer of almost half of the world's waste, until they banned the import of 24 categories of plastic and other recyclable wastes in 2018.<sup>30</sup> Policies that encourage domestic waste management and discourage exporting of waste could bolster grassroot innovations in domestic waste management and help further the transition to a more circular economy.

recyclable waste have significantly increased over the last decade. This indicator is clearly relevant for obtaining a picture of trends in the markets for selected secondary raw materials, at both national and EU levels. It is an indicator that is used by the European Commission, for example in the Raw Materials Scoreboard.

<sup>29</sup> Patents related to CE is part of EU's CE policy and the CE indicator set. Data from Eurostat

<sup>&</sup>lt;sup>30</sup> <u>https://www.greenpeace.org/eastasia/press/1008/chinas-ban-on-imports-of-24-types-of-waste-is-a-wake-up-call-to-the-</u>world-greenpeace/

### Box 2: Plastics in the Circular Economy

The omnipresence of plastic in our daily lives cannot be ignored. Their flexibility, durability, and strength have made them indispensable components of billions of modern products, and our global consumption of plastics has increased twentyfold in the last 50 years.<sup>31</sup> At current rates, plastic packaging volumes are expected to more than quadruple by 2050 to 318 million tons per year.<sup>32</sup> Global plastics production totaled 368 million metric tons in 2019.

Although it is estimated that production in 2020 decreased by roughly 0.3 percent due to the COVID-19's impacts on the industry, consumption of single use plastic rose by 300% during the pandemic.<sup>33</sup>



The recent outcry to address plastic pollution has led to innovations that help eliminate or repurpose plastic waste. For instance, Nike has successfully repurposed 4 billion plastic bottles picked from landfills to create a line of sustainable footwear. The textile industry is also experimenting with plastic waste to develop eco-friendly clothing lines.

However, despite progress in technology, these innovations only address the aspect of circular design and material flows, but

often overlook the people who move these flows. As a result, plastic pollution remains problematic as it continues to plug landfills, especially in developing countries. The mounds of toxic plastic waste that line the outskirts of urban hubs often mask the unsafe working conditions for waste pickers who earn their livelihood sorting through waste piles. The labor-intensive task of waste collection for recycling is critical to circularity, and in low- and middle-income countries, waste pickers underpin the recycling loop of the circular economy.<sup>34</sup> Where informality and working poverty are the norm, waste pickers typically receive little social protection, work in dangerous conditions, and earn low wages. The move to circularity through recycling of plastics needs to help transition these workers towards better jobs that pay better wages and allow for safer working conditions.

<sup>33</sup>https://www.economist.com/international/2020/06/22/covid-19-has-led-to-a-pandemic-of-plastic-pollution

<sup>&</sup>lt;sup>31</sup> https://ellenmacarthurfoundation.org/the-new-plastics-economy-catalysing-action

<sup>32</sup> https://www3.weforum.org/docs/WEF\_The\_New\_Plastics\_Economy.pdf

<sup>&</sup>lt;sup>34</sup> Barford, A., Ahmad, S.R. A Call for a Socially Restorative Circular Economy: Waste Pickers in the Recycled Plastics Supply Chain. Circ.Econ.Sust. 1, 761–782 (2021).



#### 4. ELEMENTS OF THE CIRCULAR ECONOMY

**CE is more than just recycling**. While recycling is an important component of CE, it is only one cog in the overall circular machinery. In fact, CE has tools that are present throughout the value chain, from product design through the manufacturing process, to the way they are used by consumers.<sup>35</sup> In this section, we discuss the 6 key elements in the value chain of the CE process- Circular Design, Sharing Economy, Maintenance and Repair, Remanufacturing, Recycling, and Reuse. Each stage of the value chain has key participants who are responsible for the tools- the supplier, the manufacturer, the consumer- and these tools may be used in concert by the participants in the value chain.<sup>36</sup>



#### Figure 7: Elements of the Circular Economy

This section describes the 6 elements of the Circular Economy and provides examples of private and public sector innovations that incorporate these elements in their operations. While many of these examples are still in an experimental stage with limited reach and job implications, it is worth studying them in a circular context to understand how certain businesses have folded in circularity in various aspects of their business operations. These examples provide anecdotal evidence of the kind of potential for job creation, skilling, and reskilling, and what it means if these businesses could reach scale.

 <sup>&</sup>lt;sup>35</sup> Closing the loop- the circular economy, what it means and what it can do for you <u>https://www.pwc.com/hu/en/kiadvanyok/assets/pdf/Closing-the-loop-the-circular-economy.pdf</u>
<sup>36</sup> Closing the loop- the circular economy, what it means and what it can do for you <u>https://www.pwc.com/hu/en/kiadvanyok/assets/pdf/Closing-the-loop-the-circular-economy.pdf</u>



#### 4.1. Designing Circular Products

**Circular Design is an essential part of the shift toward CE.** Circular design aims for easy maintenance, repair, and durability; modularity, disassembly, upgradability, recyclability, and adaptability; extended producer responsibility and transparency.<sup>37</sup> At this stage, businesses need to consider the life cycle of a product and chose the appropriate raw materials, assembly procedures and functions. At the very basic level, if the product is not designed to have an extended life cycle, the cycle breaks down as the product cannot enter the CE system to have its materials extracted as secondary raw materials. A major player in the value chain for this tool is the brand owner, the product developer and manufacturer who is often a third party. An additional consideration while thinking about sustainable design is to ensure products have minimal carbon footprint as possible when reentering the circular system.

There are a few keyways of achieving an optimal outcome when it comes to sustainably designing products. Using high quality materials to design products that last longer with an extended life span can go a long way. However, the sale of these products requires a new market strategy, especially for Fast Moving Consumer Goods (FMCG) products.<sup>38</sup> For example, another consideration is the modular designing of products in a way that the components or materials can be accessed and quickly changed in the event of a sudden failure.<sup>39</sup> This ensures that the supply of secondary raw materials is continuous without any possible breaks in the cycle. At the core of these methods lies the use of sustainable materials-materials that are durable so that consumers are not re purchasing the product repeatedly over a short period of time, can be simply recycled, and are biodegradable.

#### Box 3: Circular Design in Action: Using Wood Based Fibers in Eco-Friendly Clothing

The IFC recently invested in the construction of the one of the largest dissolving wood pulp plants in the world in Minas Gerais State, Brazil. A joint venture between Austrian leader for wood based cellulosic fibers, Lenzing Group and Brazil based Duratex, the objective is to use dissolving wood pulp as a main raw material in the production of wood-based textile fibers which are used to make textile and hygiene products. This product is biodegradable, has low GHG emission and is looking to substitute cotton which is a synthetic fiber and is water intensive to cultivate. In this plant, wasted wood chips are collected and processed with water and chemicals to make wood pulp. The pulp is them dissolved into a honey like solution and processed into a man-made fiber which is then used to make clothes. Circular Design is instrumental in creating "enabling circular jobs"-jobs that enable the adoption and upscaling of circular economy activities and form the supporting shell of the circular economy.<sup>40</sup> Circular design means developing product designs for the future, such that the future material extraction of elements of the product can occur smoothly down the life cycle of the product. Jobs like circular design engineers, circle equipment engineers will become crucial for this step to enable parts and resource recovery after the product's use phase.<sup>41</sup> This will entail an increase in demand for highskilled professionals who excel in complex problem solving on a technical level to create designs for the future.<sup>42</sup>

- $^{\rm 38}$  Closing the loop- the circular economy, what it means and what it can do for you
- https://www.pwc.com/hu/en/kiadvanyok/assets/pdf/Closing-the-loop-the-circular-economy.pdf

<sup>39</sup> Closing the loop- the circular economy, what it means and what it can do for you <u>https://www.pwc.com/hu/en/kiadvanyok/assets/pdf/Closing-the-loop-the-circular-economy.pdf</u>

<sup>&</sup>lt;sup>37</sup> Bachus, K., et al., Employment impact of the circular economy, literature study (Sept 2018)

<sup>&</sup>lt;sup>40</sup> Circle Economy Circular Jobs Definition Framework (March 2021)

<sup>&</sup>lt;sup>41</sup> Circle Economy Circular Jobs Definition Framework (March, 2021)

<sup>&</sup>lt;sup>42</sup> Circle Economy Circular Jobs Definition Framework (March, 2021)



# 4.2. Sharing Economy

With the help of technological developments, the sharing economy has reduced people's need to own things.<sup>43</sup> It has encouraged a system where consumers can use a product without the long-term commitment of owning it. With the consumer as a key player in the value chain, the sharing economy reduces the overall quantity of waste produced in the economy.<sup>44</sup>The sharing economy has also opened opportunities for renting and leasing, which form an integral part of the circular economy.

There has been a rise in the sharing economy over the past decade. The growth of companies like Uber and Airbnb is testament to the rising popularity of the sharing economy concept among consumers. Using algorithms that map various routes and passengers along the way, Uber, for example, offers a platform for affordable shared cab services, reducing the need to buy cars and in the long run, decreasing carbon emissions coming from vehicles on the road.

#### Box 4: Sharing Economy in Action:

#### Getting to the Airport Made Easier with a Car Sharing Solution in Hungary

BeeRides is a Hungarian venture that has cracked the code to efficiently travel to and from the airport. Car owners travel to the airport in their own cars and leave their vehicle in the BeeRides parking free of charge. Arriving passengers can rent these cars from the BeeRides car park at rates lower than mainstream car rental services, for several days in and around Budapest. The idea behind this model is simple- cars left behind by departing travelers are available for hire to arriving travelers.<sup>45</sup> BeeRides has no car fleet of its own but simply provides a platform to connect those who would like to rent their cars out and those who need a car for a short period of time. The rentee gets a car at rates lower than convention car rental companies and the renter develops a secondary stream of income by utilizing their idol asset. BeeRides is one of the many companies that are increasingly participating in the sharing economy. The aspect of renting/leasing out pre-owned items supports circularity through reuse and also creates opportunities for jobs with diverse skill levels. Many platforms within the sharing economy operate on an online user interface and therefore, may require medium to high digital skills and knowledge for participation. On the service supply side, there is specific emphasis on hard skills like coding and software development while operational jobs like customer care require transversal skills (soft skills) specifically heavy on interpersonal skills. Alternatively, renting/leasing of household goods and vehicles may require lower skill sets.<sup>46</sup> Thus, sharing economy could create jobs with skill requirements across the continuum of skill levels.

#### 4.3. Maintenance and Repair

This tool in the value chain involves the manufacturer, the merchant, and the consumer. The life span of a product can be extended through maintenance and repair- usefulness can be preserved through

https://www.pwc.com/hu/en/kiadvanyok/assets/pdf/sharing-economy-en.pdf

<sup>46</sup> Levelling through circular economy jobs, Green Alliance (August 2021)

<sup>&</sup>lt;sup>43</sup> Sharing or Pairing? Growth of the Sharing Economy

https://www.pwc.com/hu/en/kiadvanyok/assets/pdf/sharing-economy-en.pdf 44 Sharing or Pairing? Growth of the Sharing Economy

<sup>&</sup>lt;sup>45</sup> Closing the loop- the circular economy, what it means and what it can do for you

https://www.pwc.com/hu/en/kiadvanyok/assets/pdf/Closing-the-loop-the-circular-economy.pdf

https://green-alliance.org.uk/resources/Levelling\_up\_through\_circular\_economy\_jobs.pdf

maintenance and restored with repair.<sup>47</sup> Maintenance is an activity carried out in regular intervals during which critical points of the products are inspected to prevent malfunctioning. Regular maintenance can reduce waste as it alerts the consumer if any part of the product needs to be repaired, thereby extending its usability, and avoiding premature disposal. Maintenance services can also be leveraged by manufacturers: through the provision of after-sales services and the manufacturing of spare parts, up to three times more turnover from one-off sales can be achieved.<sup>48</sup> Government regulation to help end-use consumers engage in repair and maintenance activities can also go a long way. For instance, in March 2021, the EU formulated new regulations regarding spare parts where, under the "right to repair" regulation, it is mandatory for manufacturers to have spare parts available for at least 7-10 years after the last unit of a model has been placed on the EU market.<sup>49</sup> In a world where 30% of electric and electronic products are discarded when they are still in a repairable state<sup>50</sup>, regulations like these can help steer economies more towards a circular economy by limiting waste and encourage continual resources use.

# Box 5: Repair in Action:

#### iFixit and Repair Cafes- The Repair Revolution

iFixit is a global online repair community renowned for open source repair manuals and product teardowns.<sup>51</sup> A wiki-based website that teaches people how to fix almost anything is combined with a sales platform for tools and spare parts, creating a repair solution that helps millions of consumers every month and is relied upon by repair businesses around the world.<sup>52</sup> iFixit's philosophy is a part of a larger grassroots movement which has eventually led to the sprouting of community "Repair Cafés". A Repair Café is a place where people gather to work on repairing objects of everyday life such as electrical and mechanical devices, computers, bicycles, clothing, and other items. Repair Cafés are held at a fixed location such as church, library or campus where tools are available and where they can fix their broken goods with the help of volunteers.<sup>53</sup> Repair Café is also a new form of the grassroots movement that aims to reduce waste, overcome the current consumption habits of the society and the impulse planned obsolescence by organizations.<sup>54</sup> It is also seen as a platform to help young adults adopt interpersonal skills while promoting repair culture in an increasingly consumerist context. Volunteers at these repair cafes are generally young adults who help out in operational tasks like registration, log keeping etc. However, an increasing number of youth are taking an interest in learning the ropes of repairing various items brought into the cafes.<sup>55</sup> Repair Cafes could generate a do-it-together and "Do it yourself" spirit and strengthen social cohesion.<sup>56</sup>

<sup>56</sup> "Global Village: Warum eine neue Bewegung aus den Niederlanden Toaster und Bügeleisen repariert" Der Spiegel, 26 May

2012; "Dutch group mends broken items for free" Al Jazeera, 16 July 2012

<sup>&</sup>lt;sup>47</sup> Closing the loop- the circular economy, what it means and what it can do for you <u>https://www.pwc.com/hu/en/kiadvanyok/assets/pdf/Closing-the-loop-the-circular-economy.pdf</u>

<sup>&</sup>lt;sup>48</sup> Closing the loop- the circular economy, what it means and what it can do for you

https://www.pwc.com/hu/en/kiadvanyok/assets/pdf/Closing-the-loop-the-circular-economy.pdf

<sup>&</sup>lt;sup>49</sup> https://replique.io/2021/03/15/right-to-repair-regulation-mandatory-supply-of-spare-parts/

<sup>&</sup>lt;sup>50</sup> https://www.bbc.com/news/business-56167505

<sup>&</sup>lt;sup>51</sup> Ellen McArthur Foundation: Empowering repair

https://www.ellenmacarthurfoundation.org/assets/downloads/ce100/Empowering-Repair-Final-Public.pdf <sup>52</sup> Ellen McArthur Foundation: Empowering repair

https://www.ellenmacarthurfoundation.org/assets/downloads/ce100/Empowering-Repair-Final-Public.pdf

<sup>&</sup>lt;sup>53</sup> Wackman, John (16 July 2013). "Repair Café' Gets Stuff Fixed". Rethink Local website. Retrieved 9 February 2017

<sup>&</sup>lt;sup>54</sup> Wackman, John (16 July 2013). "Repair Café' Gets Stuff Fixed". Rethink Local website. Retrieved 9 February 2017

<sup>&</sup>lt;sup>55</sup> https://cardiffjournalism.co.uk/intercardiff/business-culture/repair-cafe-encourages-young-adults-to-adopt-self-skills



## 4.4. Re-manufacturing

**Using minimal resource, the life cycle of a product can be extended through re-manufacturing.** The process aims to, at the very least, restore the product to its original usage levels but often times new products are created in the process.<sup>57</sup> The product is reduced to its base elements and the base elements are reconditioned and the process ends with reassembly.<sup>58</sup> This reduces waste emissions, raw material demand and relatively less energy consumption than creating a new product.<sup>59</sup> Technical design, quality control, and testing play significant roles in remanufacturing and can create new jobs in these fields in the form of quality control officers, technical design experts, and testing engineers.

#### Box 6: Re-manufacturing in Action: Canon's Monochrome Multifunction Device<sup>60</sup>

Canon has been an active contributor to the Circular Economy by transforming the landscape of photographic equipment towards sustainable products and processes. The company has numerous product lines- including the Refreshed Series Brand- that feature re-manufactured parts. The used products are collected and gathered at the end of their life cycle for an initial check. The exterior covers and parts are removed and the body's frame and the parts that were disassembled are cleaned. The cleaned frames are assembled with new and reused parts and then the exterior covers are attached. The same inspection as for new products are done to make sure proper functioning of the product. Finally, the products are packaged and sent to the market. Canon's image RUNNER ADVANCE C3330F-RG- a remanufactured monochrome multifunction device- is an example of re-manufacturing. In 2019, Canon launched this product under their Refreshed series brand as a special environmentally conscious model with an increased reused parts ratio. Using meticulous washing and cleaning processes, with sandblast polishing (a technique for polishing resin surfaces by blasting with microparticles) to remove the smallest imperfections and other special treatments, the product has a reused parts ratio of over 90%. Remanufacturing of canon products like the multifunctional device creates jobs that show expertise in collecting used parts, deconstruction, and restoration of these parts to help them function anew. This requires skills in machining and mechanical assembly but may not require formal qualifications.<sup>61</sup> Additionally, jobs like quality control technicians and managers will demand high level skills while skills in machining and assembly could vary from medium to high level skills.

<sup>&</sup>lt;sup>57</sup> Closing the loop- the circular economy, what it means and what it can do for you

https://www.pwc.com/hu/en/kiadvanyok/assets/pdf/Closing-the-loop-the-circular-economy.pdf

<sup>&</sup>lt;sup>58</sup> Closing the loop- the circular economy, what it means and what it can do for you

https://www.pwc.com/hu/en/kiadvanyok/assets/pdf/Closing-the-loop-the-circular-economy.pdf <sup>59</sup> Closing the loop- the circular economy, what it means and what it can do for you

https://www.pwc.com/hu/en/kiadvanyok/assets/pdf/Closing-the-loop-the-circular-economy.pdf <sup>60</sup> Canon Global: Contributing to Circular Economy

https://global.canon/en/environment/circulation.html#:~:text=Canon%20promotes%20reductions%20in%20resource,develop ment%20of%20a%20circular%20economy.&text=We%20also%20strive%20to%20reduce,manufacturing%20at%20our%20oper ational%20sites.

<sup>&</sup>lt;sup>61</sup> Levelling through circular economy jobs, Green Alliance (August 2021)

https://green-alliance.org.uk/resources/Levelling\_up\_through\_circular\_economy\_jobs.pdf



# 4.5. Recycling- Upcycling/Downcycling

A common misconception is that recycling is simply sorting through waste and separating paper and bottle. Just as the circular economy is more than recycling, recycling is more than waste collection and separation.<sup>62</sup> Within the CE ecosystem, recycling can take two key forms- upcycling and downcycling- both of which play a key role as sub tools in the recycling process. In upcycling (also called closed loop recycling), a completely different product is created than the original one with similar/same or higher value as the original product<sup>63</sup>- a simple example would be making a pen/pencil holder from ice cream sticks or making furniture from old skateboards. Downcycling (also called open loop recycling) involves breaking the material down, to create new materials with lower value as compared to the original one. For example, turning glass bottles into asphalt, also known as 'glassphalt', which is used as road tar.

Recycling in all forms can play a critical role in the manufacturing process. The ideal scenario would be a move towards zero waste generation in manufacturing. However, if waste is produced, manufacturing processes can deploy several methods for reusing and re purposing those materials, generally for use as secondary raw materials.

## Box 7: Recycling in Manufacturing in Action: Recycling Plastic Waste in Manufacturing Processes

Heng Hiap Industries, a Malaysian company, has developed methods for manufacturing and customizing superior recycled plastic resins for use in several finished products. The company has 18 intellectual property patents and one trademark filed and is tapping into technology innovation to successfully convert plastic scrap into useful upcycled materials.<sup>64</sup> The company uses decontamination technology to recycle plastic waste and manufacture ultra-clean recycled plastic raw materials for prospective customers in Malaysia.<sup>65</sup> It has established its own industry standards along with streamlined, cohesive supply chain and production process.<sup>66</sup> Through horizontal integration of the entire supply chain framework, including collecting, washing, processing and converting raw materials into smart waste products, Heng Hiap saves on labor cost by 40% and transportation cost by 60%.<sup>67</sup> Plashaus, their flagship product, uses smart waste technology to produce plastic recycled resin at a high quality and competitive price. As the technology evolves, they plan to expand by supplying raw materials to industries that will eventually use them across a broad array of products like toys, food packing and textiles.<sup>68</sup> The process of collecting, washing, and processing will create jobs for recycling operatives which are low to medium level skilled jobs. The process of converting the raw materials into products will involve circular design strategies which will create a demand for high skilled jobs.

<sup>62</sup> Closing the loop- the circular economy, what it means and what it can do for you

https://www.pwc.com/hu/en/kiadvanyok/assets/pdf/Closing-the-loop-the-circular-economy.pdf <sup>63</sup> Levelling through circular economy jobs, Green Alliance (August 2021)

<sup>64</sup> <u>https://www.prnewswire.com/news-releases/heng-hiap-applauded-for-mitigating-the-damaging-effects-of-plastics-pollution-with-its-intelligent-plastic-technologies-301210761.html</u>

<sup>68</sup> <u>https://www.prnewswire.com/news-releases/heng-hiap-applauded-for-mitigating-the-damaging-effects-of-plastics-pollution-with-its-intelligent-plastic-technologies-301210761.html</u>

https://green-alliance.org.uk/resources/Levelling up through circular economy jobs.pdf

<sup>&</sup>lt;sup>65</sup> <u>https://www.prnewswire.com/news-releases/heng-hiap-applauded-for-mitigating-the-damaging-effects-of-plastics-pollution-with-its-intelligent-plastic-technologies-301210761.html</u>

<sup>&</sup>lt;sup>66</sup> <u>https://www.prnewswire.com/news-releases/heng-hiap-applauded-for-mitigating-the-damaging-effects-of-plastics-pollution-with-its-intelligent-plastic-technologies-301210761.html</u>

<sup>&</sup>lt;sup>67</sup> <u>https://www.prnewswire.com/news-releases/heng-hiap-applauded-for-mitigating-the-damaging-effects-of-plastics-pollution-with-its-intelligent-plastic-technologies-301210761.html</u>



#### 4.6. Reuse

The idea of reuse is that the product finds a new owner after the original user discarded it. Technology can play a key role in initiating this transfer of ownership- through the creation of an online platform or a virtual market space, consumers can buy or see second hand or used products

#### Box 8: Reuse in Action: The Online Marketplace

Singapore based company founded in 2012, Carousell, is one of the first few companies in Asia that created a C2C online marketplace for consumers to sell secondhand goods. The site is run primarily via mobile application has revolutionized the process of listing, buying and selling items by making it simple, intuitive and convenient for users to list their products and connect with potential buyers. The app allows sellers to list their secondhand goods under numerous categories and is using machine learning and AI to help users list and find items more easily. The platform allows for easy transfer of ownership of used products, thereby supporting a system of reuse of various products. **Platforms like Carousell create jobs that require high skill levels, especially digital skills, on the supply side of these services. On the user side, basic digital skills will be needed. However, the overall ecosystem of reuse relies heavily on elements of CE like repair-where low-medium skilled jobs are created. Examples of these jobs include upholsters, repairmen, repair technicians and painters- these are jobs that enable repair which in turn enable reuse.** 

#### 5. YOUTH AND CIRCULAR ECONOMY

**Millennials- youth born between 1981-1996- are likely to constitute 75% of the global workforce by 2025**.<sup>69</sup> With an increased spending power and a more socially conscious mindset, young people will influence consumptions patterns towards more environmentally sustainable choices. Millennials are more willing and likely to pay extra for sustainable products and on average, care more about issues like climate change (Figure 8).<sup>70</sup> The changing consumer preferences are in turn likely to drive demand for products with better sustainability credentials.

<sup>&</sup>lt;sup>69</sup> Percentage of the workforce: https://www.brookings.edu/blog/brookings-now/2014/07/17/brookings-data-now-75-percent-of-2025-workforce-will-be-millennials/

<sup>&</sup>lt;sup>70</sup> Sustainability as a shopping priority: https://www.nielsen.com/uk/en/insights/news/2015/green-generation-millennials-say-sustainability-is-a-shopping-priority.html



#### Figure 8: Youth View Climate Change as Pressing Issue

Source: Goalkeepers Global Youth Outlook Poll<sup>71</sup>

Notes: This statistic shows the results of a 2018 survey among youth (those aged 18+) on the severity of climate change. 2000-2300 youth per market were surveyed. Figures represent percentage of youth surveyed that stated that they agree with the statement. Survey conducted by Ipsos (Game Changers).

**Millennials are more comfortable with the idea of shared ownership.** 40% of millennials in the UK will live in rented housing until the age of 30, with a third expected to rent for the rest of their lives.<sup>72</sup> Sharing is more economically viable for many millennials, and the idea of shared ownership goes beyond housing to other products and services. Examples include online streaming services like Netflix, or fashion rental sites like 'Rent the Runway', where users can rent clothes rather than buy them outright – a principle that was described as "selling goods as services" by Walter Stahel in 1989.<sup>73</sup> Therefore, youth are likely to be important influencers in transitioning to circular approaches.<sup>74</sup>

**Digital technologies will play a pivotal role in the shift to the CE and young people are more likely to participate in the digital economy.** They prefer online shopping and tend to be more digital and app-savvy. A surge in online shopping cuts down the carbon footprint of taking multiple trips to buy products. Additionally, it gives a chance for retailer to deliver packages through multiple channels, called Omnichannel Packaging.<sup>75</sup> This allows for more innovation in sustainable packaging and changes the flows of packaging through waste management systems, (although these trends are more concentrated in the developed world).

<sup>&</sup>lt;sup>71</sup> Original question phrased as: "Do you agree or disagree with the following statements...Climate change poses a significant threat to my community."

<sup>&</sup>lt;sup>72</sup> Millennials and Renting (April 2018) https://www.resolutionfoundation.org/press-releases/up-to-a-third-of-millennials-face-renting-from-cradle-to-grave/

<sup>&</sup>lt;sup>73</sup> https://www.dssmith.com/recycling/insights/blogs/2018/10/millennials-and-the-circular-economy-the-new-green-eneration <sup>74</sup> https://www.dssmith.com/recycling/insights/blogs/2018/10/millennials-and-the-circular-economy-the-new-green-eneration

<sup>&</sup>lt;sup>75</sup> https://www.dssmith.com/recycling/insights/blogs/2018/10/millennials-and-the-circular-economy-the-new-green-eneration



#### Box 9: Improving the Circular Karma: A Youth Led Innovation

<u>WasteKarma</u> is an example of technology can be leveraged to bolster the shift to circularity. The Russian based mobile application operates as a smart garbage sorting service where users can simply scan the bar code of a product and the app gives you information on whether the packaging of the product can be recycled or not. Subsequently, the app also connects you to the nearest courier who will arrive at the user's doorstep to collect the sorted waste and deposit the same the recyclables at a recycling station. For every successful recycling trip, the user gets "karma" or points, that can be redeemed for discounted products at WasteKarma's partner grocery stores.

Apps like WasteKarma solve three key gaps faced by households and workers with respect to recycling. First, they bridge the knowledge gap for consumers with regards to what materials can be recycled and what cannot. Second, they encourage the waste sorting process at the household level, which when scaled, can eventually reduce the need for informal waste pickers and sorters. By transferring the responsibility of waste sorting to households, the burden of sorting placed on the informal sector is alleviated to a great degree. Third, the app creates jobs that are relatively cleaner and better- delivery couriers come to collect the sorted waste on a bicycle and are paid better wages through subscription revenues earned by the app. From a skills perspective, waste pickers that are phased-out due to the app can easily upskill to become courier/delivery people and continue to participate in the circular economy by accessing cleaner and better jobs. WasteKarma shows how simple solutions in the tech space can produce big gains, both from a job creation and job quality angle.

#### 6. CIRCULAR ECONOMY AND JOBS

A shift from the LE to the CE will impact labor markets around the world. Restructuring of processes along the value chain will entail dynamic shifts in the nature of jobs within the evolving circular ecosystem. As production and consumption processes adapt to more circular forms of operation, the quantity, quality, and the nature of jobs will need to adapt to the renewed industrial processes. Additionally, certain combinations of skills will become more desirable, and employees and employers will have to reinvent their mindsets and skills to adapt to these changes.<sup>76</sup> For instance, the ILO predicts that, assuming a 5% annual increase in recycling rates, direct extraction of primary resources will be replaced for recycled products and the corresponding growth in the service economy will promote rental and repair services to reduce ownership of goods at an annual rate of 1 per cent.<sup>77</sup>

#### Box 10: Why are we interested in Jobs within the CE?

Growth within CE sectors will likely create a phase of Schumpeterian creative destruction- traditional industries/sectors that are unable to adapt will be phased out by industries that are crucial to the CE shift. This will have implications for the nature of jobs that are created within the CE.

<sup>&</sup>lt;sup>76</sup> circle-economy.com/circular-jobs-initiative/circular-jobs

<sup>&</sup>lt;sup>77</sup> International Labour Organization. (2018b). World employment and social outlook 2018: Greening with jobs. Retrieved from <a href="https://www.ilo.org/weso-greening/documents/WESO\_Greening\_EN\_web2.pdf">https://www.ilo.org/weso-greening/documents/WESO\_Greening\_EN\_web2.pdf</a>



Jobs are a crucial pillar of the World Bank's development agenda and are a key pathway to a better life, especially for vulnerable groups. Labor is the most important asset of the poor, and a strategy to

leverage this asset to generate a steady earnings stream is the most sustainable pathway out of poverty.<sup>78</sup> At the peak of the pandemic, global youth unemployment rate was 13.6% with youth labor force participation rates declining from 568 million to 497 million (1999-2019).<sup>79</sup> This comes at a time when an unprecedented number of young people are set to join the labor force. In addition, COVID has brought to the forefront the importance of "building back better"-for the environment and for the labor market. In this backdrop, the trend towards to a circular economy needs go hand in hand with a more inclusive growth agenda with a focus on increasing better quality jobs for more people.



**Numerous studies have attempted to predict employment effects of the shift to CE.** Quantitative approaches to studying job creation within the CE are based on modelled predictions and results vary across papers as the applied methodology influences the results for net employment effects.<sup>80</sup> Computable general equilibrium and Input-Output model studies that include induced effects and those with a near-future time horizon report the lowest employment effects.<sup>81</sup> In contrast, policy reports state higher net employment effects than scholarly studies.<sup>82</sup> **Table 1** shows a short summary of various studies that estimate the employment effect of the shift to CE.

Author	Region	Estimated Net CE Employment Effect	Timeline	Key Takeaway						
Donati et al, 2020	Global	-5.3%	N/a	Results from the study show that environmental benefits can be obtained through the pursuit of CE strategies. The combined global effects could amount to a global relative change of $-10.1\%$ (GWP100), -12.5% raw material extraction used, $-4.2%land use and -14.6\% blue water$						

#### Table 1. Summary of Studies on Employment Effects of shift to CE.

https://doi.org/10.1016/J.ENPOL.2019.111047.

https://doi.org/10.1016/J.ENPOL.2019.111047.

<sup>&</sup>lt;sup>78</sup> Thomas Farole, Maria Laura Sanchez Puerta, Albert Sole Canut, and Anam Rizvi, 2018. "Jobs in Value Chains Survey Toolkit." World Bank, Washington, DC. License: Creative Commons Attribution CC BY 3.0 IGO.

 <sup>&</sup>lt;sup>79</sup> Global Employment Trends for Youth 2020: Technology and the future of jobs, International Labour Organization, ILO, 2020
<sup>80</sup> Lars Repp, Marko Hekkert, Julian Kirchherr, *Circular economy-induced global employment shifts in apparel value chains: Job reduction in apparel production activities, job growth in reuse and recycling activities.*

<sup>&</sup>lt;sup>81</sup> Stavropoulos, S., Burger, M.J., 2020. Modelling strategy and net employment effects of renewable energy and energy efficiency: a meta-regression. Energy Policy 136,111047.

<sup>&</sup>lt;sup>82</sup> Stavropoulos, S., Burger, M.J., 2020. Modelling strategy and net employment effects of renewable energy and energy efficiency: a meta-regression. Energy Policy 136,111047.



				withdrawal. The analysis of the socio-
				economic indicators showed global
				reductions of 6.3% in Value Added and 5.3%
				in Employment globally. However, it is to be
				noted that fiscal stimuli (subsidios or tax
				noted that instal stillul (subsidies of tax
				changes), investment and price changes
		2.10(		were not included.
Wiebe et al,	Global	+2.4%	2030	Global material extraction is reduced by
2019				about 10% compared to the baseline, while
				the impact on employment is small but
				positive. The shift from resource extracting
				sectors to the service sector will provide
				more opportunities for high-skilled and
				female workers.
Willenghems	Flanders	+31.000	2030	Scenario limited to shift of metal-electro
and Bachus				sector Exploratory data analysis indicates
2010				that the group of pon-working job seekers
2019				is disprepartianally made up of low skilled
				is disproportionally made up of low-skilled
				labor and other vulnerable groups, such as
				older workers, long-term unemployed, non-
				natives and people with an occupational
				disability. The authors expect that a
				transition to a more circular economy will
				positively affects employment for these
				vulnerable groups and reduce overall
				unemployment.
	Global	+6,000,000	2030	Almost 6 million jobs can be created by
ILO. 2018		, ,		moving away from an extract-manufacture-
				use-discard model and embracing the
				recycling reuse remanufacture rental and
				longer durability of goods it means a
				reallocation from the mining and
				manufacturing sectors to waste
				management (recycling) and services
				(repair, rent). The scenario includes only
				recycling of plastics, glass, wood pulp,
				metals, and minerals
	Italy,	+89,000-	2030	Results of the study show that: (1) there are
Coats and	Poland,	199,000,		significant links between the development
Benton, 2015	German	+68,000-		goals of the water-sewage-sludge sector
		124,000,		and the circular economy. (2) it is necessary
		+122,000-		to implement new solutions and
		287.000		technologies for increased recovery of
				energy and biogas from sewage sludge (3)
				there are still many harriers to recycling of
				rainwater and graywater as well as to reuse
				of wastewater (1) the size lar correction
				or wastewater. (4) the circular economy
				creates new opportunities for



				water-sewage and sludge management a								
				the local and national level.								
Morgan and	UK	+54,000-	2030	Quantitative analysis suggests that growth								
Mitchell, 2015a		102,000		in the circular economy can be expected to								
and 2015b				have lasting beneficial effects on the labor								
				market. Whilst these activities tend to be								
				efficient in their use of natural resources,								
				they can be relatively intensive in their use								
				of labor, compared with the activities they								
				replace. They have the capacity to create								
				dispersed employment that could								
				potentially be undertaken by those								
				currently unemployed, or those losing mid-								
				level skilled positions due to industrial								
				change.								
European	EU	+200,000	2030	Employment effects of resource								
Commission,				productivity								
2014a				improvements, not specifically on CE								

Source: World Bank Authors Literature review and Repp, Hekert et al (2019)

**Overall, studies show that the shift to CE will create more jobs.** Models studying the employment effects of CE suggest a net creation of jobs, although estimates may vary across different studies depending on the baseline assumptions and methodologies deployed for the study (Table 1). The ILO estimates that the shift to CE can create approximately 6 million jobs globally<sup>83</sup>, while other estimates suggest that employment gains could be upwards of 20 million jobs.<sup>84</sup> Circular activities like recycling, waste collection and sorting, reuse, repair, and maintenance are typically more labor intensive and will be important segues for job creation. As these labor-intensive activities demand low-medium level skills, they are also crucial pathways for creating more entry level jobs. Entry level jobs are particularly attractive to youth, especially from vulnerable communities, as they require medium to low skills and less prior work experience. However, jobs created in labor intensive CE activities are not always of a better quality, especially in the developing world. Addressing the quality of jobs created within the CE is just as important as the quantity of jobs created. We look at job quality in detail in section 6.2. As circular value chains expand, the circular activities within the chain will create demand for more workers, thereby creating more jobs across key industries.

The strongest demand for jobs will come from services sector, more specifically in service activities related to maintenance, recycling, repair and reuse as they are particularly job intensive that contribute to local employment.<sup>85</sup> Moreover, circular value chains show a high degree of interlinkage (mostly through waste streams), and this creates additional jobs in the service sector. Interlinkage of circular value chains creates indirect circular jobs-like transportation and material moving occupations, subcontracting and delivery logistics- which are critical services that support the shell of the circular economy. Most job losses will be seen in manufacturing, mining, and extractive industries- industries that are predicted to phase out under the CE. However, some key industries that will expand under the CE will have the potential to

<sup>&</sup>lt;sup>83</sup> International Labour Organization. (2019). Skills for a Greener Future-Key Findings

<sup>&</sup>lt;sup>84</sup> Circular Economy Research Center

<sup>&</sup>lt;sup>85</sup> ILO, 2018



absorb the job losses from phased out industries.<sup>86</sup> The ILO estimates that nearly 49 million jobs will be able to will find vacancies in the same occupation in other industries within the same country through reallocation.<sup>87</sup> This process of reallocation and cross industry absorption of workers will ensure net job gain during the shift to circularity.

The shift to CE will not only create more jobs but also redefine the nature of jobs- jobs created will be more diverse in terms of activities performed and skills needed by workers. A textile garment worker, for instance, will not only need to sew buttons but will also need to expand into diverse activities that involve working with new sustainable fabrics. This has direct implications to the skills needed by workers within the CE- workers will need have a diverse skill set. This is discussed in detail in section 6.3.

**Some studies highlight limitations of using traditional estimation models to quantify job effects in the CE.** For example, the design of I/O models only considers the purely economic nature of economic activities and does not always account for the spillover effects of economic activities into other spheres of the CE ecosystem.<sup>88</sup> Moreover, inconsistent data (or unavailability of data) from developing countries is a key constraint, leaving many forecasting models to operate only at a theoretical level and therefore, may not have robust estimates.<sup>89</sup>

**Considering the constraints of quantitative studies of employment generation in the CE, this section aims to develop a framework for assessing jobs implications using a circular value chain approach.** We lay out the key differences between Linear Value Chains and Circular Value Chains, develop a general CEVC framework that folds in the key elements of the CE (from section 3) and map the nature of jobs created within each stage of the value chain to occupations and the level and type of skills needed.

# 6.1. Linear Value Chains (LVCs) and Circular Value Chains (CEVCs)

Linear Value Chains mirror the workings of the Linear Economy- value is added at each step of the takemake-distribute-consume- dispose steps with jobs created within each node of chain. The nature of LVCs may differ by industry and each product within an industry may have its own version of the value chain.

#### Box 11: What are Value Chains

Value chains encompass the full range of activities required to bring a good or service from conception, through the different stages of production (provision of raw materials, input of various components, subassembly, producer services, and assembly of finished goods), to delivery to final consumers, and, finally, to disposal after use.<sup>90 91</sup> Every succeeding step in a value chain has a relatively different value than the preceding step- traditionally, each step "adds value" along the chain till the final product reaches the consumer. Global Value Chains arise when steps in the VC process are performed in

<sup>87</sup> International Labour Organization. (2019). Skills for a Greener Future-Key Findings

<sup>91</sup> Gereffi, G., Fernandez-Stark, K., and Psilos, P. (2011) "Workforce Development and Global Value Chains in Developing countries", Center for Globalization, Governance, and Competitiveness, Duke University.

<sup>&</sup>lt;sup>86</sup> International Labour Organization. (2019). Skills for a Greener Future-Key Findings

<sup>&</sup>lt;sup>88</sup> Li, Shulin. (2012). The Research on Quantitative Evaluation of Circular Economy Based on Waste Input-Output Analysis. Procedia Environmental Sciences. 12. 65–71. 10.1016/j.proenv.2012.01.248

<sup>&</sup>lt;sup>89</sup> Li, Shulin. (2012). The Research on Quantitative Evaluation of Circular Economy Based on Waste Input-Output Analysis. Procedia Environmental Sciences. 12. 65–71. 10.1016/j.proenv.2012.01.248

<sup>&</sup>lt;sup>90</sup>Thomas Farole, Maria Laura Sanchez Puerta, Albert Sole Canut, and Anam Rizvi, 2018. "Jobs in Value Chains Survey Toolkit." World Bank, Washington, DC. License: Creative Commons Attribution CC BY 3.0 IGO.



different countries. Inputs and semi-finished products and services are imported, value is added domestically, and the product is then exported for further processing or consumption.<sup>92</sup>



Box Figure: Simple representation of a basic value chain

There is value in understanding employment outcomes in the CE through a value chain lens. Value chains are particularly attractive entry points because they offer the potential to leverage job creation that can span from high-skilled, formal employment in globally competitive lead firms to quality, sustainable earning opportunities for low-skilled self-employed or smallholders.<sup>93</sup> They provide a bird's eye view of the entire product lifecycle-a critical part when envisioning CE processes- and help understand linkages between two ends of seemingly disparate activities. The ability of value chains to provide a cohesive link between a product's life cycle provides useful insights into the relationship between productivity and jobs and earnings. Moreover, value chains within the CE tend to create "value loops" where waste streams generated in one industry VC may be a useful resource for another industry. For example, a substantial waste stream of the coffee VC is coffee sludge.<sup>94</sup> Under CEVCs, coffee sludge can be re-purposed into the fertilizer VC as agricultural fertilizers. **Looking at this simple example, the looping of two different VCs could create additional job opportunities across the skill spectrum in transportation and storage logistics, delivery, and re-processing of coffee sludge into fertilizers.** 

A circular value chain would involve the integration of circular thinking into the management of supply chains and its surrounding industrial and natural ecosystems. It would promote systematic restoration of materials used within the chain towards a zero-waste vision through system wide innovation in business models and supply chain functions from product/service design to end of life and waste management, involving all stakeholders in product/service lifecycle including parts/product manufacturers, service providers, consumers, and users.<sup>95</sup>

**Figure 9 is a diagrammatic representation of what a shift from linear value chains to circular value chains could look like.** The core of the chain mirrors the LVC model - what makes it circular is the folding-in of the elements of CE (discussed in section 3) and the addition of 3 crucial nodes- processing, design and, waste collection and sorting. Each circular process helps link material back into the chain, thereby giving the chain its "circularity" and supporting a system of gradual waste reduction. It is important to note that Figure 9 is an interpretation of what the CE value chain would look like when economies are in transition to the CE. Therefore, there is some aspect of disposal towards the end of the chain-which can be used for energy recovery. An additional consideration is that making CEVCs commercially viable in market conditions will require major shifts in policy incentives, social norms, and habits, overcoming political economy hurdles, in addition to a massive innovation push.

Coffee Value Chain: Insights from Action Research (July 2018)

<sup>&</sup>lt;sup>92</sup> Thomas Farole, Maria Laura Sanchez Puerta, Albert Sole Canut, and Anam Rizvi, 2018. "Jobs in Value Chains Survey Toolkit." World Bank, Washington, DC. License: Creative Commons Attribution CC BY 3.0 IGO.

<sup>&</sup>lt;sup>93</sup> Thomas Farole, Maria Laura Sanchez Puerta, Albert Sole Canut, and Anam Rizvi, 2018. "Jobs in Value Chains Survey Toolkit." World Bank, Washington, DC. License: Creative Commons Attribution CC BY 3.0 IGO.

<sup>&</sup>lt;sup>94</sup> Maarten van Keulen and Julian Kirchherr *The Implementation of the Circular Economy in the* 

<sup>&</sup>lt;sup>95</sup> Muhammad Farooque, Abraham Zhang, Matthias Thürer, Ting Qu, Donald Huisingh, *Circular supply chain management: A definition and structured literature review*, Journal of Cleaner Production, Volume 228, 2019,



# DISCUSSION NOTE ISSUE 4

#### Figure 9: Linear Value Chain to Circular Value Chain





## 6.2. Job Quality in the Circular Economy

As seen in Table 1, estimates suggest that the shift to CE has potential for job creation. Early-stage CE activities like waste management, reuse repair, and recycling are relatively more labor intensive and will demand a large workforce. However, it is important to evaluate the shift to CE beyond opportunities for job creation to especially focus on the improving the quality of jobs.

In developing countries, jobs created in waste collection, sorting and recycling tend to be clustered in the informal sector, which are often low quality, low wage jobs with workers operating in hazardous conditions with regular exposure to toxic waste. In many low- and middle-income countries, informal recycling of waste is done by waste pickers, who have for long formed a part of an extensive informal labor market. They often deal with hazardous waste in toxic work environments, with little to no protective gear, and no form of social protection. In many cases, there is use of child labor for the task of waste picking and sorting. Apart from creating more jobs, taking the circular approach needs to shed more light on these low-quality jobs in the circular chain and could encourage policy action toward improving the quality of these informal jobs. With repurposing of waste at the core of CE processes, the shift to CE may help transition to better quality recycling industries which optimize the re-use of materials while protecting the waste pickers who do this work – especially when the waste being recycled is of a toxic/hazardous nature.

#### Box 12: Waste Pickers and Sorters- The Backbone of the Circular Economy

The core philosophy of the circular economy rest upon the ability to move towards a system that generates little to no waste- circular economists envision an ideal world of zero waste. Waste is an integral part of the CE system- it can be re-purposed to be fed back into the CE process secondary raw materials. Moreover, waste is an important part of creating CEVC interlinkages across industries-waste from one CEVC can be used as raw material in another CEVC. Thus, waste management-waste collection and sorting- becomes a crucial step in the CE process. This begs the question- can the circular economy be an important pathway to formal employment to many waste pickers who have long been relegated to the informal economy?

To begin, it's important to understand the size of the waste picker labor market. 1% of the urban workforce, or 15 to 20 million people, is engaged in recycling.<sup>96</sup> Commonly known as waste pickers, they collect, wash, sort, and process waste from streets, waterways, and landfills. Waste pickers often operate in extremely harmful working conditions, have little to no access to equipment and protective gear, and often earn their livelihoods through the trade of trash in an informal market setting. Waste pickers comprise an estimated 0.1–0.4% of workers in seven West African cities; 0.7% of workers in South Africa; and 0.1% of workers in India.<sup>97</sup> These constitute millions of people across regions that work in waste collection and sorting in the informal sector. With waste management at its core, the CE

https://www.wiego.org/sites/default/files/resources/files/WIEGO Urban Informal Workers Green Economy.pdf

<sup>&</sup>lt;sup>96</sup> WIEGO. Urban Informal Workers and the Green Economy.

<sup>&</sup>lt;sup>97</sup> Awad, A.B.; de Medina, R.; Vanek, J. Women and Men in the Informal Economy: A Statistical Picture, 2nd ed.; International Labour Organization: Geneva, Switzerland, 2013.



can offer opportunities to break the cycle of informality and fold in these workers into a more productive forms of work. Literature suggests that this can be done in 3 keyways<sup>98</sup>:

- a) Build collaborative networks of stakeholders to enable inclusion of waste pickers- <u>The South</u> <u>African Wast Pickers Association (SAWPA)</u> has a network of over 1000 registered waste pickers across 19 different regions. The organization partners with key stakeholders across various value chains, including social partners like WIEGO, and works to promote the rights of waste pickers in South Africa and to strengthen unity and cohesion among waste pickers.
- b) Establish cooperative enterprise models to integrate waste pickers into the formal economy-For example, in Ethiopia, municipal corporations are encouraged to enter public private partnership (PPP) with integrated waste management companies and outsource the solid waste management activities to the enterprise.<sup>99</sup> The enterprise hires waste pickers on a formal basis, offering them better pay and access to quality equipment to performed waste collection, transport, and disposal. All parties gain in the process - the municipality improves its reach and services through the private enterprise, the enterprise gains by increased outreach to many customers that need to be served by the municipality, and the waste pickers gain employment with better pay and better facilities.<sup>100</sup>
- c) **Build waste pickers' technical skills and capacity for entrepreneurship-**<u>Conserve India</u> employs and trains hundreds of people from Delhi's most disadvantages communities to collect plastics from across the city. The enterprise pays thrice the amount to waste pickers and profits generated by sale of recycles items are reinvested into education, health clinics and welfare programs.<sup>101</sup> Conserve India also provides skills training and loans to waste pickers to establish their own startups.<sup>102</sup>
- d) Provide access to technologies and markets that enable waste pickers to manufacture upcycled products. In Brazil, <u>The Association of Paper, Carton and Recyclable Material Pickers (ASMARE)</u> provides access to tools and technologies that help waste pickers recycle waste into furniture, jewelry, and artwork.<sup>103</sup> This helps waste pickers diversify from waste picking to starting their own small enterprises while participating in the CE.

Innovation in technology can help workers in the informal sector access better jobs- both in terms of earning a better livelihood and ensuring better working conditions. Leveraging technology to

<sup>99</sup> Business Models for Integrated Waste Management

<sup>101</sup> Business Models for Integrated Waste Management

<sup>&</sup>lt;sup>98</sup> Buch, Rajesh, Alicia Marseille, Matthew Williams, Rimjhim Aggarwal, and Aparna Sharma. 2021. "From Waste Pickers to Producers: An Inclusive Circular Economy Solution through Development of Cooperatives in Waste Management" Sustainability

<sup>13,</sup> no. 16: 8925. https://doi.org/10.3390/su13168925

https://www.innovationpolicyplatform.org/www.innovationpolicyplatform.org/system/files/4%20Integrated%20Waste%20Ma nangement\_Apr6/index.pdf

<sup>&</sup>lt;sup>100</sup> Business Models for Integrated Waste Management

https://www.innovationpolicyplatform.org/www.innovationpolicyplatform.org/system/files/4%20Integrated%20Waste%20Ma nangement\_Apr6/index.pdf

https://www.innovationpolicyplatform.org/www.innovationpolicyplatform.org/system/files/4%20Integrated%20Waste%20Ma nangement\_Apr6/index.pdf

<sup>&</sup>lt;sup>102</sup> Business Models for Integrated Waste Management

https://www.innovationpolicyplatform.org/www.innovationpolicyplatform.org/system/files/4%20Integrated%20Waste%20Ma nangement\_Apr6/index.pdf

<sup>&</sup>lt;sup>103</sup> Business Models for Integrated Waste Management

https://www.innovationpolicyplatform.org/www.innovationpolicyplatform.org/system/files/4%20Integrated%20Waste%20Ma nangement\_Apr6/index.pdf



decentralize waste collection can be key for developing countries to create a circular economy based on reusable and recycled products while improving livelihoods of informal workers. For example, India based startup Kabadiwalla Connect uses AI powered solutions to connect waste collectors with recycling facilities and thus, empowering the informal sector to decentralize waste management.<sup>104</sup> Using data and technology, they are able to map waste aggregators and stakeholders and also develop a comprehensive dataset with standardized stakeholder and material classifications.<sup>105</sup> Using this data, they are able to create a point of sale (PoS) device for scrap shops to register waste pickers as suppliers and authorize their transactions.<sup>106</sup> Waste type and quantity are entered on the device, facilitating the segregation and collation of materials from multiple orders.<sup>107</sup> Each sack or batch is tagged with a QR (quick response) code that can be traced back to the original order. By distributing "smart bins" to waste pickers, the system helps track the quality and volume of segregation at each household, helping waste pickers plan their collections. <sup>108</sup> Clear market information lets waste pickers source their material directly rather than forage through dumpsites.<sup>109</sup> Their use of tricycles for collection is cost effective and minimizes environmental impact.<sup>110</sup> Tech solutions like Kabadiwalla Connect helps waste pickers streamline their activities, create a sense of formality in the waste picking process, and enable better earnings by connecting them directly to buyers of recycled waste. However, awareness of new technology and basic digital skilling is an important cornerstone to ensure that benefits of tech innovations reach the most vulnerable.

As countries and cities seek to modernize their waste management and recycling processes, it is important to include marginalized communities in the process to ensure a fair transition to better jobs. Targeted support measures will be needed to formalize substandard, informal jobs within the CE to ensure a just transition. Municipal governments will need to work with waste pickers' organizations and collectives to build workers' capacity and develop new skills.<sup>111</sup> Moreover, private sector buy-in to improve the conditions of waste pickers can play a critical role in ensuring that negative spillovers do not trickle down the value chain and affect the most vulnerable. For example, <u>The H&M Foundation</u>, the philanthropic wing of the leading clothing brand H&M, is working with grassroot organizations in India to ensure that a shift to circular practices within their value chain does not negatively impact garment scrap pickers. Their recent partnership with <u>Hasiru Dala</u> aims at improving linkages to government schemes and help waste pickers access basic services like healthcare and skilling opportunities. H&M Foundation has also partnered with Social Alpha, an India based social impact organization, to develop new waste streams, to increase waste picker income and improve income stability. A ground up approach to tackling the problem of informal work in developing countries, with private and public sector stakeholder buy-in, may be a good start towards the shift to formality for workers in the informal sector within the CE.

 <sup>&</sup>lt;sup>104</sup> https://www.itu.int/en/myitu/News/2021/07/29/16/51/Digital-solution-India-waste-pickers-Kabadiwalla-Connect
<sup>105</sup> https://www.itu.int/en/myitu/News/2021/07/29/16/51/Digital-solution-India-waste-pickers-Kabadiwalla-Connect
<sup>106</sup> https://www.itu.int/en/myitu/News/2021/07/29/16/51/Digital-solution-India-waste-pickers-Kabadiwalla-Connect
<sup>107</sup> https://www.itu.int/en/myitu/News/2021/07/29/16/51/Digital-solution-India-waste-pickers-Kabadiwalla-Connect
<sup>108</sup> https://www.itu.int/en/myitu/News/2021/07/29/16/51/Digital-solution-India-waste-pickers-Kabadiwalla-Connect
<sup>109</sup> https://www.itu.int/en/myitu/News/2021/07/29/16/51/Digital-solution-India-waste-pickers-Kabadiwalla-Connect
<sup>109</sup> https://www.itu.int/en/myitu/News/2021/07/29/16/51/Digital-solution-India-waste-pickers-Kabadiwalla-Connect
<sup>109</sup> https://www.itu.int/en/myitu/News/2021/07/29/16/51/Digital-solution-India-waste-pickers-Kabadiwalla-Connect
<sup>110</sup> https://www.itu.int/en/myitu/News/2021/07/29/16/51/Digital-solution-India-waste-pickers-Kabadiwalla-Connect
<sup>111</sup> https://www.chathamhouse.org/2020/04/promoting-just-transition-inclusive-circular-economy-0/4-towards-just-circular-economy-0/4-towards-



# 6.3. Jobs and Skills in CEVCs

A critical pillar of ensuring a just transition to the circular economy is to provide opportunities for workers to reskill and upskill to access better job opportunities. Understanding the nature of jobs created within the CE along with the skills needed to bolster the labor demand is critical to a wholistic understand of the circular economy from an employment perspective.

**Figure 10 outlines a general framework used to evaluate each occupation. The framework suggested below can help us think through jobs implications at different nodes of the value chain.** It suggests 1) the jobs/occupations created within circular nodes of the CEVCs 2) maps them to the possible level of skill -high, medium, low 3) Provides a further breakdown of the 6 type of skills across each occupation -basic skills, complex problem-solving skills, resource management skills, social skills, system skills and tech skills 4) indicates if the job might be an entry level job and, finally 4) highlights if the jobs created are likely to be wage or self-employment. Figure 10 illustrates the overall methodology deployed in this section.

Table 2 displays a detail mapping of the methodology using a combination of searches on job portals via google and literature reviews. The occupations listed in Table 2 is not an exhaustive list<sup>112</sup>- as CE activities further develop and intensify, newer types jobs and occupations will be created in the future, which will eventually fit into this framework. Additionally, this transition will also create opportunities for upskilling for new skills. The aim of this section is to simply illustrate a framework to view jobs created within the CE and help elucidate the multifaceted nature of these jobs.

<sup>&</sup>lt;sup>112</sup> The table has been developed using a combination of google search on online job platforms, occupations listed in review paper- <u>Levelling Up Through Circular Economy Jobs</u>, Green Alliance, August 2021 and review paper- Martijn Burger, Spyridon Stavropoulos, Shyaam Ramkumar, Joke Dufourmont, Frank van Oort, <u>The heterogeneous skill-base of circular economy</u> <u>employment</u>, Research Policy, Volume 48, Issue 1,2019, Pages 248-261



#### Figure 10: Framework to define jobs in CEVCs



Note: Definitions for Basic Skills, Complex Problem Solving Skills, Resource Management Skills, Social Skills, System Skills and Technical Skills sourced from Martijn Burger, Spyridon Stavropoulos, Shyaam Ramkumar, Joke Dufourmont, Frank van Oort, <u>The heterogeneous skill-base of circular economy employment</u>, Research Policy, Volume 48, Issue 1,2019, Pages 248-261



# Table 2: Overview of Jobs Created and Skill Needs in CEVCs

Circular Element	Distinctive	Skill L	evel		Skill Type							Type of Job	
of CEVC	Job/										Level		
	Occupation										Job		
	Created												
	-	High	Mediu	Low	Basic	Complex	Resource	Socia	Syste	Digit		Wag	Self
			m		Skills	Problem	Managemen	1	m	al		e	Employ
						-Solving	t Skills	Skills	Skills	Skill			ed
						Skills				s			
Circular Design	Design	V				V	V		V	V		V	
	Engineer												
	Architectural	V				V	V		V	V		V	
	and												
	engineering												
	manager												
	Interior	V											٧
	Designer												
	Construction		V			V		V	V			٧	
	and Building												
	inspectors												
	Product	V				V			V	V			٧
	Designer												
	Cost		V			٧			V	V	V	٧	
	Estimation												
	Analyst												
	Sustainability	V			1	V	V		V				٧
	Specialist												
					•								
Sharing Economy	Software	٧				٧				V		٧	٧
	Developer												
	Customer		V		V			V		V	V	V	
	Service												
	operative												



	Public		V		V	٧		V	V		V	V	
	relations												
	officer												
	Conservation	V				٧	V		V	V		V	٧
	Scientist												
	Labor	V				٧		V	V				٧
	Relations												
	specialist												
	Delivery			V	V			V	V		V	V	
	operatives												
	Rec protective			V	V			V			V	V	
	service												
	workers												
Repair and	Upholsters			V	V		V	V			V		٧
Maintenance	Automotive		V				V		V	V	V	V	
	attendants												
	Equipment			٧	V				V		V	V	
	cleaners												
	Polishers			V	٧		V				V	٧	٧
	Watercraft		V				V		V	V	V	V	
	service												
	operatives												
	Maintenance	V				٧	V		V	V		V	
	Engineer												
	Repair		V			٧			V	V	V	٧	٧
	Technician												
	Painter			V	V						٧	V	٧
	1						1						
Remanufacturing	Product Life	٧				V	V	V	V	٧		V	
	Cycle Manager												
	Hardware	٧				٧			V	٧		V	
	Engineer												



	Tower		V				V		V	V	V	V	
	Equipment												
	installer												
	Plant and		V			V	V		٧	٧	V	V	
	System												
	Operators												
	Meter Readers			V	V				V	٧	V	V	
	Service		V			V		V	V	V	V	V	٧
	Technicians												
	Environment	V				V	V	٧	٧	V			٧
	Consultant												
	Automotive		V			V	V		V	٧	V	V	٧
	Wheel												
	Remanufacturi												
	ng Technician												
	SAP Architect	٧				V	V			٧			٧
	Warehouse			V	V		V	V			V	V	
	Attendant												
	Assembly		V		V	V			V	٧	V	V	٧
	Technician												
					-								
Recycling	Recycling		V		V		V	V			V	V	
	operative												
	Landfill		V				V	V		٧		V	
	operations												
	manager												
	Recycling			V	V		V				V		٧
	Sorter												
	Waste			V	V		V				V	V	٧
	Collector												
	Water and		V				V	V	V	٧	V	V	
	Waste												
	Treatment												



	Plant												
	Operators												
	Chemical	V				٧	V		V	V		V	
	Engineer												
	Recycling	V				٧	V	V	V	V			٧
	Consultant												
	Sanitation			٧	V				V	V	V	٧	٧
	Driver												
	Septic Tank			V	V		V		V	V	V	V	٧
	servicers												
Reuse	Electrician		V						V	V	V		٧
	Equipment			V	V			V			V	V	٧
	Cleaners												
	Repair		V		V		V	V		V	V	V	
	Technicians												
	Handyman			٧	V			V	V		V	V	٧
	Tailor			٧	V		V	V	V		V	V	٧
	Warehouse		V				V		V	V	V	V	
	Logistics												
	Operator												



# A Few Insights:

The circular economy has the potential to create jobs across diverse skill sets.

- The activities within a circular value chain will demand a broad and deep variety of skills, owing largely to the interlinked and interdisciplinary nature of the CE operating framework. Specifically, the circular economy calls for a two directional skill need<sup>113</sup>
  - a. Inter-Disciplinary skills refers to a more multi-disciplinary skill need within the CE. These are also called transversal skills (or transferable skills) and are skills that are applicable across a range of tasks, occupations, and industries. For example, communication and negotiation skills, teamwork, problem solving, leadership, creativity and adaptability that help apply new technologies Adoption of green skills- knowledge, abilities, values, and attitudes needed to live in, develop and support a sustainable and resource-efficient society<sup>114</sup>- will take precedence during the shift to circularity. These skills are vital in supporting cross sectoral collaborations and plays a role in supporting labor mobility across the value chain and across sectors.<sup>115</sup>
  - b. **Deep skills** these refer to specialist skills and are needed by employees that work in specific industries or sectors. For example, knowledge of material science, product design, industry specific engineering techniques and operational processes.

# Broad Skills (Transferable/Transversal Skills) Digital skills, green skills , social skills, individual and personal skills Deep Skills (Industry Specific Skills) Industry Specific Functional area, discipline or specialty

#### Figure 11: Skill Approach within the CE (T-shaped Skill Approach)<sup>116</sup>

Source: Closing the Skills Gap: Vocational Education and Training for the Circular Economy, Circle Economy (May 2021)

<sup>113</sup> <u>Closing the Skills Gap: Vocational Education and Training for the Circular Economy</u>, Circle Economy (May 2021)
<sup>114</sup> OECD "Greener Skills and Jobs"

https://www.oecd.org/cfe/leed/Greener%20skills\_Highlights%20WEB.pdf

<sup>115</sup> <u>Closing the Skills Gap: Vocational Education and Training for the Circular Economy</u>, Circle Economy (May 2021)

<sup>116</sup> The T-shape skills approach was designed by the Circle Economy in their paper <u>Closing the Skills Gap: Vocational Education</u> and <u>Training for the Circular Economy</u>, Circle Economy (May 2021)



2. Certain jobs created in the CE form the core of the Circular Economy- activities like waste collection and sorting, installation, maintenance, repair, and reuse are integral to the CE- and these core jobs are more likely to demand medium to low skills (less skills intensive). Jobs that form the shell of the CE (enabling jobs)- like consultants, public relations, designers, teachers, researchers, and analysts- on average, require a higher skill level and are more skill intensive.



Figure 12: Bifurcation of Skill Intensity by type of Circular Activity/Job.

- 3. Recycling, Remanufacturing and Reuse mostly demand medium to low skill levels. These are more labor-intensive early-stage CE activities and provide more entry level opportunities than other elements of the CE. This is important from a youth employment standpoint in that entry level jobs are steppingstones for youth to access productive employment opportunities in various industries. Moreover, Recycling, Reuse and Remanufacturing can act as important segues to integrate informal workers into the formal industry and fold in jobs for lower skilled workers and job seekers from vulnerable communities.
- 4. Across the board, almost all occupations require system skills and digital skills. This ties into another feature of the CE- as economies shift to CE, there will be an increasing adoption of digital technology as a supporting shell of the CE. This brings to light an important aspect of skilling, upskilling and digital skill acquisition.

**Digital technology will play a crucial role in ushering the shift to the CE.** As circularity within value chains intensifies within the fold of constant technological advancements, aspects of AI, blockchain technology, and robotization will play a pivotal role. For instance, EON Group developed a radio-frequency

Source: Definitions for Core and Enabling Circular Jobs drawn from Circle Economy Jobs Definition Framework

identification (RFID) tagging mechanism to track the entire lifecycle of a garment.<sup>117</sup> Recycling of clothing is difficult unless labels with constituent materials is intact to enable recycling of cotton and fiber, and lack of transparent data leads to a large number of garments ending up in landfills.<sup>118</sup> Digital technologies like the RFID tag is currently being tested with leading fashion apparel companies to incorporate these tags and extend garment lifecycles to both increase revenue opportunities and reduce landfill and ocean waste.<sup>119</sup>This will have a direct impact on jobs and the skills needed to support the jobs created by the inclusion of such technologies. Seemingly unrelated positions, like customer service representative or HR officer, will also need digital skills in an ever-digitizing CE. Digital skills will not be a peripheral requirement but will be considered a core skill to work within the CE.

Education systems need to be more agile in order to incorporate the rapid change in business models and skills needs within the CE. As the CE expands in scope, there will be an increase in demand for more diverse skills to support the transition. In this context, skilling programs and educational institutions will need to shed conventional approaches of learning and adapt to more agile learning modules. LinkedIn, for example, has developed micro courses that help in incremental upskilling on a variety of topics. These courses are short and focus on practical skills needed by the modern workforce. Traditional institutional programs need to include modules on circularity and enmesh them in regular teaching to encourage the uptake of circular practices. For example, MBA programs would need to incorporate sustainability skills for business managers to help them better manage circular value chains. Transforming traditional forms of education and introducing agile skill development programs can help re-tool workers and encourage lifelong learning through upskilling.

## 7. CONCLUSION

The transition to a Circular economy will stimulate changes in how things are produced and consumed. This in turn will affect the types of new jobs that may be created or how existing jobs may need to adapt to a circular approach. However, while the magnitude of job creation remains largely ambiguous, policy makers in the developing world will need to map new job opportunities that are likely to emerge, and especially assess where this movement to circular could provide an avenue to create better quality jobs for people in the informal sector. Furthermore, within the mandate of better-quality jobs lies the question of an equitable and just transition to circularity. This will also need an assessment of skilling, reskilling and upskilling needs for the different sectors. Skills and capacity development is a crucial aspect of ensuring a just transition to CE. Jobs lost in the transition can be regained by providing avenues for upskilling and digital skills acquisition to ensure that workers can access new opportunities within the CE. The CE, on average, will likely demand a higher skill level across occupations and the skill base of the CE is will be largely heterogenous. A heterogeneous skill base could open avenues for upskilling, re-skilling, and digital skills acquisition, which in turn could encourage inter-sectoral collaboration and bolster labor mobility. Labor mobility means more choices for workers- a choice to access better paying jobs, to access better working conditions, and to contribute productively to the labor market. Each CEVC within an industry will be different, and there is value in conducting deep dives of industry specific value chains in the context of the CE and its effect on jobs.

 <sup>&</sup>lt;sup>117</sup> https://www.greenbiz.com/article/how-technology-unlocks-new-value-circular-economy
<sup>118</sup> https://www.greenbiz.com/article/how-technology-unlocks-new-value-circular-economy
<sup>119</sup> https://www.greenbiz.com/article/how-technology-unlocks-new-value-circular-economy



Evaluating the CE from a jobs angle could encourage uptake and adoption of pro-environment policies by governments and policy makers, governments worry about employment outcomes of shifts to green technologies, and if an integrated approach between jobs and environment is highlighted, it reduces policy hesitancy from the side of the policy maker. Therefore, embedding the jobs angle in the environment agenda ultimately strengthens the environment agenda.

Achieving an inclusive circular economy is a gradual process and the transition cannot be facilitated overnight; rather, this requires policy coherence, education of consumers, and well-planned integration of the informal sector and stakeholder buy-in, particularly for those likely to be adversely impacted by the change. The CE entails a shift in the way we view, think about, and design products to achieve resource efficiency, thereby creating renewed value within the system.



## **KEY REFERENCES**

Awad, A.B.; de Medina, R.; Vanek, J. Women and Men in the Informal Economy: A Statistical Picture, 2nd ed.; International Labour Organization: Geneva, Switzerland, 2013. https://www.ilo.org/wcmsp5/groups/public/---dgreports/--stat/documents/publication/wcms\_234413.pdf

Barford, A., Ahmad, S.R. A Call for a Socially Restorative Circular Economy: Waste Pickers in the Recycled Plastics Supply Chain. Circ.Econ.Sust. 1, 761–782 (2021). https://doi.org/10.1007/s43615-021-00056-7

Buch, Rajesh, Alicia Marseille, Matthew Williams, Rimjhim Aggarwal, and Aparna Sharma. 2021. "From Waste Pickers to Producers: An Inclusive Circular Economy Solution through Development of Cooperatives in Waste Management" Sustainability 13, no. 16: 8925. https://doi.org/10.3390/su13168925

Business Models for Integrated Waste Management- Innovation Policy Platform https://www.innovationpolicyplatform.org/www.innovationpolicyplatform.org/system/files/4%20Integr ated%20Waste%20Management\_Apr6/index.pdf

Canon Global: Contributing to Circular Economy https://global.canon/en/v-square/65.html

Circle Economy, Goldschmeding Foundation. "*Circular Jobs Definition Framework*", March 2021 <u>file://wbgvdiprofile/vdi\$/wb578473/RedirectedFolders/Downloads/604b1ce1bd5a7ecc9e17f9ec\_20210</u> <u>311 CJI Brief 1\_297x210mm\_b753179020.pdf</u>

Circle Economy. "Circular Jobs Initiative" circle-economy.com/circular-jobs-initiative/circular-jobs

Circle Economy. "Closing the Skills Gap: Vocational Education and Training for the Circular Economy" (May 2021) <u>https://assets.website-</u> <u>files.com/5d26d80e8836af2d12ed1269/608c0aa6fec4df0fa7bd78e4\_20210422%20-</u> %20CJI%20VET%20Paper%202%20-%20297x210mm.pdf

Commission Staff Working Document: <u>Measuring progress towards circular economy in the European</u> <u>Union – Key indicators for a monitoring framework</u>. Eurostat, Statistics Explained, Structural business statistics

https://doi.org/10.1016/J.ENPOL.2019.111047

Daniel Steinvorth, "GLOBAL VILLAGE: Why a new movement from the Netherlands is repairing toasters and irons." Spiegel Politics

https://www.spiegel.de/politik/heile-welt-a-be00dd1a-0002-0001-0000-000085913052?context=issue

Ellen MacArthur Foundation, "What is a circular Economy? A Framework for an economy that is restorative and regenerative by design"



https://www.ellenmacarthurfoundation.org/circular-economy/concept

Ellen McArthur Foundation Towards the Circular Economy vol.3 , 2014

Ellen McArthur Foundation, ARUP. "The Circular Economy Opportunity for Urban and Industrial Innovation in China", 2018 <u>https://emf.thirdlight.com/link/fucrb1b7wej5-x8o5gz/@/preview/2</u>

Ellen McArthur Foundation: Empowering repair. https://www.ellenmacarthurfoundation.org/assets/downloads/ce100/Empowering-Repair-Final-Public.pdf

European Commission <u>Measuring Progress Towards The Circular Economy- Key Indicators for a</u> <u>Monitoring Framework</u> (January 2018)

Farooque, Muhammad & Zhang, Abraham & Thurer, Matthias & Qu, Ting & Huisingh, Donald. (2019). Circular supply chain management: A definition and structured literature review. Journal of Cleaner Production. 228. 10.1016/j.jclepro.2019.04.303. https://www.researchgate.net/publication/332690616 Circular supply chain management A definiti

on and structured literature review

Gartner Publication. "Future of Supply Chain 2019", September 2019 https://www.gartner.com/en/supply-chain/research/future-of-supply-chain

Gereffi, G., Fernandez-Stark, K., and Psilos, P. (2011) "Workforce Development and Global Value Chains in Developing Countries", Center for Globalization, Governance, and Competitiveness, Duke University. https://gvcc.duke.edu/cggclisting/skills-for-upgrading-workforce-development-and-global-value-chainsin-developing-countries-2/

Green Alliance (August 2021), Levelling through circular economy jobs https://green-alliance.org.uk/resources/Levelling\_up\_through\_circular\_economy\_jobs.pdf

IISD and SITRA. "Effects of Circular Economy on Jobs" https://www.iisd.org/system/files/2020-12/circular-economy-jobs.pdf

International Labour Organization – Geneva (2020): "Global Employment Trends for Youth 2020: Technology and the future of jobs" <u>https://www.ilo.org/wcmsp5/groups/public/---dgreports/---dcomm/---</u> <u>publ/documents/publication/wcms\_737648.pdf</u>

International Labour Organization. (2018b). World employment and social outlook 2018: Greening with jobs. <u>https://www.ilo.org/weso-greening/documents/WESO\_Greening\_EN\_web2.pdf</u>

Kaza, Silpa, Lisa Yao, Perinaz Bhada-Tata, and Frank Van Woerden. 2018. <u>What a Waste 2.0: A Global</u> <u>Snapshot of Solid Waste Management to 2050</u>. Urban Development Series. Washington, DC: World Bank. doi:10.1596/978-1-4648 -1329-0. License: Creative Commons Attribution CC BY 3.0 IGO



Lars Repp, Marko Hekkert, Julian Kirchherr, Circular economy-induced global employment shifts in apparel value chains: Job reduction in apparel production activities, job growth in reuse and recycling activities, Resources, Conservation and Recycling, Volume 171, 2021, 105621, ISSN 0921-3449, https://doi.org/10.1016/j.resconrec.2021.105621.

Li, Shulin. (2012). The Research on Quantitative Evaluation of Circular Economy Based on Waste Input-Output Analysis. Procedia Environmental Sciences. 12. 65–71. 10.1016/j.proenv.2012.01.248 <u>https://doi.org/10.1016/j.proenv.2012.01.248</u>.

Linear Economy- An Unsustainable Posture for our Planet <u>https://en.beecircular.org/post/linear-economy-an-unsustainable-posture-for-our-planet</u>

Maarten van Keulen, Julian Kirchherr, The implementation of the Circular Economy: Barriers and enablers in the coffee value chain, Journal of Cleaner Production, Volume 281, 2021, 125033, ISSN 0959-6526, <u>https://doi.org/10.1016/j.jclepro.2020.125033</u>.

Martin Calisto Friant, Walter J.V. Vermeulen, Roberta Salomone, Analysing European Union circular economy policies: words versus actions, Sustainable Production and Consumption, Volume 27,2021, Pages 337-353, ISSN 2352-5509, https://doi.org/10.1016/j.spc.2020.11.001.

Millennials and Renting (April 2018)

<u>https://www.resolutionfoundation.org/press-releases/up-to-a-third-of-millennials-face-renting-from-cradle-to-grave/</u>

Nielsen UK (2015) Sustainability as a shopping priority <u>https://www.nielsen.com/uk/en/insights/news/2015/green-generation-millennials-say-sustainability-is-</u> <u>a-shopping-priority.html</u>

Patrick Schröder (2020) Promoting a Just Transition to an Inclusive Circular Economy. Chatham House <u>https://www.chathamhouse.org/2020/04/promoting-just-transition-inclusive-circular-economy-0/4-towards-just-circular-economy</u>

PWC Publication, "Sharing or Pairing? Growth of the Sharing Economy" https://www.pwc.com/hu/en/kiadvanyok/assets/pdf/sharing-economy-en.pdf

PWC. "Closing the loop- the circular economy, what it means and what it can do for you" <a href="https://www.pwc.com/hu/en/kiadvanyok/assets/pdf/Closing-the-loop-the-circular-economy.pdf">https://www.pwc.com/hu/en/kiadvanyok/assets/pdf/Closing-the-loop-the-circular-economy.pdf</a>

Sarah O'Connor, "Not All Green Jobs are Safe and Clean", The Financial Times <u>https://www.ft.com/content/111f9600-f440-47fb-882f-4a5e3c96fae2</u>



This S4YE Knowledge Brief was prepared by Medha Madhu Nair (Technical Officer, S4YE) and Namita Datta (Program Manager, S4YE, World Bank). The team received guidance from Ian Walker (Manager, Jobs Group). The team is grateful to Grzegorz Peszko (Lead Economist, Environment, Natural Resources and Blue Economy, World Bank) and John Anagnostou (Senior Industry Specialist, IFC) for their substantive comments and suggestions. The Note has also benefitted from several discussions with partners. We would like to thank Caspar Edmonds (International Labor Organization), Prof. Giorgos Demetriou (Circular Economy Research Center), Julia Bakutis (H&M Group), and Patrik Lundström (Renewcell) for providing valuable insights.

S4YE is a multi-stakeholder coalition that aims to provide leadership and resources for catalytic action to increase young people engaged in productive work. S4YE's partners include the World Bank Group, Accenture, Mastercard Foundation, Microsoft, International Youth Foundation (IYF), Youth Business International (YBI), RAND Corporation, the International Labour Organization (ILO), the Government of Germany, and the UN Office of the Secretary-General's Envoy on Youth. The S4YE Secretariat is housed in the Jobs Group within the Social Protection and Jobs Global Practice at the World Bank Group.

This knowledge brief does not necessarily reflect the views of the World Bank or each S4YE partner. For additional resources for youth employment, please visit https://www.s4ye.org/s4yepublications