ISST

Unpacking the Circular Economy

Foregrounding the Contributions of Workers in the Informal Economy in Delhi

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Acknowledgements

Glossary of Terms

Circular economy: An economic system aimed at eliminating waste and the continual use of resources

E-waste: Electronic waste is generated by the disposal of electronic products such as cell phones, computers, and televisions.

Fast fashion: An approach to the design, creation, and marketing of clothing that emphasizes making fashion trends quickly and cheaply available to consumers

Home-based workers: People who produce goods or services in or near their homes for local, domestic, or global markets

Informal economy: Economic activities, enterprises, jobs, and workers that are not regulated or protected by the state

Linear economy: A system where resources are extracted to make products that eventually end up as waste and are thrown away

Own-account workers: Workers who work on their own account or with one or more partners, holding the types of jobs defined as "self-employment jobs" and have not engaged on a continuous basis any employees to work for them

Planned obsolescence: A situation in which goods are deliberately designed or made to last for a short period

Retail: Selling goods directly to the public, usually in small quantities

Sieving: To use a sieve to separate solids from a liquid or to break up large solids

Street vendor: Someone who sells food or other goods in the street, sometimes illegally

Upcycling: Making new objects out of old or used things or waste material

Value chain: The steps in creating a product, from its initial design to its arrival at a customer's door, with each step adding some value

Waste pickers: People who collect household or commercial/industrial waste from private waste bins or dumpsters, along streets, and in landfills, usually for resale

Wholesale: Buy and sell goods in large quantities and therefore at cheaper prices, usually to shopkeepers who then sell them to the public

Winnowing: To separate grain from its outer layer (chaff)

Abstract

The circular economy has emerged as a viable alternative to the "take–make–use–dispose" linear economy by encouraging reuse, repair and recycling whenever possible, thereby reducing waste generation and encouraging more conscientious use of natural resources. Although the Global South has a long history of traditional informal livelihoods that are inherently circular and attempt to generate value out of waste to the farthest extent possible, these informal livelihoods remain neglected in research and discourse on the circular economy.

This report presents six case studies of informal livelihoods in the city of Delhi. The case studies found that workers in the informal economy are vital to circular production, contributing significantly to managing waste and closing material cycles through promoting repair, reuse, and upcycling of waste. Moreover, the workers in the informal economy help subsidize the cost of living for them in the city by providing affordable goods and services. Despite their positive contributions to the economy and the environment, these informal circular livelihoods are "invisibilized", "stigmatized" and under constant threat because of unfavourable legislation.

Such work is predominantly performed by socially "othered" people, particularly members of lower castes and tribes and religious minorities, due to the social stigma associated with the impurity of waste. Poor widowed/separated and old migrant women from marginalized communities were found to be most vulnerable and concentrated in the lowest-paid and precarious work of waste collection, street vending, and home-based work.

The study found that workers in the informal economy are at the core of the circular economy, devising innovative ways to tackle the "throwaway culture" (or rapid waste generation) within their limited means despite the lack of state support and social protection while facing socio-economic marginalization and stigmatization.

Keywords: circular economy; street vendors; home-based workers; waste pickers; reuse; repair; recycle

Table of Contents

1

Introduction

In response to ecological and economic challenges, the concept of a circular economy has emerged as an alternative to the "take–make–use–dispose" linear economy (Gutberlet & Carenzo 2020; Das 2021). The circular economy has become a powerful new buzzword within political, academic and policy debates about environmental sustainability and climate change (Gutberlet & Carenzo 2020; Pansera et al. 2021), with a focus on the reduction of waste. In the Global North and increasingly in the South, the circular economy is discussed as an innovative approach to waste management. However, informal reuse and repair workers, especially in the global south, have always focused on the concept of circular resource flows. In countries such as India, the circular economy is based on the reuse, repair, and recycling of resources, with deep roots in the urban informal economy (Corwin 2017; Jhabvala 2021; Das 2021). In India, examples of these workers include, but are not limited to, cobblers, tailors, second-hand goods vendors, reusable implement makers, weavers, artisans, and so on. Although workers in the informal economy are vital to circular production, they have been overlooked and are largely absent from research, discourse, and engagement on the circular economy.

The dominant concept of a circular economy prioritizes ecological and environmental sustainability outcomes but neglects social sustainability and livelihood issues (Gutberlet & Carenzo 2020). Further, efforts by the government and the private sector to promote the circular economy have ironically tended to undermine these informal livelihoods. According to Renana Jhabvala (2021), "If we want to maintain a circular economy, we must recognize this is supported not by large companies or big contractors but by these small people who need supportive policies." While the circular economy is upheld by people at the base of India's economic and social pyramid, they remain invisible and undervalued. To establish a sustainable circular economy, we must return our attention to the people who are already at the core of the circular economy. The discourse on the circular economy must expand to include workers in the informal economy and their livelihoods in the informal repair, reuse, and recycle economy.

ISST undertook a scoping study[1] aimed at gathering evidence from the ground regarding the various innovative contributions that workers in the informal economy may make towards managing waste and closing material cycles. While there is sufficient evidence to support the former, this study intends to explore how material cycles can be closed through promoting repair, reuse, and upcycling of waste — an area of academic research and advocacy that has received relatively little attention. By exploring and documenting the contribution of workers in the informal economy such as waste pickers, home-based workers, and street vendors, the study aims to place informal livelihoods at the center of the discourse on promoting a circular economy.

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[1] This study was commissioned by WIEGO – Focal City Program as part of WIEGO's Reducing Waste in Coastal Cities project.

THE CIRCULAR ECONOMY

REGENERATE — conscientious use of natural resources

REDUCE — eliminating waste and pollution

REUSE & RECYCLE — keeping products and materials in circulation

A circular economy is an industrial system that is restorative or regenerative by intention and design (Ellen MacArthur Foundation n.d.). It is based on three principles: eliminating waste and pollution by reducing the use of non-renewable resources, keeping products and materials in circulation by reusing and recycling whenever possible, and regenerating nature through more conscientious use of natural resources. In a circular economy, products should be designed such that any "waste" generated should re-enter the economy and prevent the extraction of virgin resources from the environment, thus "closing the loop". A circular design aims to manufacture and use products such that they have a net-zero effect on the environment (Velenturf & Purnell 2021). Circularity is being promoted as an effective way to address climate change and the depletion of natural resources (Gutberlet & Carenzo 2020). Despite a growing body of literature on the benefits of the circular economy, it continues to suffer from unclear theoretical grounds and structural barriers in its implementation (Corvellec et al. 2021). There is currently little consensus on the definition of the circular economy, with gaps in its conceptualization and a lack of congruence to contexts where informal work abounds.

While most traditional societies use resources conservatively, industrialization and productivity enhancement have created a "throwaway culture" by providing an illusion of unlimited resources (Prabhu 2021). Excessive waste creation is an unavoidable feature of modern economies that carries a fetishized desire for the "new" — a trend that is sustained with the help of a culture of compulsive disposal and planned obsolescence. Referred to as the "throwaway ethic", this trend

began in the United States in the mid-20th century as a response to the Great Depression in an attempt to create constant demand and resolve the economic crisis. In India, planned obsolescence was popularized in the liberalization era (Bhattacharya 2018). The throwaway culture is driven by a change in technology as well as taste. Since technology produces goods in a way that they only last for a short period, people no longer value the acts of preserving old things or reusing and recycling them. Further, the shrinking of space in urban areas does not allow for old things to be stored and repurposed later (Bhattacharya 2018).

The contemporary clothing industry imbibes this consumption ethic with its fast fashion trends that are based on quick production and cheap pricing to gain a competitive edge. Consumers respond to this system by adopting patterns of quick use and disposal of clothes (Koszewska 2018). Likewise, Priyadarshini and Abhilash (2020) argue that the Appliance and Consumer Electronics (APE) market in India will also see huge expansion due to the digitization policies of the government, thus leading to an increase in e-waste. There is also a wide disparity between e-waste generation and e-waste recycling in India, with only 3.47% of the total generated amount being recycled. In 2018, the Union Environment Minister declared that India's current goal is zero waste (Vardhan 2018) but solid waste management is one of the lowest-ranked policy priorities and suffers from the lack of finance, manpower, and equipment (Harriss-White 2020).

Waste takes on different meanings as it flows through the circular economy. Thill (2015: 29, as cited in Bhattacharya 2018) describes waste as leftovers after "desire has been squeezed out of it", implying that what is waste is often socially determined and what is waste for one may not be so for another. An individual who views a product as "waste" will attach negative value to it because of the costs of disposal and pollution and its costs to public health (Harriss-White 2020). However, unlike "trash", "waste" can be transformed into something useful for another individual through repair or recycling. This understanding of "waste" is in line with Michael Thompson's "Rubbish Theory" (1979, as cited in Corwin 2017), which asserts that for rubbish (or waste) to regain value, certain human actions are required. For example, in India e-waste transitions from rubbish to valued products through reuse industries. Recycling or reusing waste assigns new economic value to it, in what Marx (1971, as cited in Harris-White 2019) described as the "reconversion of the excretions of production". Waste can also be categorized into "sinks" and "taps", wherein the former refers to waste that is not recycled and is left to nature's sinks, such as a municipal dump or a dry river bed, whereas waste that gains new value through reuse or recycling becomes raw material in itself and serves as a "tap".[2]

Informal Livelihoods in the Circular Economy

The literature on circular economy focuses on designing industrial processes and systems to ensure circularity in product lines. However, the work done in the circular economy does not necessarily happen in a tightly defined, formal set-up, especially in developing economies that have a large informal sector. Such a research orientation misses the repair-recycle-reuse processes in the informal sector and the interdependence between the formal and the informal sectors in carrying

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[2] Both "sinks" and "taps" depend on human labour — most of which takes place in the informal economy.

out these processes. With a few exceptions, the existing literature fails to account for the contributions of informal livelihoods to the circular economy. One group that is gaining attention is waste pickers who separate waste and pass on recyclable material to middlemen or the recycling industry. Gutberlet & Carenzo (2020) highlight how the work of these workers in the informal economy is crucial for the protection of the environment, albeit often at the cost of their health because they do not have access to adequate protective gear.[3] In the absence of a formal network for waste collection in much of the Global South, these workers in the informal economy form an integral part of the circular economy.

Another category is e-waste workers. The e-waste sector in India is driven by economies of reuse and repair, rather than waste and recycling, thus, preventing or delaying the transformation of electronics into e-waste (Corwin, 2017). Corwin's study of South Delhi's Nehru Place points to electronic scrap shops that store e-waste and sell them to repair workers who use the parts of devices that have been deemed worthless to repair other devices. E-waste flows into the informal sector through door-to-door collection as well as imports (Rastogi 2021). In a new form of colonialism, developed nations dump large quantities of their e-waste in the Global South, where they are processed by workers in the informal economy. While the Basel Convention of 1992 tried to prevent this "toxic colonialism" or "garbage imperialism'', countries continue to find ways around it (Corwin 2017; Rastogi 2021). India is a major destination for such imported e-waste.

Other less-discussed examples of waste workers in the informal sector are recyclers who deal with used car parts and second-hand clothing. Bhattacharya (2018) discusses the work of people in the informal sector of Mayapuri — India's largest metal and junk trade yard. They use parts from discarded cars as quick-fix solutions (jugaad). These recyclers possess specific skills that add new value to discarded car parts. Despite their positive contributions to the economy and the environment, their livelihoods are under constant threat because of unfavourable legislation. In 2014, the National Green Tribunal banned all diesel and petrol vehicles that were more than 15 years old from operating. This led to the devaluation of used vehicles and their premature disposal despite being in good condition.

Several communities are also involved in the recycling or reusing of old clothes, which limits waste generation. One popular system is bartering old clothes for kitchen utensils. Norris (2005) highlights the case of one such group of workers involved in recycling and reselling old clothes — the Waghris[4]. Devipujak Waghris can maximize their profits by transforming unwanted clothes into new products. They use parts of expensive saris to make scarves, bedspreads and cushion covers by sewing the cut-out parts onto cotton backing and reusable cloth bags. The used clothing market of Ghoda Mandi in Delhi is one of the largest in the subcontinent and sees 1,000 to 1,500 dealers every day. Recycled cloth items are also gaining popularity among Western travellers-turned-traders who import them in vast quantities and sell them for several times the Indian prices. The used clothing sector has huge potential for generating employment due to the large amounts of garments that are discarded by middle and upper-class households every year, owing to space

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[3] Workers often do not have protective gear appropriate for their work conditions, such as burning dumpsites, or that are appropriately designed for their specific occupation.

[4] The community now seeks to call themselves Devipujak and shuns the derogatory term Waghri.

constraints in cities. However, most Indian families that can afford to buy new clothes continue to perceive used clothes as potentially ritually polluting, since clothing even when taken off the body and divested is culturally believed to retain bodily traces of the person. When lower-middle-class women purchase from these traders, they often lie to their friends and relatives about the source of their clothes because buying second-hand garments is frowned upon. SEWA[5] workers are also involved in recycling old clothes that they obtain in exchange for utility items or as waste from textile manufacturing units. They try to utilize even the smallest pieces of cloth to make blankets or clothing for children (Jhabvala 2021).

Challenges Faced by the Informal Circular Economy

Delhi's informal waste processing sector is mainly made up of migrant workers living in the suburbs of the city (Bhattacharya 2018). Aspirations for a "world-class city" displaced its urban poor and their workspaces to the peripheries of the city, indicating that despite its significance to the sustenance of urban spaces, waste work is considered socially and aesthetically undesirable (Rathore 2020a). Further, bourgeois environmentalism calls for "modern" management systems that prioritize the environmental and aesthetic impact of the activity over workers' health and work conditions (Rastogi 2021).

Not only are spaces where waste is collected "invisibilized" or "othered" but also the work is usually performed by socially "othered" people who have to deal with high levels of stigmatization (Harriss-White 2020); she described waste as an "economic and social trap for SCs and STs[6]." Harriss-White (2017) points out that even when the labour force is socially cosmopolitan, it involves individuals from marginalized groups, such as lower castes, tribes, and religious minorities like Muslims and Christians. Her study of a small town in South India confirmed these observations and further highlighted how waste work functions as a structure of violence against Dalits and Adivasis who have very few alternative work opportunities. While some upper castes are open to working in municipal jobs in the waste sector, the informal economy for waste is almost exclusively made up of workers from marginalized communities. Due to the lack of suitable economic alternatives, workers find it challenging to exit the sector, although they try their best to ensure that their children do not have to follow in their footsteps. In India's highly stratified society, waste collection, sorting, repurposing, repairing, recycling, and selling are stigmatized with underlying caste and class dimensions that inform the work in terms of space, tools, and resources.

Along with social stratification and caste-based discrimination, workers in the informal economy lack legal protection. As uneducated workers, they are often unable to correctly identify hazardous waste that may be detrimental to their health as well as that of others. Such hazards are exacerbated in the absence of adequate protective gear (Rastogi 2021). Further, vendors often face police harassment and are forced to pay bribes despite having the requisite paperwork. Jhabvala's (2021) commentary on street vendors of second-hand clothing noted that they were unable to find

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[5] Self-Employed Women's Association, a low-income, self-employed women's trade union.

[6] Scheduled Castes and Scheduled Tribes are two of the most disadvantaged socio-economic groups in India.

spaces in cities and were threatened with fines and physical violence for setting up illegally. They also faced restrictions in entering gated colonies to collect old clothes and were often asked for bribes to enter.

On the other hand, recyclers who have recently formalized, fear extortion and wrongful arrest by the police who expect formal recyclers to pay larger bribes because they own larger facilities (Rastogi 2021). Formalization brings its own set of challenges for waste workers since they have to meet stricter qualitative and quantitative goals and generally experience less freedom. For instance, formal units of Moradabad have to comply with government regulations, taxation, and labour laws and pay rent on a larger area (Rastogi 2021). Additionally, workers are often unable to exercise the knowledge gained from years of experience.

Although such irreplaceable knowledge maximizes efficiency and reduces the amount of waste dumped in landfills (Gutberlet & Carenzo 2020), informal reuse and repair work is often devalued in terms of value creation and labelled as "low-skilled" or "old-fashioned" (Corwin 2017). Bhattacharya's (2018) study of Mayapuri's car parts dealers revealed that their jobs are highly specialized with a fairly organized division of labour, where earnings are proportional to the skills required for the changes. Much like factory work, each labourer usually specializes in a single task. Similarly, most workers involved in e-waste recycling possess specialized skills attained through experience and are always innovating. Innovation is connected with the idea of jugaad, meaning that the workers are open to tinkering with objects to extract the maximum value from them (Corwin 2021). Informal waste processing in India largely relies on such specialized skills to derive the last bits of economic worth from waste.

7

Photo Credit: Rashmi Choudhary

Looking ahead, the informal e-waste sector has massive potential that can be realized with adequate government support. Excluding workers in the informal economy from the rule books often threatens the "right to waste", while the unavailability of reliable data on their work invisibilizes their contributions (Rathore 2020b). As migrant workers and non-voters in their constituency, informal waste workers can rarely act as a pressure group (Bhattacharya 2018). However, there have been some efforts to organize, with waste pickers organizing themselves to pressurize the government to include them in official waste management programs (Dias 2016; Dias & Silva 2017; Gutberlet & Carenzo 2020). Cities like Pune, Bengaluru, and Delhi have made efforts to promote low-value circular activity by including informal waste workers in the municipal waste management system, allotting land for recycling work, and issuing identity cards that provide legal and social protection (Rathore 2020b). Instead of privatizing waste work, the government should officially recognize informal waste workers who have formed an integral part of the circular economy for decades and give them access to household waste.

To sum up, while the Global North views the circular economy as a solution to a host of ecological issues by redirecting resource flows, the approach to circularity in the Global South is not limited to such technological and governance aspects of resource management. The Global South faces a greater challenge of overcoming the hurdles of poverty and social exclusion in trying to ensure a more sustainable model of resource use (Gutberlet & Carenzo 2020). In the Global South, much like in the Global North in the past, transforming from a linear to a circular economy is a political process that must account for the interests of the various stakeholders involved, including addressing the informal sector where most of the waste management occurs (Chaturvedi et al. 2017). Despite their contribution to the circular economy and ecology, informal livelihoods face numerous risks, challenges, and discrimination, including an unfavourable policy environment.

The following section describes the purpose of the study, the research design and the methodology. The report then presents and discusses empirical evidence collected from the six case studies on the source and destination of the waste material processed by workers in the informal economy, the nature of the work process, the skills involved, reported earnings, contribution to waste prevention, and cross-sectoral/formal-informal linkages. Next, the report examines challenges, perceived value, and policy overview across the six case studies. The concluding section recognizes the contributions of workers in the informal economy to the circular economy and the environment and their positive social impact on the urban poor, while highlighting the stigma and invisibility associated with such informal livelihoods. Finally, the report highlights some considerations for future research to advance the recognition and protection of informal livelihoods in the circular economy.

Purpose and Scope of the Study

The study contributes to the discourse on the circular economy by shifting the focus to informal livelihoods and workers who are at the core of the circular economy in India. Select scholarship has documented informal livelihoods in the reuse of old cloth, e-waste repair and recycling, and car recycling; however, there are several other informal livelihoods embedded in the value chains of the urban circular economy that need to be identified and documented. While some recent research studies have explored informal livelihoods in the reuse and repair economy by focusing on one particular informal livelihood or sector, this study explores informal livelihoods across the urban circular economy to document the diversity of the informal reuse, repair and recycle economy and to highlight the cross-sectoral linkages between waste pickers, home-based workers, and street vendors.

The study is a first step towards building evidence on informal livelihoods in the circular city economy of Delhi. It has been undertaken by the Institute of Social Studies Trust (ISST) in partnership with WIEGO, driven by common mandates of generating research knowledge on informal livelihoods and marginalised communities, to secure more inclusive policies and regulations.

The objectives of the study are as follows:

Initiate an exploration of the role of informal reuse, repair, and recycle livelihoods in the circular economy through a study of the flow of material through the value chain.	*Initiate a probe of the challenges and opportunities for the development and preservation of these livelihoods.*	*Identify possible areas of evidence-based policy recommendations to foster an inclusive circular economy approach through an initial set of case studies from Delhi.*

The study is driven by three research questions to understand the key realities, contributions and challenges of workers in the informal economy.

Research Questions

1 *What is the nature of informal livelihoods in the urban reuse and repair economy?*

2 *What is the contribution of informal work to the reuse and repair economy?*

3 *What are the risks, challenges, and opportunities to improve informal work in the circular economy?*

The first question aims to identify some informal livelihoods in the reuse and repair economy in Delhi and to document the nature of the work process, skills used, and level of earnings. The second question aims to document the contributions of these livelihoods to waste prevention, the backward and forward linkages of waste flows to explore the circular flow of material, and the interlinkages between informal work and formal systems. The third question aims to unpack the challenges and risks involved in these informal livelihoods, and opportunities to improve the conditions of such informal work.

Research Design and Methodology

The study is a community-based, cross-sectoral, descriptive study, which makes use of a qualitative, exploratory case study approach that allows us to explore the complexities of the processes in the circular economy. This scoping study aims to explore and build evidence on diverse informal livelihoods engaged in the urban reuse, repair, and recycling economy.

In order to explore the role of informal livelihoods in the circular economy, the study faced the challenge of addressing the circular material flow in a large metropolitan city within a small scoping study. We needed to understand the waste value chain to build evidence on informal circular livelihoods; however, many of these waste materials have long, complex life cycles, moving through elaborate value chains, at times with global linkages. While the study remained focused on the livelihoods and workers in the informal economy, to address circularity, we designed the study to look at waste in a dynamic way by tracing the movement of waste materials to and from the worker in the informal economy to its next destination. This required us to trace the flow of waste materials one node backward and one node forward in the value chain, aiming to gather data on how the workers source the materials and where it travels next. Key informant interviews (KIIs) were conducted to bridge the gaps in our understanding of the flow of material and the afterlife of waste. Although the study was initially planned as a small scoping study to be completed in three months, further visits and deeper engagement with the workers and stakeholders were required. This, in turn, allowed for documentation and evidence-building far beyond the remit of a scoping study.

Delhi was selected as the field site due to its vibrant reuse and repair economy. The participants were workers in the informal economy (waste pickers, home-based workers, street vendors), key stakeholders, and ground-level experts engaged in repair, reuse, and recycling work. The selection of the participants was guided by our local partners, i.e., community-based organizations. This decision was made considering the difficulties in reaching workers in the informal economy, whose work is typically carried out on the streets. Additionally, it was done with the intention of exploring potential opportunities for fostering collaboration and solidarity among various informal stakeholders involved in the circular economy across different sectors.

The study used several methods to collect data: semi-structured, in-depth qualitative interviews and interactions with workers in the informal economy; observations of individuals or groups of two to three workers when workers were working in clusters; interviews with key stakeholders who provide raw/ waste material to the workers and who buy or use the products and services provided by the workers; and additional KIIs with ground-level field experts as required in each case study. On an average, for each case study, five to six workers were interviewed, along with three to six interactions (not full-fledged interviews) with workers individually or in small groups. Additionally, researchers also conducted at least one interview and/or three to eight interactions[7]

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[7] It was particularly challenging to interview consumers of reuse and repair goods in the street market. These were rarely sit-down interviews and more often were interactions with consumers individually or in small groups while they were shopping.

with key stakeholders to map one node of backward and forward linkages. The data was collected between May and June 2022 and was facilitated by WIEGO and ISST's partner community-based organizations – Basti Suraksha Manch, SEWA Bharat, Action India, and Community for Social Change and Development. Moreover, literature and policy review has been conducted to understand the impact of policies on the livelihood of workers in the informal sector in the circular economy.

All research ethics were maintained during the course of data collection; respondents were informed about the purpose of the research and the researchers. Due verbal consent was taken for each respondent's participation in the study and before recording the interviews. The names of all workers have been anonymized to protect their identity and due permission was taken from the rest of the respondents for use of their names in this report.

The selection of the cases was based on a literature review and a mapping exercise of the various informal reuse, repair, and recycling livelihoods in Delhi. The rationale for selection was the following:
- To capture the diversity of the informal reuse, repair, and recycle economy
- To highlight the cross-sectoral linkages between waste pickers, home-based workers, and street vendors (both mobile and stationary)
- To highlight the formal-informal linkages, forward-backward linkages, and connections with local markets and global supply chains.
- To capture the impact of disposable culture and circular economy policies
- To capture the diversity of scale and diversity of place of work – whether market, streets, or informal settlements and slums.
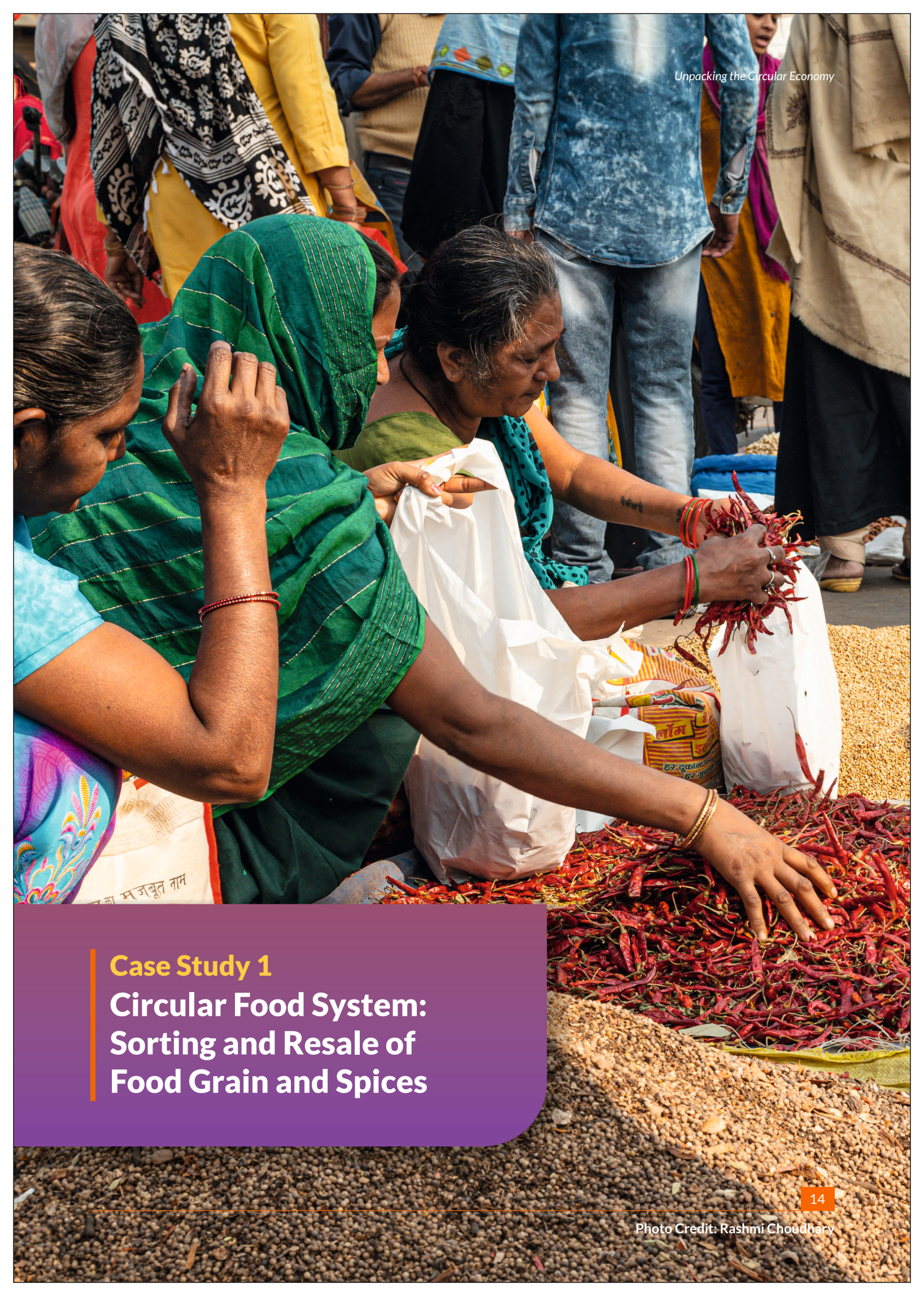
Six livelihoods were identified in consultation with the WIEGO team to capture the diversity of the informal reuse, repair, and recycle economy.

Table 1: Details of case studies

Theme	Case Study	Sector	Field Site	No. of Respondents*		
				Workers	Linkages	KIIs
Reuse	Sorting and resale of food grain and spices	Waste collection, home-based work, street vending	Sadar Bazaar	5 & (4)	2 & (7)	2
Reuse	Resale of electronic goods	Street-based vendors	Raghubir Nagar	6 & (6)	1 & (8)	2
Recycle	E-waste dismantling	Home-based work	Seelampur	5 & (6)	2	1
Recycle	Upcycling of old clothes	Home-based work	Sewa Ruaab	6 & (3)	(3)	1
Repair	Repair and resale of shoes	Street vending, home-based work	Sundar Nagari	6 & (4)	(7)	1
Repair	Knife sharpening	Street-based vendors	Kapashera & Seelampur	4 & (1)	(6)	

Note: The numbers in () indicate the number of interactions; while the other numbers indicate the number of interviews.

Case Study 1
Circular Food System: Sorting and Resale of Food Grain and Spices

Photo Credit: Rashmi Choudhary

India is the second-largest food producer in the world but on the Global Hunger Index 2022, India ranked 107th out of 121 countries, with a level of hunger that is "serious" (Chandra, 2022). India faces the paradox of an abysmal hunger index and high food wastage. This case study traces the life cycle of food grain waste: how it flows, the processes through which it gets transformed, and its afterlife. The site for this case is Sadar Bazaar in old Delhi, which is a major private food grains and spices trading market in India.

In the wholesale market, food grains and spices are transported, stored, and displayed in large jute bags. There is a lot of spillage and wastage of grains, pulses, and spices during storage (rodent infestation), transportation, taking samples, display, weighing, and selling. This mix of spilled, wasted, and discarded food grains and pulses are collected/bought by the workers in the informal economy from these wholesale shops and godowns, which they clean, sort, and resell in the local Sunday market to small retailers, migrant men, and lower-income households. The majority of workers engaged in this work are migrants from the Munger district of Bihar, many of whom belong to the Dalit fishing community.

Sources and Forms of Food Waste

The markets of Naya Bazaar, Khari Baoli, and Siraspur generate food waste during storage and trading, but in a mixed form that requires intensive labour to make it reusable and sellable. The traders and shopkeepers are not willing to invest the money and labour required to clean and separate this waste into usable components and simply choose to discard it.

There are different kinds of waste which are generated in these wholesale markets as listed below:

1. A mix of different kinds of lentils, which is known as *sakeran*. Also, a mix of larger pulses, such as kidney beans and chickpeas

2. Grains that spill onto the shop floor in Naya Bazaar due to improperly packed bags or tears caused by rodents, mixed with other food grains as well as contaminants like dust

3. Grains that fall on the ground during the process of loading and unloading outside the shops on the roads of Naya Bazaar

4. Mixes of spices or a single spice mixed with contaminants caused by rodents tearing into bags at the shops in Khari Baoli

5. Food grains that fall onto the floors of *godowns* during transportation or as a result of improper storage at Siraspur and Lawrence Road

6. Samples of food grains kept on display that can be collected/bought/begged from shops in Naya Bazaar

7. Waste collected from garbage dumps in and around the market through scavenging and begging

Wholesale shops and *godowns* in these above-mentioned markets are the source of waste material for workers who process and resell discarded food products. Traders, *palledaars* (labour for loading and unloading) and *safai karamcharis* (cleaners who work at the food markets and are responsible

for handling the waste generated) are the intermediaries from whom the waste material is sourced by the workers. Women workers, predominantly from nearby slums, go to wholesale markets at around 4 or 5 a.m. and sweep up the food waste scattered around the shops. The workers negotiate their continued access to the waste material by bribing the drivers, *palledaars*, or *safai karamcharis* in the market.

A trader, Anant, remarked that approximately 10-12 kilos of *sakeran* is produced in a week, despite his best efforts to minimize this loss. Over the years, due to increases in prices, traders and shopkeepers have started exercising greater control over the amount of waste generated and the price at which it is sold. The *sakeran* is sold for around Rs. 30-35 per kilo depending on its composition, with the workers having no bargaining power to influence the prices.

Restoring Value to Food 'Waste'

The wasted food is obtained by collecting, buying, sweeping, begging, or scavenging. Through a series of operations (cleaning, sorting, segregating and grading), workers convert the discarded items into valuable products that are further sold in the market. The workers engaged in this work are clustered in a slum/basti near Sadar Bazaar's wholesale market and they work out of their homes or use the nearby railway tracks for their work. Access to open spaces is crucial for their

work, while their homes double up as spaces for work as well as storage of their inventory.

Different types of food waste require different processes for sorting and segregating depending upon their size and composition. Suresh is a man in his late 40s living in the basti who procures, processes, and sells dry red chillies. He is an own-account worker who engages family labour as well as hired labour, i.e., his wife and two women who work for a daily wage. He elaborated:

> *We buy it [food waste/dry red chillies] from the cleaning operative at the market like the one who is assigned to the market. They collect the leftovers that are outside the shops in the market and sell them to us. So we get material on all five days but that material is not enough and that's why we work on it for three days like I am telling you my personal way, we will clean it on Thursday, Friday and Saturday and then sell it on Sunday." – Suresh*

The food waste undergoes multiple stages of processing before being sold in the local street market. In Suresh's case, the chillies are first cleaned by winnowing to remove loose threads and bits of paper. The second step is separating large pieces of chillies from the mix by hand, which is called *chaatna* (separation). The third step is sieving; sieves of different mesh sizes are used to separate leaves, seeds, dirt, and sand. This is done by using sieves of different sizes. The next step is *fatakna*; the remaining mixture is put on a *soop* (winnowing fan) and tossed to remove the *kankad* (small stones). At the end of these steps, three different products are recovered: dry red whole chillies, chilli seeds, and small broken chillies or flakes.

Mixed spices are processed similarly. Another own-account worker, Dinesh, buys bags of discarded mixed spices. He hires one or two women as wage labour to clean and sort this mixture depending on the amount of waste material collected. Larger spices like *tej patta* (bay leaves), *dalcheeni* (cinnamon), *haldi* (turmeric), and *badi elaichi* (black cardamon) are separated by multiple rounds of hand picking, while smaller spices like *laung* (cloves) and *jeera* (cumin) are separated using sieves of different sizes. A *soop* is used to separate dirt and pebbles.

There is gendered segregation of the work process, with women more often being assigned the tedious and time-consuming task of hand-picking chillies, while men do the sieving. Integration into the work process is also different; women are often hired as wage workers or provide unpaid family labour, while men are usually contractors who hire other workers and are capable of securing higher earnings for themselves compared to women workers.

The mode of accessing food waste determines the quality and quantity of the items that they receive as well as how much value they can generate from it. There is a hierarchy among workers engaged in food waste processing. Some women go early in the morning at 4-5 a.m. when the market is closed and sweep the grains lying in front of the shops, others clean the shops in exchange

Photo Credit: Rashmi Choudhary

for *sakeran*; however, the most common practice is to buy *sakeran*. Own-account workers like Suresh and Dinesh buy the waste material from markets and then process it with the help of unpaid family labour. Waged labour working under Suresh and Dinesh may directly procure re-sellable waste materials from the market. Another group of workers collect/buy the waste swept up from in and around the shops. The hierarchy is reflected in their differential earnings, the scale of operations, and living and working conditions. While own-account workers like Suresh and Dinesh live in the *basti*, workers like Kanti, who collect *sakeran* by sweeping it off the floor, live on the side of the bridge under a temporary tarpaulin structure. At the bottom of the hierarchy are the workers who beg and scavenge for food waste in the market.

Learning by Doing

This work is based on common and shared community knowledge gained through the transfer of knowledge and skills among family members and relatives. The main mode of learning the work is through observation and practising the work from a very early age. The work involves the use of minimal traditional tools as well as one's hands for segregation. Tools like sieves of different mesh sizes are used to separate different components, a winnowing fan or *soop* is used to separate dirt and dust *(garda)* from the products, and a broom is used to sweep up the *sakeran* or waste material. Over the years, the workers have developed an understanding of which tool is the most appropriate for segregating a particular mix of pulses or spices.

> As Atul remarks, "Wherever I worked, I gained this knowledge by working there and then I developed the skill myself. If I would have not worked then I would have never developed this wisdom".

Over the years and through practice, workers also learn the art of negotiating and bargaining with traders as well as customers.

Destination of Restored Food Commodities

Following from the discussion above, the recycled food grain market functions on the nexus of producers – workers – consumers. This section discusses the consumers of the end product, which is sold in Sadar Bazaar market on Sundays. The buyers include people buying for household consumption, small traders/ shopkeepers buying for further sales, event planners/ organizers looking to buy cheap products in large quantities and people buying low-quality products for animal feed.

Prakash, a small retail shop owner from Dwarka, buys products like dry *lal mirch* (red chillies), fryums and papad (dry snacks), and *dhania* (coriander) for his shop. At one time, he buys approximately one quintal (100 kgs) of *lal mirch* (red chillies) from Suresh, who is a relative. His main reason for buying products from this market is the cheaper prices.

Customers from both near and far areas of Delhi NCR[8] also visit the market to fulfill their domestic consumption needs. One group of women said that they shop at these markets because, unlike the nearby wholesale shops, they can get smaller quantities at lower prices. According to them, prices are very high at the grocery/ department shops in residential areas; if they get a saving of 10-15 rupees on a product, it makes a significant difference to their food budget.

The Sunday market at Sadar Bazaar is popular for four main reasons: the goods are cheaper than in other markets; the goods are kept open and not packaged so people can assess the quality of the product; there is flexibility in the quantity one can buy; and there is scope to negotiate prices.

The Scale of Processing Food Waste

The scale of work undertaken by each worker depends on the amount of capital invested to source

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[8] It refers to a planning region including Delhi and several districts from the surrounding states of Haryana, Uttar Pradesh and Rajasthan.

the waste material. Those who have enough capital to buy the materials can function at a higher scale than workers who collect waste material via sweeping or begging who operate at a much lower scale. Even among those who buy waste material, some operate at a higher scale than others.

Own-account workers who buy waste and also employ labour, like Suresh, work with comparatively larger quantities than other workers. In a good week, Suresh can buy 20-40 kilos of product per day and he gets approximately 2.5 quintals processed in a week. From this material, he can generate approximately 50 kilos of chillies as the processed product that can be further sold. The product bought for Rs.2,000 can be sold for roughly Rs. 5,000.

Photo Credit: Rashmi Choudhary

Ankita and Pooja are both separated women who work as small own-account workers (working only with family labour) and manage to get 30-40 kilos of product in a week; after cleaning, sorting, and grading it, they earn roughly Rs. 1,000-5,000 a week. Pooja also works as wage labour at Suresh's unit to supplement her income. Many of the workers who work in this sector usually have another stream of income to offset the insecurity and vulnerability in gaining steady access to materials in this sector.

Case Study 2
Waste to Wear:
Repair and Resale of Shoes

Photo Credit: Rashmi Choudhary

The circular economy aims to reduce the use of virgin material as well as waste generation via recovery routes for post-consumer waste (Singh & Ordoñez 2016). The repair and resale of old shoes is one such crucial recovery route. This case study maps the process of buying old shoes and sorting, cleaning, repairing, and reselling them in different local markets. The work of repairing shoes is concentrated around Sunder Nagri, which is one of the largest resettlement colonies in Delhi. It is home-based work carried out by women and men in small, cramped homes in informal settlements. The repaired shoes are then resold by these workers at different street markets across Delhi. In Sunder Nagari, this work is predominantly done by the migrant Mochi community with their ancestral roots in villages near Bhopal in Madhya Pradesh. While their ancestors performed the stigmatized labour of working with leather, their work has now evolved into repairing and reselling old shoes.

Sourcing Old Shoes

Workers purchase old shoes from different street markets across Delhi. One such market is in Sunder Nagari and another prominent source of old shoes is the street market in Raghubir Nagar. The vendors at the Raghubir Nagar market, also known as *pheriwalas* collect old shoes, clothes, and electronics from residential colonies across Delhi NCR and sell them as they are or with minor repairs. The workers in the informal economy source different kinds of shoes, from flip-flops and sandals to sports shoes and leather shoes from these markets. These shoes are sold by *pheriwalas* at rates as low as Rs 10-100 with a markup of around Rs.10-30, depending on the condition of the shoes, with branded shoes commanding higher prices.

The workers select old shoes that are in good condition and bargain for a good price based on the condition of the shoe. Another factor in selecting shoes is the skill of the worker. As one old woman worker (Daya) explained her choice of shoes: *"Those goods that need less work. Like I know how to stick the sole. So I will take those shoes that I can easily work on. And I won't take those that need a lot of repair because I don't know that work. So somebody else will take those shoes."*

The Work of Repair

The repair of old shoes involves different stages. The first stage involves visiting local markets to buy old shoes, sort out shoes in good condition, negotiate the price, and buy shoes; the second stage involves washing them, drying them in the sun, and repairing them; and the final stage involves reselling them in the local market. The repair work depends on how damaged the old shoes are and the kind of work required to make them look new. The repair work starts with thoroughly cleaning the shoes with water and detergent; then they are kept in the sun to dry. The next step is to mend tears and damage on the soles and sides which can be repaired by pasting using strong adhesives. For some shoes, parts such as Velcro, buckles, or the sole need to be replaced and leather, rubber, net, or cloth patches need to be fixed using cheaply sourced matching material that would blend in with the shoe. After this, the shoes are polished and laces are put on before they are sold.

There is a gender division of labour in the tasks. Washing is primarily done by women and avoided by men. Both men and women handle the repair and resale of shoes, but major repairs are done by men while women limit themselves to minor repairs. Children may also help to polish the shoes. Some single or widowed women handle the entire process; Daya, for example, is a widow who lives alone in a rented room and does all the work herself from cleaning to repairing and mending.

Since this work primarily takes place inside homes, space for working and storage is a constraint. Thus, the amount of work that one can do is affected by the amount of space available to them. Workers who operate on a larger scale can rent a separate room for this work and even hire wage labour.

Combining Community-based Knowledge and Innovation

Repairing and restoring old shoes to give them a fresh appearance and resale value requires significant skill and innovation. The repair process involves skill and finding creative and

resourceful solutions to fix the shoes using minimal and affordable resources. For example, scooter mats are used to patch up the shoe soles, and stretchable mesh commonly found in undergarments is used to replace the cloth at the front of sports shoes. Workers emphasize that this work demands both '*hunar*' (skills) and '*karigari*' (craftsmanship). Various tools and products, such as adhesives for pasting, scissors, sharp flat tools known as *kataar* for cutting, and *regmaar* (sandpaper) for finishing, are employed in the shoe repair process.

Due to the fact that most workers come from families that have been involved in the same trade for generations, they acquire the necessary skills from a very young age through observation and practice. Workers also need to learn the art of assessing the condition of old shoes and negotiating fair prices when purchasing and selling them. These skills are developed over time through experience and practice.

Photo Credit: Rashmi Choudhary

Selling Repaired Shoes

Delhi boasts of several weekly street markets where second-hand shoes are sold such as Kabadi Bazaar, Mahila Bazaar, Gokulpuri, and Bhajanpura. The act of setting up stalls and selling shoes in these markets is a tedious, exhausting task, for which workers have to brave extreme weather conditions as well as engage in tough price negotiations with customers. Due to such challenging circumstances, older women are unable to access the markets.

In Kabadi Bazaar, vendors can either place their stalls inside the market or they move around on the main road in front of Red Fort carrying their products in a cloth bag *(gathri)* on their backs. Vendors prefer to sell shoes "on the run" since this market is in a constant state of disruption due to regular evictions by the police and civic authorities. While they are on the move, vendors look for customers such as tourists visiting Red Fort and stop for a few minutes to show their goods and strike quick deals. Although Kabadi Bazaar is more lucrative as it is near a prominent tourist location, older women workers lament

that their ageing bodies no longer allow them to visit such large markets where they need to hustle instead of settling for the less lucrative and more peaceful local markets. One woman vendor from Sunder Nagari said that even after doing all the repair work, she is often willing to sell the shoes at a markup of as little as Rs. 30-40, because she is desperate to sell her goods. Sales also depend on weather conditions, with the summer months seeing lower sales due to low footfall of customers and low demand for shoes.

Mahila Bazaar, on the other hand, provides a comparatively secure place for vendors because it is set up by SEWA and there is no harassment by the police or civic authorities, thus reflecting the power of collectivization in securing better working conditions. Customers in Mahila Bazaar include autorickshaw drivers, rickshaw drivers, security guards, and members of low-income families living nearby. Some customers feel that this market provides good quality, durable shoes as an alternative to buying expensive new shoes, while others believe that since these are old, repaired shoes they should be cheap. As a result, vendors have to undergo tough price negotiations with the customers, with deals falling through for very small margins.

26

Photo Credit: Rashmi Choudhary
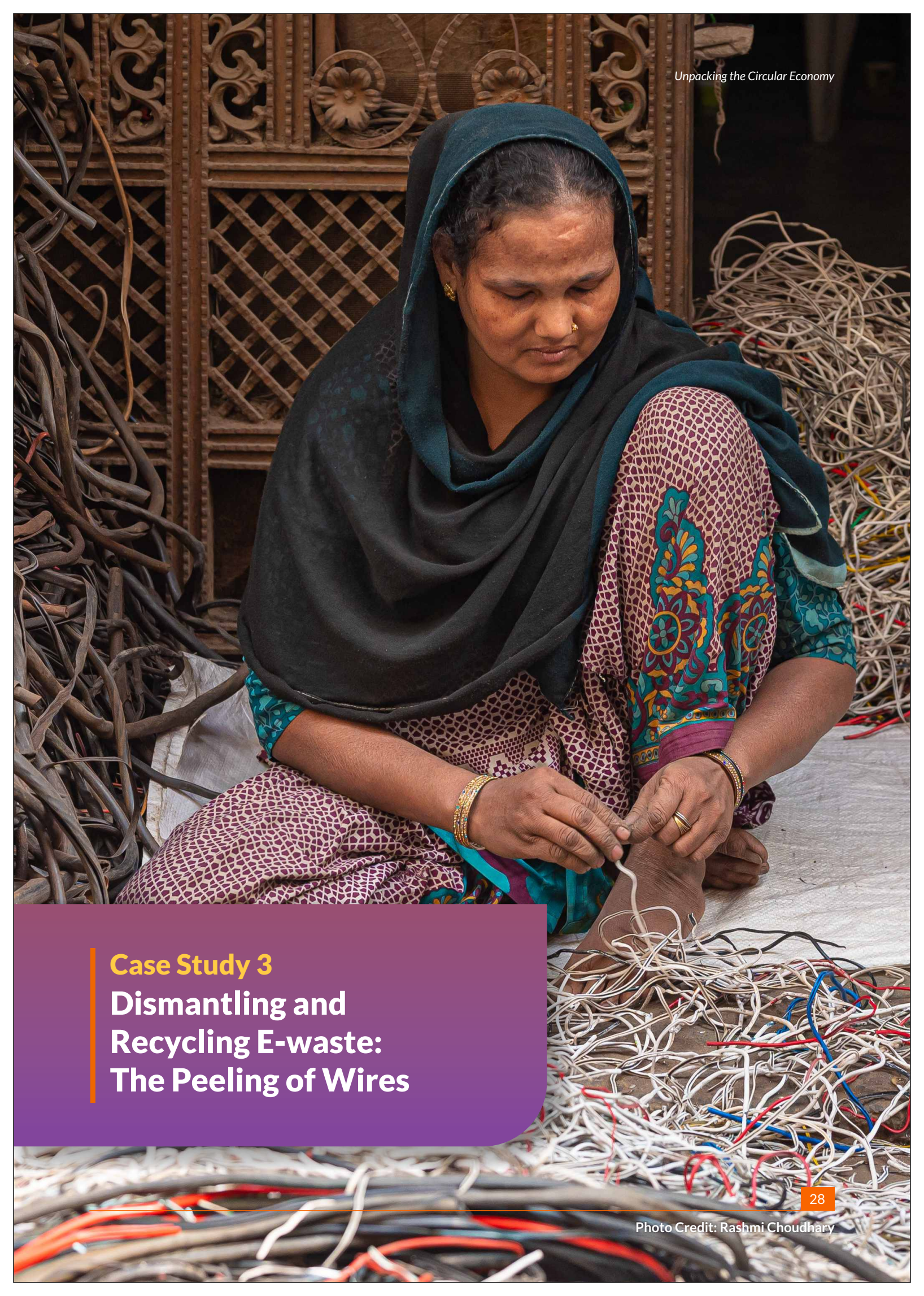
The Scale of Repair and Resale of Old Shoes

There are two sides to the work done by workers in repairing shoes. On one side are factors relating to how much work they can do, which is contingent on age, gender, number of family members involved in the work, and cash in hand to invest. On the other side, are factors related to how many sales they can make, which depends on access to markets and weather conditions. These two together determine the scale of operation for informal shoe repairers.

In a sourcing visit, most workers buy 2-3 pairs of shoes, depending on the money they have and the condition of the shoes they find in the market. The price can be as low as Rs. 20-30 but on average it is Rs. 100-150, depending on the condition, type, and worker's ability to repair the shoes. Flip-flops and floaters are generally available at cheaper prices than sports and leather shoes. Some workers engage in the work on a larger scale and have rented a room or a workshop space to carry out the repair work. This work is either done by family labour alone or with additional hired wage labour, thus increasing the scale of work.

On the side of sales, workers said that in the summer months, they can sell a few pairs in the market. At one time, they can sell 2-4 pairs of shoes, but there are also days when they are not able to make any sales. Sales are usually dismal in the summer months and pick up in winter months. Further, the street vendors placing their stalls in the Kabadi Bazaar or selling on the run have better chances of making sales than vendors who only go to the weekly markets. The earnings from sales determine the availability of capital to further invest in inventory, i.e., how many shoes they can buy and repair, thus determining the scale of operation.

Case Study 3
Dismantling and Recycling E-waste: The Peeling of Wires

Photo Credit: Rashmi Choudhary

A more digital and connected world has also created one of the fastest-growing waste streams in e-waste. India generates more than two million tons of e-waste annually and also imports undisclosed amounts of e-waste from other countries around the world.[9] The majority of India's e-waste is processed by a widely distributed network of workers in the informal economy who collect, dismantle, and recycle it. Dismantling involves breaking end-of-use equipment into its components and segregating them for convenient recycling.

In Delhi, there are several interconnected hubs where e-waste dismantling occurs. One notable hub is Seelampur, which is the largest e-waste dismantling center in India. Seelampur has emerged as a thriving market for electronic waste, supporting an estimated 50,000 people who earn their livelihood from this sector. This unorganized industry has successfully diverted tons of hazardous waste from landfills while providing livelihood to millions of people, but some of the challenges are the environmental and health risk emanating from their activities (Toxics Link, 2018).

This case study examines a specific task in dismantling e-waste, i.e., separating the wires from their coating (usually plastic) for reuse. The site is New Seelampur, a resettlement colony in Delhi with a large Muslim population. Wire dismantling is largely performed by members of the migrant Muslim community from Badayun and Bulandshahr districts of Uttar Pradesh and some districts of Bihar such as Munger. The women do wire peeling as home-based work, while men peel wires in groups on the by-lanes and streets of New Seelampur.

Sources and Destinations of Wires

Several suppliers/dealers are located within the New Seelampur area. They procure the material, that is, the rolls of wire, from places such as Meerut, Srinagar, Bhopal, Faridabad, and Delhi, and also through shipping ports. The dealers bring the wires to their godowns (warehouses) in New Seelampur and then supply them to women who peel them from their homes. After the peeling is done, they pick up the PVC and metal from the houses.

There are various kinds of complex work arrangements between the suppliers/contractors and the workers. Salman engages in two kinds of work. One, he supplies wires to the houses of women and after it is peeled, he collects the separated PVC and copper. Two, he works in the godown with his brothers to dismantle and separate the components of thin or broken wires that cannot be done by hand. Another dealer, Sohail, owns a house in the New Seelampur area. The ground floor of the house consists of one room that is used to store bundles of wires. The upper floors are leased to families who also perform peeling for him; one young tenant works as a supervisor and oversees the loading and unloading of wires. Sohail hires one male worker to do some wire peeling; the worker also supplies the wires to different houses and then collects the separated products. Most dealers process 1.5-12 tons of wire in a month depending on the space and money available to them.

In the *godowns* like the one owned by Salaman, the wires are put through a machine to separate the

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9   https://scroll.in/article/913428/in-india-e-waste-recycling-comes-at-a-heavy-cost-to-workers-health-and-environment
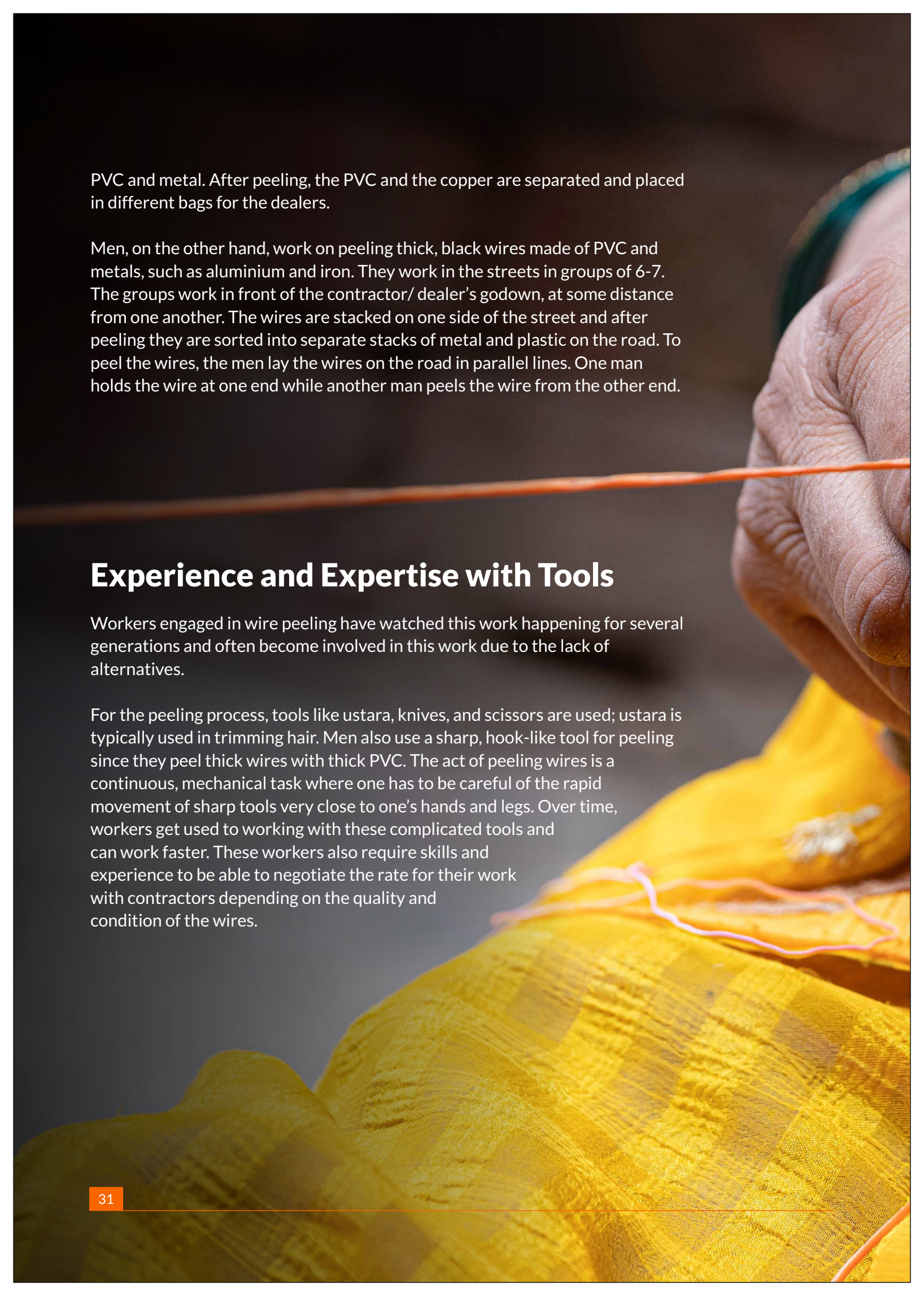
Photo Credit: Rashmi Choudhary

metal and the plastic; it generates a mix of metal *choora* (dust) from the copper and plastic beads *(daana)* from the plastic. Women workers are hired to separate the plastic beads and the metal parts as well as the metal dust from other types of dust by immersing the mix in water *(dhulai)* and then using a sieve. The copper that they collect is in different forms, that is, copper strands from the wires, copper bits from the machine, and copper dust, which are sold further. The rate of copper depends on the overall exchange rate of the metal and they receive this information through a WhatsApp group. The rate of copper is generally around Rs. 780 for a kilo. This metal is sold to metal shops in the same area, from where it goes to kilns to be made into *sillis* (brick-like shapes) or rods and then used to make copper products. The plastic beads are sold to plastic processing units outside Delhi and are used to make flip-flops and helmet parts.

Peeling the Wires

Men and women work on different kinds of wires as well as from different workspaces. While women collect wires from ironing presses, coolers, fridges, and washing machines, men work on wires that are used to connect electric poles. Women work from home, whereas men work on the street.

Women peel the thin wires in their homes along with other female family members. In New Seelampur, homes consist of one large room where the women work with other female family members, live, and sleep. Sheena, who peels wires from her home with the help of her three daughters, follows this arrangement. They stretch one leg, wrap the wire around their toe ,and start peeling the PVC (plastic) off the wire with a sharp tool. This requires strength, which is why the wire is anchored to the toe; Sheena explained that younger children anchor the wire by tying it to the door. Each wire is peeled multiple times because even a thin wire contains multiple layers of

PVC and metal. After peeling, the PVC and the copper are separated and placed in different bags for the dealers.

Men, on the other hand, work on peeling thick, black wires made of PVC and metals, such as aluminium and iron. They work in the streets in groups of 6-7. The groups work in front of the contractor/ dealer's godown, at some distance from one another. The wires are stacked on one side of the street and after peeling they are sorted into separate stacks of metal and plastic on the road. To peel the wires, the men lay the wires on the road in parallel lines. One man holds the wire at one end while another man peels the wire from the other end.

Experience and Expertise with Tools

Workers engaged in wire peeling have watched this work happening for several generations and often become involved in this work due to the lack of alternatives.

For the peeling process, tools like ustara, knives, and scissors are used; ustara is typically used in trimming hair. Men also use a sharp, hook-like tool for peeling since they peel thick wires with thick PVC. The act of peeling wires is a continuous, mechanical task where one has to be careful of the rapid movement of sharp tools very close to one's hands and legs. Over time, workers get used to working with these complicated tools and can work faster. These workers also require skills and experience to be able to negotiate the rate for their work with contractors depending on the quality and condition of the wires.

32

Photo Credit: Rashmi Choudhary

Earnings from Wire Peeling

For women, the scale of work varies because they do not have definite hours or a fixed number of workers. Sheena says that the rate they get for a wire depends on the kind of wire and how straight, dirty, tangled, and thick it is. The rate varies between Rs. 5-10 per kilo and, on average, they earn Rs 250 to Rs 400 a day. Sheena, a single mother, sustains her household with this work and peels around 50 kilos a day. Sometimes, her daughters also work with her and they can peel up to 200 kilos a day. Kashi, a young woman who does this work with her mother and sister, can peel around 20-50 kilos (depending on the material) in a day. She does much less work than Sheena because Kashi's household has an alternate source of income where her father works as a construction labourer.

Men are also paid according to the weight of the wire they peel at around Rs. 1-3 per kilo. One man explained that they prefer to be paid by weight rather than on a daily rate because this gives them more autonomy. They can make Rs. 400-500 a day.

The work is often erratic and they are unable to get continuous work. Sometimes, men do not have any work for a stretch of 20 days. However, this is not the case with women who get continuous work from different dealers and suppliers. While women get higher rates for peeling because their work is more challenging, men can get more work done during the day.

This process of dismantling e-waste into metals and plastic and further using these extracted products represents circularity in resource usage. From suppliers/contractors to dismantlers, the workers keep in motion the flow of products from waste to production.

Case Study 4

Reclaimed Gadgets:
Resale of Electronic Goods

The resale of electronic goods provides another avenue for managing discarded electronic waste. The used electronics economy plays a critical role in redirecting so-called "waste" back into use, either by producing new products from used parts or through resale (Corwin 2021). There is a growing second-hand market for electronic goods and devices in India for several reasons: a change in the consumption pattern of the average Indian upper- and middle-class population post-liberalization, shorter product life cycles with lower durability, increased mobility and relocation of the working population[10], and fast-changing technology that makes electronic goods obsolete. These have heightened the disposable culture of 'use and throw'. However, the resale and repair of electronics have come into focus due to the proposed Right to Repair law[11] by the Government of India, which seeks to give more control of electronic products to consumers and break away from the producer's monopoly over the product. Against this backdrop, it is important to recognize the contribution of the vast repair and resale electronics sector in India. This case study focuses on the return of electronic waste into commodity circuits through informal reuse and repair livelihoods.

Raghubir Nagar is one of the markets in Delhi where old electronic goods are resold. Workers in the informal economy collect old electronics via pheri from residential colonies across Delhi NCR. The electronics undergo some minimal repair and are then resold in the local street markets.

Collection through *Pheri*

Old electronic goods are generally collected through *pheri*, a term that means "to roam for barter/trade"; hence, the people who perform this trade are called pheriwalas. In Raghubir Nagar, the *pheriwalas* are migrants from the *Devipujak Waghri* community in Gujarat that trace their roots to pre-independence provinces in Pakistan. Members of this community maintain close ties with their native villages, although they are not a land-owning community and have traditionally worked on other people's land for a wage.

Workers who collect/barter electronics, generally source these products from middle-class and upper-class households in Delhi NCR. These products are collected in exchange for utensils and in very rare cases for money. Households give away their old electronics when they stop working or if they buy newer models. *Pheriwalas* develop long-standing relationships with these households that they rely on to make a trade.

Ati, a homeowner in the Kamla Nagar area, says that she generally gives away products like chargers, tape recorders, blenders, and mobile phones. The exchange takes place after roughly estimating the value of the goods exchanged. The *pheri* vendors give higher value utensils such as non-stick pans or pressure cookers in exchange for electronics. This exchange takes place through multiple negotiations regarding the number of commodities (clothes, electronic goods, etc.) that need to be exchanged in return for utensils. During festivals like Diwali when people clear old items

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[10] https://economictimes.indiatimes.com/industry/services/retail/the-story-of-indias-rs-60000-cr-second-hand-market-minus-cars-and-bikes/articleshow/10533326.cms?from=mdr

[11] https://timesofindia.indiatimes.com/gadgets-news/explained-what-is-the-governments-proposed-right-to-repair-law-and-why-it-is-good-news-for-you/articleshow/92902844.cms

from their homes and buy new goods, the households exchange more goods with *pheri* workers or give them away to domestic workers.

Repair and Resale

The electronics collected in *pheri* can range from large household electronic goods like TVs, washing machines, refrigerators, microwaves, and ovens to small electronic items such as mobile phones, mixers, hand blenders, clothes irons, and tape recorders. The quantity and types of electronics collected in *pheri* are varied. As Geeta ben from SEWA noted, it was only in the past 15 years that *pheriwalas* have started taking electronics in *pheri*. Earlier, they only took clothes and shoes but watching *kabadiwalas* make good returns on electronic goods, the pheriwalas also started accepting electronic goods on *pheri*. Describing their work, Tasha a *pheriwala* said,

> *The rich people (badi kothi wale) give it in scrap and we take it from them and we have our customers who come and buy from us. They ask us to bring expensive utensils for them like cookers, dinner sets or plates. So, we try and get these things for them, like someone gives an old mixer with old clothes, old watches, mobile, fan or fridge. We sell things like these to our customers and if it isn't sold, we give it in scrap too.*

These products can either be in good working condition or need repair. Most of the electronic goods collected in *pheri* are sold as is in local street markets depending on their condition. In the case of mobile phones, some workers may disassemble them to take out batteries and chips that they want to sell separately. Sometimes, workers get electronic goods that are in good condition and require minimal repair; they get these repaired by local electricians for a small sum of money while taking into account their profit margin. Few workers repair electronic goods on their own; those who do are almost exclusively men who, over the years, have picked up the skills on the job or young men who have learned minor mobile phone repair work. Hence, repair work is done exclusively by men or by engaging professional repair workers, depending on whether there is potential for profit after paying the repair worker. On the other hand, it is women who do the *pheri* because they get easier access to houses. While some men also go for *pheri*, predominantly it is the man who stays back to manage the care responsibilities at home while the woman goes on *pheri*.

Traditional Knowledge and Acquired Skills

The work of *pheri* has been carried out by the Devipujak Waghri community for several generations which has allowed workers to learn from their elders. There are many aspects of skill in *pheri* work. One aspect is that they have to roam around and call out loudly to attract the attention of householders. Second, they have to determine how many clothes or electronics they have to take in exchange for the utensils that they give. This includes estimating the prices at which they will be able to sell the collected products against the value of the utensils they are giving out to calculate their profits. These workers need to implement strong negotiation skills both while collecting products and while selling.

Over the years, men have acquired basic repair skills. These skills are also acquired through observing their elders and learning from workers who do professional repairs. In the case of mobile phones, it is particularly the young men who have picked up the skill of repairing mobiles. However, engaging in the trade of old mobiles carries risks due to the constant fear of police action. This concern arises from incidents where stolen mobiles have been sold in the Raghubir Nagar market.

Destination for Reselling – Old Electronics Markets

The electronic products collected via *pheri* are sold at the Sunday market of Kabadi Bazaar near Red Fort and at Raghubir Nagar Market. Vendors set up stalls on the road by spreading a mat or a cloth. However, not everyone has equal access to these markets. Older single women doing the work alone find it difficult to go to faraway markets or markets that are under constant threat of police clampdown such as Kabadi Bazaar.

The customers for electronics products are people looking for old electronics at cheaper rates and repair workers looking for parts to replace malfunctioning parts of other electronic goods. The customers include tourists, apprentices/trainees, and e-rickshaw drivers. They come from nearby areas as well as from outside Delhi and have heard about markets like Kabadi Bazaar where they can get old electronics at cheap rates.

A couple of men from Rajasthan related their experience of buying electronics in Raghubir Nagar Market.

> We got four good cameras for very little money, it is possible that the product may not work properly but it is not much of a risk given the cheap rates.

They were also aware of how those commodities were sourced and mentioned that sometimes one can find very good products among them. Other customers at the market included a woman undergoing beauty salon training who was looking for low-priced hair equipment, an e-rickshaw driver looking for music systems, and many individuals looking to buy mixer-grinders for their households. All the products could be checked first at a shop behind the stall before buying. The prices of these products were highly variable and depended on negotiation between the customer and the vendor.

Scale of Resale of Old Electronics

The amount of electronic goods each pheriwala can get varies greatly. While they can get clothes on almost every visit, electronics are much rarer, sometimes as few as two in a month. Geeta ben noted that

> Earlier if it was 50%, now it is not even 25%. It was a good income back then but clothes have always been more in ratio. Also, because clothes anyone can give but electronics we get two in a month maybe.

The scale of operation also depends on the nature of the products collected. For instance, mobile phones are the most frequently collected products in *pheris*. This comes from the disposable culture associated with the consumption of electronics where older versions of mobile phones are made available in the market after short intervals of time. Larger products like TVs, washing machines, and microwave ovens are received very rarely.

The pricing of these products depends on their condition and model. For instance, basic, old model mobiles (not smartphones) are priced at around Rs. 50, and broken mobiles can be sold for Rs. 20-100. The storage chips of mobile phones are also sometimes sold separately, depending on their storage capacity, ranging from Rs. 100-200. Products in full working condition can be sold at much better rates than the ones with even minor defects, while non-working phones are sold as *kabaad* (scrap). The prices of all these products depend on negotiations in collecting/buying and selling the products.

Case Study 5

Restoring Value to Waste: Knife Sharpening

The work of sharpening knives, scissors, and other tools is an age-old profession in India. The process of sharpening involves repairing old products that have gone blunt and making them reusable. This is an important part of the circular economy because reusing these tools reduces the burden on metal resources.

The work of sharpening is largely community-based work done by the Muslim community. While members from different communities are involved in this work, Muslims have been initiated into this work through community and family links and have been trained in this work as apprentices. On the other hand, non-Muslim workers seem to have stumbled on this work after trying other jobs and electing to do this work perhaps due to the low cost of investment in tools and other inputs required to set up work. This is reflected in the fact that mobile workers in Kapashera Market who do not have a shop and work by setting up their tools and goods on a cycle are non-Muslims, while the Muslim workers have more permanent and stationary set-ups.

This case study seeks to understand the work of different kinds of sharpeners, that is, mobile sharpeners who roam the streets in residential areas as well as stationary sharpeners who work out of a small shop. This case study is conducted in New Seelampur and Kapashera areas near the Delhi-Gurgaon border.

Demand for Sharpening Tools

The customers for sharpeners consist of two groups of people. The first group comprises people getting daily household tools sharpened and the second group comprises people from various professions that use these tools on a regular basis such as barbers and cooks. The first set of customers does not get their products sharpened frequently since they only use them for regular household tasks. On the other hand, people who use products like *ustara* (sharp blade), knives, and scissors in their trade need to get them sharpened frequently due to the high rate of usage. For instance, workers who use *ustara* for peeling wires need to get it sharpened once a week.

Sharpeners who have a shop get regular customers such as salon owners, barbers, and wire peelers. These sharpeners also get household customers who want knives and scissors sharpened. In the case of mobile sharpeners, the majority of their customers are from households because they roam around in residential colonies. These vendors also stand in the evening Kapashera market, where they get customers from hotels and vegetable vendors in the market.

Both sets of customers prefer to get their products sharpened rather than buying new products since sharpening is cheaper. For people using these products in their trade, sharp tools are critical to the quality of their work and they cannot frequently buy new products. For instance, a new *ustara* costs Rs, 60, while it can be sharpened for Rs. 10. In this sense, it is profitable for them to get their tools sharpened rather than buying new products every time.

'Restoring' Knives and Scissors

The work of sharpening involves sharpening the blunt edges of knives, scissors, cutters, *ustara*

(sharp blade used by wire peelers), and *darati* (curved knife). There is some difference in the way stationary sharpeners and mobile sharpeners conduct their work.

Sharpeners with shops set up a rudimentary machine to sharpen blades. It consists of two large wheels placed on the ground parallel to each other. One wheel is made of stone and the other is made of a chemical alloy. The wheels are connected to an electric motor. The worker sits in front of the wheel and sharpens the blade of the tool on the wheel using a fluid movement of his hands.

Mobile sharpeners roam around areas like Kapashera and Dundahera. In summers, they start at 8-10 a.m., go home at noon for lunch, and return to Kapashera Market where they stay until 10-11 p.m. In winters, they can roam the streets for longer and take shorter breaks in the afternoon. One of the sharpeners said that they walk approximately 10 km a day. Mobile sharpeners work on bicycles. Products like knives, locks, and lighters are displayed at the front of the cycle. Behind the handlebars, there is a small wheel that is attached to the back tyre with a string. When the worker pedals, the back tyre rotates causing the small wheel to rotate and sharpen the tools.

Both sets of workers not only sharpen old tools but often sell new ones. Mobile sharpeners also sell new knives, locks, and lighters, while sharpeners with a shop make new scissors and sell hair salon products and equipment depending on their customer base. Unlike other work processes in the circular economy discussed in this report, the work of sharpening is mainly done by men. We did not encounter any women workers involved in the work of sharpening tools.

Apprenticeship and Skills

The work of sharpening is based on community knowledge, where the skills are learned and transferred through family and friends. All the workers we interacted with had been engaged in this work for more than 10 years. Of the four workers, two belong to the Muslim community and own a permanent shop, while two non-Muslims work as mobile sharpeners. One of the two non-Muslim workers interviewed learned this work from his father who also did the same work. The other non-Muslim worker has migrated from Nepal and learned this work from neighbours and friends.

The Muslim knife sharpeners have learned this work from their ustad, who is an expert in this field from the same community. They worked and trained with the expert, first as apprentices and then opening shops of their own. For Muslim sharpeners, the teacher-apprentice relation with their ustad is important for initiation into this work.

The work of sharpening is a skilled task that requires synchronized and steady placement of the hands and holding the product carefully against the circular motion of the wheel. If the hands are not steady, there are high chances of injury.

The Scale of Sharpening Products

The earnings of the workers involved in sharpening are varied and uncertain. The money that these workers can earn is highly dependent on weather conditions and varies from day to day. For mobile sharpeners, there is no set number of customers that they expect in a day. On some days, like rainy days, they may not get any customers at all. The rates for sharpening also differ for different products; for instance, a household knife is sharpened for Rs. 10, larger knives for Rs. 20-30, *ustara* for Rs. 10, scissors for Rs. 40-70 (depending on its weight), and *darati* for Rs. 20.

For mobile sharpeners, their earnings are more uncertain than for those who have shops, because roaming the streets looking for work adds another level of precarity to their work. Dev, a mobile sharpener in Kapashera, said, **"I sometimes get 200 rupees, sometimes 50. There is no regularity in this work".** On the other hand, Raj, another mobile sharpener remarked that he can earn approximately Rs. 400-500 a day, but this includes the repair of old products as well as sale of new products. Sharpeners with shops can earn approximately Rs. 500-600 per day if the work is good. The amount earned has to be adjusted for the electricity bill, that is, Rs, 200 per day, so the final earnings amount to around Rs. 300-400 per day.

All these sharpeners also engage in some kind of other work, that is, they not only repair old products but also sell new products. Some of these workers also remarked that they make more profit from doing repair work than selling new products, **"it is more profitable to sharpen old knives. not in new"** (Raj), but they still have to deal in multiple items and diversify their work to earn a decent living.

Case Study 6
Sustainable Fashion: Upcycling of Scrap and Old Clothes

The fashion industry, with its fast fashion trends and throwaway ethic, has a huge environmental impact. Sandin and Peters (2018) argue that the global demand for textiles has been continually increasing and will reach unprecedented levels in the future. They illustrate that the clothing industry impacts the environment not only through waste generation but also through toxins released in the processes of dyeing and printing. Recently, there has been a rise in the popularity of sustainable fashion brands that sell pre-used and pre-loved clothes. This is partly a marketing strategy in the face of growing consciousness among consumers regarding the environmental impact of the clothes that they buy and partly a way to reduce production costs by using old/scrap cloth.

This practice fits into the circular economy by upcycling old, ruined, and leftover clothes into new utility products, albeit only to a limited extent, considering the large amounts of textile waste produced by the fashion industry every day. Upcycling is a form of recycling through which higher-value goods are made from lower-value scrap/old clothes. SEWA Ruaab is an organization that engages home-based women workers in upcycling old clothes. SEWA has played a definitive role in mobilizing and helping to organize women workers engaged in such home-based work.

Source of Old/Scrap Cloth and their Afterlife

The upcycling of clothes done by SEWA Ruaab is based on the idea that the cloth waste generated in various forms can be modified and made into usable items. The waste cloth is obtained from different sources: private brands, households, manufacturing units, and Sewa Centers in Jaipur.

1. Private brands in the garment industry provide them with small pieces of cloth measuring 1-2 meters. These pieces cannot be used to make a full garment, so these brands collaborate with SEWA Ruaab instead of throwing them away. This collaboration includes the brands that design and provide waste cloth for the finished product, and the workers at SEWA Ruaab who make the product.

2. Households contact SEWA Ruaab to make products from old/retired clothes. These are usually readymade clothes, such as jeans, sarees, and school uniforms that have either been outgrown or have minor tears and marks. Households try to get new products made out of them since they have lost their original value. There are two types of arrangement: some households donate their old clothes to SEWA Ruaab, while others give the old clothes to Ruaab in exchange for goods made out of them. These households contact Ruaab through online platforms like Instagram.

3. Manufacturing units give SEWA Ruaab scrap cloth that they have bought from markets like Seelampur and Nehru Place and ask them to make specific products out of them.

4. SEWA Ruaab's in-house manufacturing centers, like their block printing in Jaipur, also generate scraps of cloth that can be upcycled. The scrap generated in Jaipur is sourced by the New Ashok Nagar Center and used to make products like scrunchies.

Of all these kinds of scrap, it is most difficult to work on readymade garments provided by households since these have to be unstitched to take out the design pattern. Since these are worn clothes, they may have holes and unremovable stains that either need to be fixed or removed.

The pricing of the products depends on how much work is required and whether or not the product design is labour-intensive. The size of the order also depends on the client. For instance, orders from households are generally small, ranging between 10-20 pieces, while from brands and manufacturers, the orders are as large as 100-200 pieces. The orders that Ruaab receives are either through their online platforms or through direct contact with clients. Any kattran (cloth cuttings) left after sewing is also returned to clients. SEWA Ruaab also sells its in-house manufactured products through its website, retail store, and exhibitions in Delhi.

Upcycling Process

The work of making goods out of old/scrap cloth is done by SEWA Ruaab at their multiple centers in Delhi. The work starts from receiving old/scrap cloth from clients. The cloth is in the form of sewn cloth, such as school uniforms, military uniforms, hospitality sector dresses, kurtis, shirts, pants, or other products such as sarees and curtains. Ruaab has employed and contracted workers who work at different stages of processing this cloth and turning it into goods.

The first step after receiving the old/scrap cloth is thoroughly washing it. The task of washing is assigned to a separate group of workers and is important for the safety of all the members involved as well as for the subsequent processing of the cloth. According to Priya, a merchandiser for Ruaab,

> All the clothes are completely washed because we also have to keep the members' safety in mind. Then whatever scrap comes from outside, we wash and then according to the nature of the fabric, we separate them according to the product. Like this can be made from this fabric and that from that one. Then if there is a ready garment like you have given a kurta- this is my old kurta and I want to use it, please make a product from it. So, first, we will wash it, then open its stitching, take out the pattern, whatever product can be made from it, and then sew it, it goes for finishing.

Next, designs for the new products are either provided by the client or Ruaab members do in-house designing. The design depends on the nature and condition of the cloth. The process of examining, designing, and cutting the cloth happens at Ruaab centers. Various workers are involved at this stage. The designing is done in collaboration with the merchandiser, a designer appointed by SEWA Ruaab working in the new Ashok Nagar center, and the person in charge of local centers like the one at Sunder Nagri. The products designed are tote bags, quilted pouches, zippered pouches, bottle covers, file covers, children's bedding, tassels, key chain toys, scrunchies, aprons, sling bags, coasters, and bookmarks.

After the design, the center-in-charge is given training and guidelines on how the cloth is to be cut and the product is to be manufactured. The center-in-charge imparts these instructions to the women members of SEWA Ruaab and divides the work according to the skills of the workers. One group of women is responsible for cutting the cloth and making preliminary samples for approval. They have to be mindful of the torn, stained parts and cut the cloth accordingly. Another group of women is engaged in sewing the product. While the first group works at the local Ruaab centers, the second group consists of home-based workers who receive the pre-cut cloth from the center. This upcycling work which was started during the pandemic is dependent on the size and frequency of clients' orders, therefore, work is not continuous although it is fairly regular with gaps between orders.

A Mix of Skills and Training

Since the work of generating goods out of old/scrap cloth involves many stages and different members, their skill sets also vary. The tools that they use in this work are sewing machines, scissors, and cutters.

The members engaged in cutting the cloth are more trained and experienced in the work of cutting and sewing. They also have to know how to manoeuvre around the ruined parts of the cloth and take out sections that can be used to make new products. This requires skills, expertise, and

creative thinking to extract the maximum amount of clean material and strips of cloth.

Women who work from home possess basic sewing skills that they have learned from their family members or friends. Some young women have also learned this work through YouTube videos. New members are required to have basic sewing skills and are asked first to take up simpler products like masks. They are also required to have a sewing machine so that they can work at their home. For many of them, the machine was part of their wedding gifts from their parents. Before the pandemic, SEWA Ruaab was only engaged in embroidery work and many of its older members were skilled in embroidery. At the onset of the pandemic, when embroidery work stopped, they ventured into stitching because some members knew basic sewing and did local or self-tailoring work. All the members associated with SEWA Ruaab are also given training in sewing and in making specific products.

The Scale of Cloth Upcycling

SEWA Ruaab has one client that regularly provides scrap/old cloth for upcycling. The kind and number of products that are made depend on the nature of the scrap material and how much cloth can be extracted from it. From one saree, 50-60 small pouches can be made; from one piece of shirt or *kurti* a bag can be extracted; similarly, one bag or 2-3 bottle covers can be made from one military uniform.

The women working with SEWA Ruaab work on a piece rate basis, which is the same for all of them. They receive Rs. 3 for a mask (out of new cloth), Rs 25-60 for a bag, Rs. 8-25 for pouches depending on the size and design, and Rs. 25 for bottle covers. The amount of work is highly dependent on the number of orders received by SEWA Ruaab, which ranges from 300-500 products.

This process undertaken by SEWA Ruaab presents a model of circular usage of cloth. As with other case studies, the women workers associated with Ruaab on a piece rate basis play a key role in transforming old/scrap cloth into new useful products.

Table 2: Gender segregation in work process and place of work

Case study	Work process	Gender of worker	Place of work
Sorting and resale of food grain and spices	Sweeping food waste scattered around wholesale shops	Women	Market
	Buying food waste from local municipal cleaners and warehouse workers	Men	Market/ Warehouse
	Winnowing, sieving	Women & Men	Home and nearby open spaces
	Handpicking food waste	Women	Home and nearby open spaces

Case study	Work process	Gender of worker	Place of work
	Street-based vending	Women & Men	Street
Repair and resale of old shoes	Collecting old shoes from households through barter	Women	Street/home of a client
	Buying old shoes from pheriwalas	Women & men	Street market
	Washing and drying shoes	Women	Home
	Mending and repairing shoes	Women & men	Home
	Street-based vending	Women & men	Street
Resale of electronic goods	Pheriwalas collecting old electronic goods from households through barter	Women	Street/home of a client
	Minor repairs of old electronic goods	Men	Home
	Street-based vending – workers selling old electronic goods	Women & men	Street
E-waste dismantling	Sourcing old wires and collecting separated PVC and metal	Men	Shop/workshop
	Dismantling wire using machine	Men	Informal workshop
	Separating PVC and metal	Women	Informal workshop
	Peeling thin wires and separating PVC and metal	Women	Home
	Peeling wire with thicker PVC and separating PVC and metal	Men	Street
Upcycling of old clothes	Receiving used cloth from a brand or client	Staff	Sewa Ruaab center
	Washing, dismantling, designing, cutting, and sewing	Women	Center/home
	Sending final product to the brand or client	Women	Sewa Ruaab center
Knife sharpening	Collecting knives from customers	Men	Street/Market
	Sharpening knives	Men	Street/Market
	Returning sharpened knives to customers	Men	Street/Market

Linkages: Cross-sectoral and Formal-informal

These diverse case studies of informal work in the urban circular economy reveal cross-cutting themes with cross-sectoral as well as formal-informal linkages. Workers in the circular economy engage in a combination of street vending, home-based work, and waste collection work in the course of their everyday work. Yet, in the literature and in advocacy work, these occupational groups are discussed, analyzed, and mobilized independently. A significant insight from studying these different informal livelihoods involved in the circular economy has been the robust cross-sectoral linkages between these occupational groups.

On examining the work process of the informal livelihoods from sourcing the waste/scrap material to processing and reselling them, it was observed that many of these workers in the informal economy engaged in multiple activities of waste collection, home-based work, and street vending. Female own-account workers engaged in the sorting and reselling of food waste would sweep and collect spilled food grain from around wholesale shops, clean, sort and grade them in their homes, and sell them in the Sunday street market. Even workers who did not collect food waste, bought them from local municipal cleaners). In the case of the resale of electronic goods, the goods are sourced through *pheri* work that involves visiting residential areas and collecting old clothes, shoes, and household electronic goods in exchange for new utensils and sometimes money. The collected goods are then resold in the local street market. Similarly, in the case of repair of old shoes, the shoes are purchased from *pheriwalas* (itinerant buyers of old household goods), repaired at home, and sold in various street markets in Delhi. The study, thus, reveals overlapping cross-sectoral identities of these workers in the informal economy as well as cross-sectoral linkages in the sourcing of material. Hence, there is a need to go beyond thinking and advocating for them in silos.

The case studies also find scope for cross-sectoral solidarity across the value chain and the need to explore inclusive solutions and preservations. For instance, the *pheriwalas* aid households in effectively getting rid of their old clothes, shoes, and electronic goods, while providing new utensils in return. Similarly, knife sharpeners provide a useful service to the household and help to reduce waste. For the smooth functioning of *pheriwalas* and knife sharpeners, cooperation with Residents' Welfare Associations needs to be explored through collectives with mutually agreeable systems to foster trust.

On the other hand, SEWA works with both *pheriwalas* and shoe repair workers and could serve as a link between them to facilitate the sourcing and trade of old shoes in a mutually beneficial manner; other organizations can facilitate such relationships between key actors in the reuse and repair economy. Similarly, SEWA could form a vital link between *pheriwalas* and SEWA Ruaab to facilitate the supply of good quality old clothes to be upcycled at the SEWA Ruaab centers.

The case studies also give valuable insights into the complex interlinkages and interdependencies between the formal and the informal. By examining the forward and backward linkages of the informal circular livelihoods through tracing the sourcing and distribution of waste material, the study revealed how goods and services flow and are transmitted between the formal and informal systems in the urban reuse and repair economies. Following the supply chain of materials processed or sold by workers in the informal economy, it was interesting to note the close economic ties between the informal reuse, repair, and recycling economy and the formal sector.

Waste material sourced from the formal sector was found to be collected, sorted, cleaned, repaired, and resold in the informal street markets of Delhi. For instance, in the case of processing of food waste, the waste material processed by the workers in the informal economy was sourced from the registered wholesale shops of Naya Bazaar and Khari Baoli markets and was resold in the informal street markets on Sundays. The market for the resale of food grain functions on the nexus of traders – workers – consumers, with workers in the informal economy heavily relying on the backward linkage with wholesalers and traders of food grain and spices. However, over time there are also growing tensions; formal sector actors like wholesale shop owners have started exploiting this arrangement by hiring labourers to collect the spilled grains in sacks of 40-50 kilos and selling them to workers in the informal economy, whereas earlier these grains were simply discarded and picked up by workers for free. Next, although old electronic goods resold by workers in the informal economy are largely sourced from middle-class and upper-middle-class households in Delhi, some discarded electronic goods are also sourced from retail shops which are then resold in the street markets.

Workers in the informal economy were found to be not only sourcing waste/ scrap material from the formal sector but also reselling or supplying them back to the formal sector after processing them. In the case of discarded food grain and spices, the material is sourced from wholesale markets and some of it finds its way back into the formal system as it is also purchased by retailers, hoteliers, and event organizers. Although local customers make up the majority of the consumer base, some small retailers are also found purchasing food grains and spices at cheaper rates for their personal use and for further sale at higher prices. In the case of wire peeling, the flow of material has complex global and local supply chains, and the dismantled metal and PVC return to the formal recycling and manufacturing units. In the case of upcycling used clothes, the old clothes are sourced from the client which is a fashion brand, and the upcycled new accessories are supplied back to them for sale in their retail shops. In the case of knife sharpeners, their customers were often barber shops, salons, and restaurants.

These close interdependencies and interlinkages reveal the contribution of the informal reuse, repair, and recycling livelihoods as an important participant in the value chains of formal sector businesses and enterprises.

Challenges and Risks in the Informal Circular Economy

Workers engaged in the reuse, repair, and recycling of waste material face myriad challenges in doing their work on a day-to-day basis. To extract value from the waste and scrap, workers in the informal economy and their families are confronted with risks, social stigma, harassment, poor working conditions, health hazards, and economic exploitation. There were several common challenges and risks faced by these workers across different sectors as well as some challenges unique to a sector. This section discusses some of the challenges and risks facing informal livelihoods in the reuse and repair economy in Delhi, with insights for similar informal livelihoods in urban economies. The challenges and risks are summarized in Table 3.

1. Social stigma and the cultural meaning of waste

The case studies revealed that some of the work on reuse, repair, and recycling of waste was stigmatized due to its association with the impurity of waste. Work dealing with waste and scrap has been understood through the lens of dirt, purity, and caste-based division of labour and hence carries a social stigma. The stigma associated with working with waste came out strongly in the case studies on reselling of food waste and old shoes, and the upcycling of old clothes.

The sense of social stigma was felt and articulated most strongly by workers handling food grain waste. In the market, the source of these commodities is shrouded in invisibility because there is a stigma attached to processing and reselling 'wasted' and 'discarded' food products. The workers struggle to get acceptance for their stigmatized work and were careful to disassociate themselves and their saleable commodities from the waste work once they set up their stalls in the street market for fear of rejection and stigma.

The case study on upcycling of old clothes revealed that women workers were sensitive to the stigma ascribed to the cultural meaning of used clothes as dirty and polluting, especially if they belonged to a deceased person. The cultural meaning of old clothes as being low-status goods and polluting generates ambiguous feelings among workers in the informal economy about working with old clothes as they had previously worked with high-status goods while doing embroidery work on new clothes supplied to the global value chain. However, these old clothes play an integral role in clothing the poor who cannot afford to buy new clothes. Similarly, in the case of repairing old shoes, the traditional occupation of workers from the mochi community was associated with the stigma related to the caste-based division of labour and the notion of impurity and pollution associated with working with leather.

2. Invisibility and Illegality

Another important characteristic of several informal livelihoods was that the work was shrouded in

invisibility and illegality. The provisions of the Food Standards and Safety Act seek to establish scientific standards and regulate the manufacture, storage, distribution, and sale of food articles to "ensure availability of safe and wholesome food". Informal livelihoods engaged in the processing of discarded or wasted food grains, pulses, and spices are thus considered illegal and are kept hidden. Similarly, in the case of e-waste dismantling, informal e-waste dismantling work is associated with illegality, environmental pollution, and health hazards. Hence, e-waste dismantling hubs like Seelampur form the hidden underbelly of the digital revolution.

Another good in the circular economy that is marred by criminality and invisibility is second hand/used mobile phones. The used phones traded by these workers are often erroneously treated as stolen goods since these mobiles are collected informally without any paperwork. These workers shared that they were reluctant to collect old mobile phones during their pheri as they feared getting picked up by the police. When workers in the informal economy are found unknowingly selling stolen phones provided to them by customers, they are often forced to pay policemen a hefty bribe. These workers suffer criminal stigmatization by the police as well as middle and upper-middle-class residential authorities where they go for pheri work. Significantly, many of these workers prefer to remain invisible to keep their livelihood away from the gaze of the authorities. Along with being on the lookout for police clamp downs, workers in these sectors were often forced to bribe the authorities to securely continue their work. Such instances of bribery were observed among sellers of second-hand shoes, electronic goods, and food grains.

3. Challenges in access to waste material

Rising inflation has affected workers in the informal economy. It has limited their access to waste material and, in turn, has affected the marketability of their goods because goods have become expensive and beyond the reach of poor consumers.

For instance, with rising inflation, traders in the spice and grain market have become conscious of the value of the waste generated and have started collecting and selling the wasted food grains and spices to these workers in the informal economy which were previously available to them for free. Due to the rising cost of buying wasted grains and spices, the workers sense a threat to the sustainability of their livelihood. Suresh, a food waste worker, noted that *"because of inflation, our work has died out because lalas (wholesale traders) take most of the material."*

Another group of workers who are threatened by waning access to material is pheri workers. Over the years, they have lost access to residential areas in the city due to the emergence of gated communities and Residents' Welfare Associations that limit access to these areas. Moreover, the emergence of online portals like OLX that facilitate the hassle-free resale of old household goods and electronics has badly hit their trade and dried up their access to old electronic goods.

4. Challenges from the linear economy

The reuse, repair and recycle economy is often in competition with the linear economy which keeps producing cheap new goods at an ever-faster rate. The glut of cheap new consumer goods in the market is a real threat to many of these livelihoods. For instance, the sale of old, repaired shoes is hampered by the flow of new, cheaper alternatives in bulk into the market. Even price-conscious consumers from poorer households now prefer the cheap, new alternatives to repaired branded

shoes since these households now need to pay only a small premium to buy new shoes. This has resulted in many workers diversifying their livelihood strategies by starting to sell new shoes along with repaired old shoes to cater to changing customer tastes, although the margins are much lower in the sale of new shoes This phenomenon is not exclusive to the market for shoes, because the market for clothes and electronic goods has undergone the same transition, resulting in lower profit margins and the erosion of workers' skills.

5. Occupational risk, health hazard, and depletion

Informal waste workers are exposed to various occupational hazards, both physical and chemical. The workers sometimes carry out risky procedures with their bare hands without suitable protective equipment and they risk injury; for instance, wire dismantlers and knife sharpeners risk injury while working with sharp blades. Wire dismantlers face an additional risk from their close, unprotected contact with plastics, chemicals, and metals while peeling, shredding, and heating wires, while knife sharpeners risk injury to their eyes from flying sparks and broken particles.

The long hours of repetitive, labour-intensive work for the majority affects their overall health. Home-based garment workers complained of eye-strain, while *pheri* workers and vendors of old shoes faced challenges in carrying their heavy load across the city and in the markets. All street vendors are exposed to the extreme heat and climatic variations.

Pheri workers and street vendors complained about taxing work routines. Women *pheri* workers felt depleted; they suffered from sleep deprivation and lack of adequate rest. Their daily routine consists of waking up around 3-4 a.m. to secure a place in Raghubir Nagar Market, going home to do their household chores, then out again for *pheri*, and working on the collected products in the evening. The next morning, they set out for work early in the morning.

6. Lack of decent living and working space, and the challenges of home as a workplace

Several workers in the informal economy are home-based. They engage in reuse, repair, or recycling work in or near their homes, as in the case of workers engaged in food waste work, repairing old shoes, upcycling old clothes, and e-waste dismantling. Their homes also double up as their workplace, which leads to cramped living spaces of poor quality that lack basic infrastructure. Many workers in the informal economy, particularly those engaged with food waste, live in slums that lack decent hygienic living and working spaces. Moreover, their work gets interrupted by other day-to-day household activities.

In the case of sorting and reselling food grains and spices, the work requires adequate open spaces for the processes of winnowing, sieving, and sorting waste material. In the absence of suitable alternative open spaces, workers carry out this work around the railway tracks or make unauthorized use of public spaces, inviting unwanted attention and harassment from railway authorities.

7. Lack of urban space assigned for street vending leads to harassment by police and civic authorities

Workers in the informal economy, particularly street vendors, find themselves the victims of

harassment, intimidation, and exploitation (StreetNet International 2021). They suffer harassment from the police and civic authorities for using public places for street vending and setting up slum colonies and are targeted for suspected crimes in their locality.

Street vendors such as old shoe vendors spoke about multiple experiences of facing physical violence, confiscation of goods, and corruption from the police and civic authorities. Many street vendors recounted constant harassment by the authorities despite regularly bribing the police and MCD authorities. Food waste workers and street vendors narrated accounts of their entire market and slums on the pavement being bulldozed, resulting in heavy losses. Suresh, a food waste worker, recounted, *"MCD (civic authorities) and all, they always trouble us. On (date), everyone's material (maal) was destroyed…()…they just ran a bulldozer over all the material. It was all scattered and became waste and then it was sold to people like us who work with waste…()…a lot of people went into lakhs of debt after it."*

The lack of decent urban space for street vending multiplies the hardships of workers because they need to go to different markets to buy old shoes and then go to multiple markets every week to put up stalls to sell their goods. In markets such as Kabadi Bazaar, workers have to sell old shoes while "on the run" to avoid being harassed by the police, because they are not legally permitted to set up stalls in the bazaar. This becomes especially difficult for older women street vendors.

Apart from street vendors, workers who temporarily occupy the street or other public spaces for their work are also targeted. For instance, male wire peelers work on the streets and hence are targeted by the police during raids with threats of confiscation of the material and the payment of heavy bribes of Rs. 50,000-100,000.

8. Limited access to liquid capital and cash-in-hand to invest in inventory

Waste work is a livelihood that requires the least investment of capital to make a living, but workers still need cash to buy the materials, particularly those working on food waste, shoe repair, and resale of electronic goods. These workers need regular access to liquid capital or cash in hand to purchase discarded food grains and spices, old shoes, and old electronic goods. An informal street vendor in Sadar Bazaar market exclaimed, *"Jitni poonji utni kamai"* (as much capital, as much earnings), rueing his lack of access to capital for better returns.

9. Excess supply of labour, low earnings, and lack of bargaining power in the value chain

Due to the excess supply of cheap labour in the urban informal sector, workers end up competing with each other for work and earnings, bringing down the earning potential for many of these informal livelihoods. For instance, the number of migrant workers engaged in wire peeling work in the Seelampur area has increased over the years, resulting in both work and income shrinking for everyone. With the availability of a large pool of workers who are not organized and instead compete with each other, these workers lose their bargaining power to negotiate for better rates and working conditions for their work. One woman wire peeler noted, *"There are a lot of people peeling it, if you do not do it, someone else will"* and another added' *"Yes, someone else will do it. If I ask for 10 rupees a kilo and someone does it for 5, he will not give it to us. He will give it to the 5 rupees one".* Moreover, any loss in material returned to the contractor is heavily penalized and workers had to

compensate at the going rate of the metal being extracted. The workers lack a collective voice and are not able to bargain and influence the rates or resist exploitation by contractors.

10. Challenges of working with certain waste products

It is particularly difficult to work with a certain type of waste material like red chillies that cause a burning sensation when they come in contact with the skin. When cleaning and sorting red chillies in large quantities, the workers suffer a burning sensation all over the body that becomes unbearable in hot weather. Similarly, workers find it challenging to work with old clothes compared to new clothes, because they have to make careful adjustments to avoid stains, holes, and tears. Sewing old cloth also takes more time as it needs to be handled with care since old cloth can get torn during stitching or when sewing on a zip.

There are other risks and challenges associated with these informal livelihoods such as the problem of child labour. Especially in the e-waste dismantling sector, children, particularly girls, are initiated into this work at a young age to support their mothers. Women pheri workers faced difficulties in their day-to-day commute and lack of safety. Women workers found it challenging and expensive to commute around the city, since they are not allowed to travel with their goods on metro trains.

Table 3: Challenges faced by informal livelihoods in the circular economy

Main challenges	Sector-specific observations
1. Social stigma and the cultural meaning of waste	• Food grain resellers are stigmatized for dealing with wasted and discarded products. • Resellers of old clothes viewed their products as polluting. • Repairers of old shoes face caste-based stigmatization because they work with leather.
2. Invisibility and illegality	• Resale of food grains is pushed into illegality by the Food Standards and Safety Act. • E-waste dismantling is associated with illegality, pollution, and health hazards. • Used mobile phone traders are often found dealing in stolen phones unbeknownst to them.
3. Challenges in access to waste material	• Resellers of food grains now have to pay for material that earlier was free. • Pheriwalas have lost access to residential colonies due to the emergence of gated colonies & online portals.
4. Challenges from the linear economy	• Sale of old, repaired shoes is hampered by the flow of new cheaper alternatives in bulk into the market.

Main challenges	Sector-specific observations
	• Workers diversify their livelihood strategies by selling new shoes along with repaired old shoes.
5. Occupational risk, health hazards and depletion	• Wire dismantlers work with sharp objects and face close unprotected contact with harmful substances. • Knife sharpeners work with sharp blades and are exposed to flying sparks and broken particles. • *Pheri* workers and the old shoe vendors face taxing work routines and have to carry heavy items.
6. Lack of decent living and working space, and the challenges of home as a workplace	• Food grain resellers live in cramped slums and are forced into the unauthorized use of public spaces for their work.
7. Lack of urban space assigned for street vending leads to harassment from police and civic authorities	• Old shoe vendors faced physical violence and confiscation of goods and are constantly "on the run". • Entire markets and slums of food waste workers are bulldozed. • Male wire peelers working in public spaces are subject to police raids.
8. Limited access to liquid capital and cash-in-hand to invest in inventory	• Workers working in food waste, shoe repair, and resale of electronic goods require access to liquid capital.
9. Excess supply of labour, low earnings, and lack of bargaining power in the value chain	• An increase in the number of wire peelers in Seelampur has shrunk everyone's work and income.
10. Challenges of working with certain waste products	• Food waste workers find it difficult to work with red chillies as it causes a burning sensation when it comes in contact with the skin. • Old clothes need to be handled carefully. • Women pheri workers faced safety issues as well as cost concerns while travelling.

Invaluable Yet Stigmatised: The Paradox of Informal Circular Economy

This study also tried to unpack workers' perceptions of their work.

1. Precious source of livelihood and sustenance for the urban poor

The informal reuse and repair economy was reported as a significant source of livelihood and employment opportunities for low-skilled and lower-income workers migrating to or living in Delhi. The workers valued their work as their means of livelihood and sustenance for themselves and their families. The workers spoke about waste as a valuable resource for the urban poor and a source of their livelihood.

A food waste worker, Munger, noted, *"Garbage and wastage will always be there, but here we are getting our livelihood through waste and waste is a huge source of money too. All poor people are supported by this waste and that's how they go up the ladder. This waste is gold for us as it provides us with food."* In a similar vein, Tasha, a *pheriwala* noted, *"It's like things that people throw away in foreign countries, here those things feed the stomach of the extremely poor, illiterate people who live in slums. Those discarded clothes and shoes are helping us run our household."*

2. Providing cheap goods and services for the urban poor

Workers in the informal economy were also acutely aware of the contribution of their work to the subsistence of the urban poor by making available affordable basic commodities like food, clothes, and shoes. Suresh, a food waste worker, commented on the recycled food grain, pulse, and spice market: *"If the government supports us, this market is very good according to the budget of poor people."* Tasha, a *pheriwala*, articulates that not only are they dependent on pheri goods for survival but they also provide cheap clothes and shoes for the urban poor and migrant workers.

"In India, (old clothes) is worn and used by poor people and are also further sold to rikshaw sellers, labourers, and other poor customers. That's how our life works and if pheri is stopped, we'll die of hunger. But even labourers will be forced to buy new clothes. The government will not give us money for new clothes or shoes."

3. Ecological and environmental contribution

Largely, workers did not associate their work with the environment. The workers did not consider themselves environmental workers nor did they feel that they were perceived as such by the state or society at large. One worker remarked that often they are associated with dirt: *"No, people don't understand. They think we are just spreading dirt but in reality, if we are not there, everything will be dirty."* However, following conversations with the study team, some workers acknowledged that

their work did indeed contribute to reducing waste and controlling pollution. Kaifanwara, a home-based worker who upcycled old clothes, noted, *"Yes, obviously. We are making something out of waste so we are saving it from being wasted and it is being used by someone as well as we earn from it. So, it is good for the environment as well as for us".*

In particular, workers associated with advocacy on social issues and with exposure to discourse on waste and pollution more readily related their work to waste reduction and its environmental impact. Many of these workers were associated with community-based organizations, either directly or indirectly, but almost none of the organizations were directly engaged in creating awareness or advocating for the recognition of the worker's contribution to the environment.

4. Stigmatized work and resistance to generational continuity

There is an acute stigma associated with some of this work, particularly for those dealing with food waste. The food waste workers we interacted with did not want their children to come into the same line of work; instead, they tried to educate their children for a better future.
"I want them (children) to study and do good work, not this kind of garbage"

"But we think that whatever we are doing, our kids shouldn't be doing this work. We are struggling continuously to get our kids out of this filth (gandagi)".

The workers associated this work and their living conditions with *kuda* (garbage) and *gandgi* (filth) and wanted a better future for their children. They also understand that their work is unsustainable since they are generating food from 'waste', and their work will never get acceptance from the government. The fear of stigma was most evident in the weekly market where none of the workers was ready to acknowledge that they were selling fallen food material when we met them at the Sunday market.

5. Resist stigma through collective action

Despite the stigma associated with working with leather and shoes, workers resisted the caste-based stigma associated with their work and were actively reimagining their work as creative and skill-based work involving refashioning old shoes into new ones. The workers took pride in the quality of shoes they make available at reasonable prices compared to the cheaper new products that are not very durable. These workers in the informal economy were engaged in pursuing meaning-making and dignity for their work despite constraining circumstances, as noted elsewhere by Wittmer (2021) in the context of women waste pickers in Ahmedabad. In the case of workers working with old shoes, the stigma is addressed and mitigated through activism under the aegis of SEWA (Hariss-White 2017).

Policy Considerations for an Inclusive Circular Economy

Amid growing concerns over rapid environmental degradation and waste generation, the government, civil society organizations, and producers have all shown a willingness to adopt circular economy systems. To this end, the Indian government has introduced various new policies and schemes albeit with a disproportionate emphasis on environmental concerns over the workers' working and living conditions. Moreover, the large majority of the government's initiatives have targeted the formal sector, while the circular economy lies at the intersection of the formal and informal sectors, with a larger share of recyclers and repair workers working out of the informal sector. For this study, we delve into a few acts and policies enacted or proposed by the Government of India in recent years that aim to encourage circularity. These include the E-Waste Management Rules of 2016, the National Policy for Urban Street Vendors (2006) and the Street Vendors (Protection of Livelihoods and Regulation of Street Vending) Act of 2014, the Food Safety and Standards Act of 2006, the Food Safety and Standards Regulations of 2019, the Anti-dumping law, and the proposed Right to Repair. These policies help us contextualize the product-specific case studies undertaken for this report.

E-waste Management Rules

The E-waste Management Rules, 2016 that came into effect on 1 October 2016 succeeded the E-Waste Management and Handling Rules of 2011, and attempted to formalize the entire value chain by mandating manufacturers, producers, recyclers, refurbishers, and dismantlers to get licences that were subject to clearance from the Central Pollution Control Board and the State Pollution Control Board (Rastogi 2021). The license or the authorization to work would only be granted if the boards find the proposed methods and available infrastructure for dealing with e-waste satisfactory. The new Rules undertook steps to increase producers' responsibility over the e-waste generated by them through extended producer responsibility (EPR) (Rastogi 2021). Further, the formal and informal sectors were separated and producer responsibility organizations (PROs) were equipped with the task of bringing waste from the informal sector to the formal stream through take-back systems and buyback (Biswas & Singh 2020). In a way, these changes solidified the formal-informal binary and criminalized informal sector recycling (Rastogi 2021).

The main objective of these rules was to define the roles and responsibilities of various actors involved in handling e-waste like manufacturers, producers, dismantlers, recyclers, refurbishers, and consumers. As per the E-waste management rules, "Extended Producer Responsibility – Authorisation" places the onus of establishing channels for environmentally sound management of e-waste on producers. In 2019, producers were asked to collect 20% of the waste generated by their products, which would increase by 10% every year for the next five years (Lahiry 2019). A draft notification by the Environment Ministry in May of 2022 declared that the recycling target for companies will rise to 60% of their sales by 2023 (Koshy 2022). Moreover, companies also have

to ensure that the waste they collect reaches authorized recyclers and dismantlers (Lahiry 2019).

Several loopholes prevent the Rules from fully realizing their potential. Firstly, they do not apply to microenterprises as defined under the Micro, Small, and Medium Enterprises Development Act, 2006, i.e., units with an investment of not more than Rs. 25 lakh in plant and machinery. Secondly, the lengthy and ambiguous procedures associated with obtaining authorization disincentivize producers and dismantlers from obtaining authorization. Moreover, most provisions under the Rules lack mechanisms to ensure that they are met and do not carry any instructions on how to implement them.

The main shortcoming of these rules is their failure to include the informal sector where the largest share of e-waste is handled in India. In the absence of provisions that safeguard their survival, workers in the informal economy are further pushed to the brink of illegality, where they face constant threats from civic authorities. As a result, they try their best to evade the authorities by working in residential colonies, slums, or unauthorized settlements, making it difficult to monitor their activities, which continue to have an adverse effect on the environment as well as on their health (Biswas & Singh 2020). For instance, the wire dismantlers of New Seelampur who are not included under the Rules continue to work under precarious and unsafe conditions with few avenues to improve their working conditions. Moreover, schemes that encourage producers to take back the electronics they produce threaten the livelihoods of a large number of informal repair workers and resellers, such as the resellers of electronics in Raghubir Nagar who depend on these discarded products.

Street Vending Regulations

The National Policy for Urban Street Vendors (2006) and the Street Vendors (Protection of Livelihoods and Regulation of Street Vending) Act, 2014 govern the spaces in which vendors can operate. Street vending forms an integral part of the circular economy by giving reuse and repair workers as well as consumers access to second-hand repaired products. The overarching objective of the Policy for Urban Street Vendors is *"to provide and promote a supportive environment for earning livelihoods to the vast masses of urban street vendors while ensuring that such activity does not lead to overcrowding and unsanitary conditions in public spaces and streets"* (National Policy for Urban Street Vendors 2006: 6). The policy and the act make provisions to protect the rights of urban street vendors as well as to regulate their activities. The protection of rights includes safeguards from provisions, such as that under the Indian Penal Code that penalize individuals for obstructing public spaces of navigation and makes them vulnerable to police harassment. It also includes giving street vendors legal status by *"formulating appropriate laws and providing legitimate hawking zones in urban development/ zoning plans and ensuring their implementation"* (National Policy for Urban Street Vendors 2006: 12).

For this purpose, a registration process to counter the illegality associated with street vending was introduced. However, questions remain regarding the methodology and coverage of this process of licensing. This is further complicated by the existing hierarchy among workers in the informal economy, as observed in Sadar Bazaar's Sunday food market, where some vendors have permanent spaces, while others appear every week and set up a temporary stall on a sheet on the road. Further, there are vendors on the margins who sell goods procured through sweeping, begging, and

scavenging. While registration and licensing are important, all these categories of workers must be taken into account and given access to adequate spaces.

The Street Vendors (Protection of Livelihoods and Regulation of Street Vending) Act, 2014 states that a Town Vending Committee (TVC) has to be created for every ward and these should include representatives from vendors/hawkers as well as other personnel from government and non-government organizations that have a stake in the work. The TVC would be tasked with regulating and monitoring hawking activities as well as collecting registration fees and fines from defaulters. However, our interviews with street vendors revealed mixed reactions to the TVC, with workers like Suresh, a food waste processor, who represented the community in many public forums finding the TVC useful and accessible, while other workers found their participation in the forum a mere obligation. A shoe reseller, Reshma, remarked that her participation in the forum is limited to signing a sheet of paper that is circulated. Thus, it seems that while TVCs create a space for increased participation by vendors at the grassroots level, their voices and demands rarely make their way into the meetings that are hierarchical and inaccessible. Inaccessibility is further emphasized by the use of English as the mode of instruction and communication at the meetings. At the end of the day, most vendors do not entrust TVCs with bringing about any real change and, therefore, do not voice pressing concerns such as police harassment and the lack of basic amenities like water, electricity, and washrooms.

Food Safety and Standards Act and Regulations

Food Safety and Standards Act, 2006 and Food Safety and Standards Regulations of 2019
The Food Safety and Standards Act, 2006 regulates the work done by workers in the informal economy who resell "discarded" or "wasted" food items like grains and spices. These workers are particularly vulnerable as their work is deemed illegal given food safety standards. The provisions of this Act that seek to establish scientific standards and *"regulate the manufacturing, storage, distribution, sale, and import of food articles to ensure availability of safe and wholesome food"* are in contrast to work in the circular economy in the food grain market of Sadar Bazaar. The Act also defines contaminants, extraneous matter, and hazardous items that should not be present in the food articles and can be harmful on consumption.

In 2018, the Government of India introduced the Compulsory Food Waste Reduction Bill to form a committee that oversees food waste reduction in the country. The committee would be charged with the responsibility of publishing a "Food Waste Reduction Strategy" within six months of its establishment, thereby halving food wastage by supermarkets and food manufacturers from 2016 to 2030. This would include requiring these bodies to enter into formal agreements with food redistribution organizations to donate unsold in-date food to them. Further, the committee would ensure that its targets are pursued through periodic inspections and penalties in the case of non-compliance. Another set of rules that attempts to facilitate this relationship between food-generating bodies and non-profit organizations is the Food Safety and Standards (Recovery and Distribution of Surplus Food) Regulations, 2019, including an initiative called "Save Food, Share Joy" that aims to create a surplus food recovery ecosystem (Times of India 2019).

The field narratives reveal that workers cannot envision any possibility of reconciliation between their work of processing and reselling discarded food grains and spices and the government's

regulations around food safety, although the practice of cleaning and sorting mildly spoiled food grains to salvage unspoiled food grains was common in many Indian households, whereby food is cleaned of contaminants like small stones *(kankad)* or insects *(susri)* by handpicking, placing them in the sun or cleaning them with water before use. Given the traditional Indian practices of food waste prevention and the government's recent attention on food waste reduction, there is a need to envisage innovative strategies to reduce food waste which include the informal livelihoods working on preventing food wastage.

Anti-dumping Laws

Anti-dumping laws are meant to protect the importing country's domestic market from unfair trade practices. A dumping duty is an additional import duty imposed by governments to offset the negative impact of dumping on domestic goods, because dumping of cheap goods harms micro and small industries and negatively affects local employment (Sury 2020). Anti-dumping laws also become significant for some segments of the circular economy since they protect the informal reuse and repair livelihoods from competition from cheap foreign goods.

The impact of cheap imports is particularly evident among workers in Sunder Nagri engaged in repairing and reselling shoes because they face tough competition from the influx of low-priced and low-quality Chinese shoes. Many leather shoe manufacturers have spoken out against the influx of low-priced Chinese leather shoes, which harms their production and market (Ghosal 2020). Chinese shoes not only hamper the market for new locally produced shoes but also the market for old repaired shoes since they are even cheaper than the repaired old shoes. The textile sector is another sector that is a victim of dumping from abroad. This dumping is exacerbated due to the rapid spread of fast fashion practices that create false demand, leading to greater consumption and disposal of clothes. Cheap clothes are produced in bulk to cater to changing trends and dumped when trends change. Thus, they are designed for obsolescence and destined for landfills (Williams 2022). These trends are counter-productive to sustainable fashion initiatives undertaken by organizations like SEWA Ruaab.

Proposed Right to Repair Law

In a press release in July 2022, the Ministry of Consumer Affairs, Food & Public Distribution laid out the framework for the Right to Repair, which will mandate manufacturers to share product details with their customers so that the latter would have access to the technical knowledge required to carry out repair work on their own or with the help of a third party. In its initial phase, the scheme would cover products like farming equipment, mobile phones/tablets, consumer durables, and automobiles. The Right to Repair seeks to accomplish three things: first, to empower customers and make repair work more accessible to a larger section of society; second, to generate employment in the informal sector by familiarising third-party buyers and sellers with the procedures used by the original equipment manufacturers (OEMs) and thus legalizing their work; and third, to reduce e-waste generation by keeping products in circulation for longer periods and disincentivizing planned obsolescence. According to the ministry, the new law seeks to empower both those who fix minor glitches in technological devices and those who cannibalize products to provide spare parts for the circular economy. One idea behind such provisions is to protect the livelihoods of repair workers and resellers who are often at the receiving end of police crackdowns and perceive them as thieves.

Conclusion and the Way Forward

Workers in the informal sector are at the core of the circular economy as they ensure that almost nothing is allowed to go to waste

The study found that traditional informal livelihoods are inherently circular, using waste and generating value out of waste to the farthest extent possible. Nearly nothing is allowed to go to waste in a resource-poor setting, as these workers struggle to eke out a living and means of subsistence through this work. These informal livelihoods insert themselves into an otherwise linear economic system and recover the value of waste through reuse, repair, and recycling, thereby closing the material flow loop. The workers reclaim value from discarded waste, which is thought to have no use or value and is considered unrecoverable by the formal economy. Moreover, the informal reuse, repair, and recycling economy complements and supports the formal sector by processing and recycling their waste and closing the loop of material flow.

These informal livelihoods also have a significant positive environmental impact in terms of saving landscapes and water bodies from pollution and refuse (Jhabvala 2021). The informal circular livelihoods reduce the amount of waste in municipal landfills, reclaim, repair, and recycle discarded material, and reintroduce it into value chains. Thereby the workers' activities also benefit the environment by saving precious natural resources from depletion. While workers in the informal economy contribute to the environment by promoting the recycling of waste, the relatively basic techniques they employ, combined with improper management of toxic waste material, poses environmental and health risks (Toxics Link 2018).

Significant positive social impact of the reuse and repair economy by providing informal livelihoods and subsidizing urban living for the poor.

The urban informal reuse, repair, and recycling economy not only provides valuable livelihoods to the urban poor but also subsidizes living in a city for the urban poor because it makes goods and services available at cheap prices that otherwise would have been unaffordable for them. So, it is not just a source of livelihood for those engaged in it but also a source of subsidized living for low-income consumers of reused, repaired, and recycled goods. It provides a social safety net to the urban poor against the rising cost of living in cities. They make a valuable contribution to the food security of the urban poor who have been severely hit by the rising prices of basic food items. For the migrant urban poor who cannot afford new clothes and shoes, the informal circular economy provides restored clothes and shoes at affordable prices. Further, the reuse and repair economy provides low-income households with goods and services to support their livelihoods like cheap mobile phones, cheap spare parts, cheap electronic goods like beauty parlour equipment, and the repair of knives and scissors to ply their trade.

Socially stigmatized labour performed by the most marginalized communities

In India, the work dealing with waste and scrap has been understood through the lens of dirt, impurity, and the caste-based division of labour and is often marred by social stigma. Waste collection, processing, and resale have traditionally been a task left to the lower castes. The informal reuse, repair, and recycling livelihoods in Delhi that were studied also indicated the preponderance of workers from marginalized castes, classes, religious groups, and regions. The workers studied were Dalits, backward castes, scheduled tribes, and Muslims who were most often also migrants.

Thus, this stigmatized work is disproportionately performed by socially "othered" people, provoking Barbara Harris-White (2020) to describe waste as an "economic and social trap for SCs and STs." Yet their significant positive contribution to the circular economy and environment raises the question of whether marginalized caste, religious groups, and migrants are pioneering the circular economy in the Global South.

Informal circular livelihoods are relegated to the peripheries of the city

These informal livelihoods contribute significantly to the urban circular economy and the protection of the city's environment, yet they are geographically and spatially marginalized and relegated to the peripheries of the urban space. These workers and their livelihoods were found to be consigned to slum areas, resettlement colonies, and street markets. Even within these marginalized spaces, informal work was further concentrated in the small, cramped homes of many of these workers. Their reused goods street markets are not recognized and are not part of the urban planning programs and hence are often uprooted in city beautification projects.

The experiences with the state are varied and mixed

Among workers in the informal economy, street vendors faced regular low-level harassment, bribery, or confiscation of goods on an almost daily basis, and evictions from time to time. Workers living in the slums expressed nervousness about their slums being demolished or relocated to locations at a greater distance from markets for the waste materials or relocated to places where they would not have access to open spaces for work.

On the other hand, India is also one of the very few countries to have developed a national policy on street vending and the Street Vendors (Protection of Livelihoods and Regulation of Street Vending) Act, 2014. The Policy and the Act make provisions to protect the rights of urban street vendors, recognize street vendors, and formalize their operations while regulating their activities. Subsequently, surveys have been carried out to collect data on vendors/hawkers/weekly markets in different zones and create a database for future interventions for the regularisation of street vendors in Delhi. These are some of the positive interventions of the state.

Remarkably, some workers in the informal economy, such as e-waste workers and food waste workers, prefer to stay invisible and keep their livelihood away from the gaze of the authorities, and may benefit from the neglect.

Precarious conditions of work and living

Despite keeping tons of waste away from landfills, preventing the depletion of natural resources, and providing affordable goods to the urban poor, workers in the urban reuse, repair, and recycling economy face stigma, invisibility, illegality, and precarious economic and living conditions. While the circular economy has become a buzzword in policy circles, there has been a lack of recognition of the role of informal livelihoods in the circular economy and in closing the loop. Informal livelihoods also suffer from a lack of recognition of their work, place of work, and the street market where they operate. Moreover, their skill and accumulated knowledge have been rarely recognized or valued (Rajendra 2022).

Workers in the informal economy experience precarious economic and living conditions shaped by their intersectional vulnerabilities, stemming from caste, class, gender, migrant status, religion, the informality of labour, nature of labour (waste collection, home-based work, and street vending), and place and conditions of residence. The workers have no legal recognition or protection, and no access to social benefits, and work under unsafe conditions. In terms of informal livelihoods in the circular economy, poor widowed/separated old women from marginalized communities were found to be particularly vulnerable, concentrated in the lowest-paid and precarious work of waste picking, street vending, and home-based work. All of these challenges represent the tangible and intangible costs of informal circular livelihoods.

The study explored the role of informal work in the circular economy by documenting diverse informal reuse and repair livelihoods in the city of Delhi and its contribution to the circular economy and material recovery. The study has revealed that these workers are at the core of the circular economy, devising innovative ways to tackle the "throwaway culture" (or rapid waste generation) within their limited means despite the lack of state support and social protection. The study also highlighted the social stigma, invisibility, illegality, discrimination, harassment, and stark working and living conditions under which many of these workers operate.

Going forward, the academic and policy discourse needs to move beyond economy/environment and circularity to also consider dignity and circularity. As our study highlighted, it is not only about reinserting the discarded resources into the circular economy but also about human labour. The study findings establish that informal reuse, repair, and recycling workers are an integral part of the circular economy. The contribution of these workers in the informal economy needs to be acknowledged and made visible through more in-depth participatory research to study the diverse informal livelihoods and the complex waste economies they are embedded within. These workers' accumulated valuable knowledge, skills, and innovative perspectives in restoring value to waste need to be recognized and preserved for their contribution to the circular economy.

These informal livelihoods need to be supported and protected for their efforts and contribution to the circular economy, environment, and poverty reduction. There is scope to create consciousness among the workers about their overlapping cross-sectoral work identity (waste pickers/home-based workers/street vendors) and go beyond thinking and advocating about them in silos. There is also a need to build cross-sectoral solidarity and partnerships between informal stakeholders across the value chain and to explore inclusive solutions (for instance, solidarities between pheriwalas and shoe repair workers or SEWA Ruaab could benefit both groups of workers).

Finally, the state owes these workers for their significant contribution to the environment and poverty reduction and should compensate them in the circular economy for their service by identifying them as workers and ensuring social protection as well as decent working conditions and wages. This can be done by taking steps to ensure workers have access to waste and other reusable material, access to safe public spaces for vending, working spaces, safe commutes, and access to healthcare and pension schemes. There is scope for more positive changes in policy frameworks to make them more inclusive towards workers in the informal economy and provide meaningful representation in the urban planning process.

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