International Journal for Multidisciplinary Research (IJFMR)
E-ISSN: 2582-2160 ● Website: www.ijfmr.com ● Email: editor@ijfmr.com

Mindful Utilization over Wasteful Consumption

Dr. Meenal Annachhatre[1], Dr. Manasi Gore[2], Ms. Dhanashree Kandalgaonkar[3]

[1,2]Assistant Professors, Department of Economics, SPPU, Pune
[3]Research Assistant

Abstract

Sustainability has become the buzzword in the 21st century. One of the key aspects in this drive towards a better future is recycling. Recycling, particularly of materials like electronic components, is crucial in environmental protection. The Repairability Index (RI) brought out by France is therefore a crucial step in this direction. In 2025, the Government of India also received recommendations regarding Repairability Index in mobile and electronics sector. This paper aims to study the structure and composition of the French Repairability Index, and bring out its critical analysis. Then it has studied the framework proposed in India regarding mobile and electronics repairability. The researchers have also conducted a primary survey of 200 mobile shop owners in Pune City, Maharashtra. By doing this, they have tried to compare the theoretical advances in India related to repairability, and the ground reality in case of its implementation. While looking at the concept of Repairability Index, the authors have also taken into account the Extended Producer Responsibility regulations brought out by the Government of India. Also, the idea of Repairability Index has also been studied point of view of circular economy, environmental impact, and employment generation in the field of recycling. It also has tried to assess their alignment with the various international climate resolutions such as the Paris Agreement and the United Nations Sustainable Development Goals. RI as a framework is an important step in the positive cycle towards sustainability. If scaled properly, it has the potential to become an important tool in accessing the recycle capacity of a product. However, issues such as inclusion of limited products and enforcement problems reduce its impact. Also, in case of the primary survey, repairing work has been seen to be more profitable than new sales. This gives an encouraging picture for the environment. However, issues like lack of formal repair training, logistical problems etc. hamper their potential. Despite these shortcomings, the notion of repairability and Repairability Index will be important tools in saving the planet.

Keywords: Repairability Index, Extended Producer Responsibility, circular economy, Employment, e-waste management, Paris Agreement, SDGs, Climate Action

Introduction

In 2019, France generated 1,362 mn tons of E-waste and became one of the top ten E-waste generating countries in the World, while its recycling rate was 32% only. A survey done in most of the European countries during the same time showed that 77% of consumers would prefer repairing of the damaged devices, but manufacturers have no formal commitments to make the product easier to repair. In response to this challenge, the French government created the Repairability Index (RI) in 2020 as part of the Anti-Waste and Circular Economy Law to facilitate the repairability of electrical and electronic products and

the reuse of spare parts (One Planet; n.d.). To create an ecosystem where consumers choose options that promote mindful utilization of their products over wasteful consumption is taken up across the globe.

The Repairability Index is undoubtedly one of the key regulatory breakthroughs made in the last decade in the realm of sustainable consumption and circular economy legislation. The core purpose of the index lies in the creation of a rating system, which would inform users about how easy it would be to fix a product in case of its malfunctioning or wear and tear. Although it had previously been easy for consumers to compare the energy efficiency of various household appliances based on standardized labeling, such a way of comparing repairability was not yet developed.

The importance of this legislative issue arises in the context of the prevailing linear economy model of the past decades, according to which resources are extracted from nature, used to produce goods, which are then sold and eventually discarded because of their malfunctioning or outdatedness. This model is responsible for producing vast amounts of e-waste, which is the fastest growing waste stream in the world. Besides, it leads to endless extraction of finite minerals and metals and emits enormous quantities of carbon throughout the whole process.

In India during May 2025, a govt. appointed committee has recommended to the Consumer Affairs Department a self-declared RI by original manufacturers for these products to enable consumers to make informed choices. The researchers have aimed to study the importance of circular economy referring to this right to repair movement in India.

This research incorporate both secondary and primary data techniques to comment upon the feasibility of the Repairability Index referring to Pune local market's buyers as well as sellers 'approach towards the same and their employment related scenario.

Research Objectives

1. To explore the Repairability Index idea and Indian Government's stake on the same.
2. To assess the buyers and sellers' viewpoint on the RI and employment through primary data collection restricting to Pune City.

Review of Literature

The research about the Repairability Index (RI) has gained momentum over the last few years owing to the rising concerns related to e-waste, planned obsolescence, unsustainable consumption patterns, and transition to circular economy models. The existing research studies, on the whole, define repairability as a critical sustainability measure which helps prolong the lifespan of the product, conserve resources, minimize waste production, and ensure environmentally sustainable manufacturing and consumption practices. Repairability is currently considered not just a feature of the product but a multidimensional management approach which encompasses such aspects as environmental sustainability, consumers' rights, industrial policies, and circular economy development (Baral & Misra, 2025). The existing literature stresses that modern economies, which operate on "take-make-dispose" principles, are fast depleting the Earth's natural resources and creating waste, particularly in the electronics industry (Manglai, n.d.).

The theoretical background of the Repairability Index is firmly based on the concept of a circular economy where products are maintained and repaired to ensure that they continue to remain in productive use for as long as possible. A number of studies stress that repairability stands at a higher level in the waste hierarchy compared to recycling since it ensures that the energy, labor, and resources used in the

production of products are not wasted (JoCE, 2024). From literature reviews conducted in the studies, it becomes apparent that there is a clear connection between repairability and "Design for Repair" (DfR), ecodesign, and the international Right-to-Repair campaign. According to the thesis from Université catholique de Louvain, repairability can be considered as a socio-technical sustainability model that considers engineering design, life cycle management, and consumer accessibility in one comprehensive evaluation framework (UCLouvain Thesis, n.d.). In addition, experts have emphasized that repairability plays an important role in climate change mitigation since the manufacture of products, especially electronic products, contributes significantly to greenhouse gas emissions (UCLouvain Thesis, n.d.).

There is also considerable literature on the development and nature of repairability assessment frameworks. The French Repairability Index is well known as one of the first official frameworks for assessing repairability in terms of a score (Baral & Misra, 2025). Currently used frameworks consider product design based on factors such as easy dismantling, spare part availability, access to repair instructions, software, and special tools. Literature suggests that these frameworks should be developed not only to promote better designs for maintenance but also to allow consumers to buy products with higher repairability scores (JoCE, 2024). Literature also highlights the need to incorporate software support in repairability assessments as modern electronic products use firmware systems, software locks, and serialized parts, which can limit independent repairs despite hardware being repairable.

On the other hand, the literature also highlights several shortcomings inherent in the current Repairability Indexes. The most common criticism is the over-reliance on engineering aspects without giving due consideration to the actual experience of users. In their observation study, Manglai, (n.d.). find that even products which are considered highly repairable using standard criteria can also be perceived as difficult for users. The research shows an important difference between the repairability index of a product and its user-perceived repairability since many consumers struggle with opening a product, diagnosing faults, the complexity of repairs, and the fear of breaking a product when attempting repairs. Thus, it becomes clear that repairability should be considered not only from an engineering perspective but also psychologically (Manglai, n.d.).

The environmental impact assessment of repairability systems is another significant topic covered in the literature. The existing literature indicates that increased repairability lowers e-waste generation by preventing early disposal and ensuring an extended period during which the product functions efficiently (Baral & Misra, 2025). Increased repairability also means that there will be less need for primary raw material sourcing since fewer products will require replacement. Studies that include lifecycle assessment analysis indicate that the manufacturing stage of electronics accounts for the most carbon emissions; thus, increased repairability can lead to significant reduction in embodied carbon emissions by minimizing replacement rates (UCLouvain Thesis, n.d.). Scholars also claim that increased repairability lowers landfill volumes, prevents toxic waste leakage, and avoids environmentally damaging informal recycling processes that are common in developing countries (JoCE, 2024).

The literature also focuses on the connection between repairability and the circular economy. Repairability is always considered an important facilitator of circular economic systems since it enhances secondary markets including refurbishment, reselling, remanufacturing, and reuse (Baral & Misra, 2025). According to existing literature, repairability strategies can influence industrial production systems as they promote modular design, improve serviceability, and encourage sustainable consumption. Additionally, literature stresses the economic importance of repair ecosystems as they may create jobs in fields of repairing, diagnostics, spare parts logistics, refurbishment, and reverse logistics chains. This aspect is very important

for developing countries such as India where large-scale informal repair industries have emerged and due to affordability issues, people prefer to maintain their products by repairing and servicing them (Baral & Misra, 2025). Therefore, the concept of Repairability Indices can be viewed not only as an environmental tool but also as a tool for creating green jobs and fostering circular economies.

One other key theme that emerges from the literature concerns the difficulty associated with standardization and implementation. There are huge differences in the scoring systems, weightings, and criteria used by various Repairability Indices, thus making international comparison difficult (JoCE, 2024). Some authors argue that repairability indices, especially those like the French Repairability Index, are highly dependent on manufacturer self-assessment, leading to the risk of over-reporting, inconsistency, and greenwashing (UCLouvain Thesis, n.d.). This calls for the adoption of verification and validation procedures, transparent scoring methods, and third-party audit systems to enhance credibility and efficacy of repairability indices. The literature also points out the necessity of including parameters like software repairability, durability, upgradeability, and usability in future repairability indices because the existing systems cannot address all the aspects of modern electronics products (Manglai, n.d.).

This review of the literature indicates that the concept of repairability needs to be contextualized to social and economic environments instead of being transferred from one country to another. According to Baral and Misra (2025), there is a need for an indigenous Repairability Index in India taking into account aspects like multilingual communication, economic limitations, informal repair mechanisms, and regional imbalances in the repair infrastructure. The proposed model will have to consider factors like serviceability, technical capacity, availability of spare parts, and survivability to develop a more contextualized repairability index.

In general, the body of literature shows a wide consensus regarding the Repairability Index as becoming a valuable tool for environmental governance and sustainability policies. In sum, current research emphasizes that the concept of repairability plays a significant role in supporting the transition toward circular economy principles, climate change mitigation, sustainable production processes, waste reduction, and resource efficiency. Nevertheless, there are a number of issues that still remain unaddressed in the literature, including problems with standardization, underestimation of software restrictions, an overemphasis on technical aspects, insufficient incorporation of the user perspective, and the complexity of implementing this index in emerging economies. Future research increasingly calls for a multidimensional approach to understanding repairability.

Research Methodology

The study has been divided into two parts. The first part deals with exploring the theoretical aspects of the Repairability Index. As such, data collection for this part has been done through secondary sources. The concept of the French Repairability Index has been explored first. The structure and composition of it have been studied. Critical analysis of the index has been done alongside. Importance of the index with regards to environmental impact, circular economy, and employment generation in recycling sector has been studied. Afterwards, the proposed Indian Framework for Repairability Index in mobile end electronics sector has been explored as well. It has also been studied on the grounds as the French index. For these purposes, data was collected from official government websites. Also, scholarly articles related to analysis of the indices were also used as reference material.

The second part deals with conducting primary survey. Primary survey was conducted on mobile shop owners in Pune city, and the sample size was 200. A survey questionnaire was made for this purpose. Based on the findings of the survey, appropriate conclusions were drawn.

Data Analysis and Interpretation

Understanding the French Repairability Index

The French Repairability Index comes into force through AGEC Law (Law No. 2020-105 of 10 February 2020), which is an all-encompassing anti-waste law and circular economy law. The law is derived from France's commitment to reduce the impact of climate change and various subsequent laws like the law of energy transition for green growth, launched strategically in coincidence with the Paris Agreement signed in December 2015, and the French Climate Plan, 2017 (UNEP, 2021). The French Ministry of Ecological Transition oversees the operation of the index and scoring grids for different products.

Sectors and Products Covered

Starting from January 2021, the index was applicable to five types of products, namely: smartphones, laptops, televisions, washing machines, and lawn mowers (Right to Repair Europe, 2023). Such types of products were chosen based on market presence, ecological footprint, as well as the possibility of creating appropriate criteria to measure their repairability. Since 2024-2025, the country started replacing the Repairability Index for televisions and washing machines with the more general Durability Index that included criteria related not only to repairability but also reliability (TÜV SÜD, n.d.; Enviropass, 2024).

The Five Criteria and Their Weightage

There are five criteria assessed by the French index on which each product receives up to 20 points, which makes up a maximum of 100 points per product. The number is then divided by 10 and rounded off to the first digit after the decimal point. Thus, consumers receive scores out of 10. Below are the criteria used:
Criterion 1 - Documentation (20 points, 20%): This criterion is aimed at evaluating how much documentation (including serial numbers, disassembly guides, manuals, diagnostic tools, etc.) is provided by manufacturers to users and professional service providers. Criterion 2 - Ease of disassembly (20 points, 20%): This criterion is focused on assessing the ease of disassembly of a certain type of device, number and type of tools needed, as well as features of fasteners used. Criterion 3 - Availability of spare parts (20 points, 20%): This criterion is based on an evaluation of how committed manufacturers are to providing spare parts for their products and how long is the period during which spare parts are available. Criterion 4 - Price of spare parts (20 points, 20%): The focus of this criterion is on evaluating whether it is financially viable to repair a product rather than replace it. According to research, spare parts should not cost more than 30% of the retail price of the product (Manglai, n.d.). Criterion 5 - Product specific criteria (20 points, 20%).

Scoring Scheme and Display Criteria

The calculation of the score is done using a standardized Excel document provided by the French ministry of Ecological transition where parameters have to be filled. The legal obligation of sellers is to make it visible next to the price of the product at the moment of its sale either in person or online using color codes starting from red for poorly repairable products all the way to dark green for highly repairable products according to the energy efficiency labeling model (iFixit, 2022).

Strengths of the Index

The main structural advantage of the index consists in its simplicity and measurability. Being just one mark from 10 that is color-coded and shown on the spot of purchase, it can be easily understood by any

consumer regardless of his or her technical skills. The development of criteria in the course of a joint venture between various stakeholders ensured that the index was applicable in reality (HOP, 2022). The fact that the software-related criteria were included made the index forward-thinking because nowadays many devices go obsolete not due to hardware problems, but software-related ones (Right to Repair Europe, 2023).

Limitations of the Index

By far the biggest problem with the system is the lack of independent audit or verification of claims made by the companies about the scores, leading to the possibility of inflated scores due to self-reporting. Inquiries conducted by such organizations as iFixit and HOP have found discrepancies between company scores and those independently determined by such organizations (iFixit, 2022; HOP, 2022). While the principle of equal weightage is elegant, it might not capture accurately what actually determines the repair versus replacement decisions of customers, where cost is likely the deciding factor.

Among other problems with the scheme are the narrow range of products covered (five categories only), constant scores that do not factor in changes in the reparability of the device over its lifecycle (e.g. availability of spare parts after launch), lack of sanctions or effective measures to ensure compliance, and the absence of environmental benefits in terms of CO2 reduction and resource conservation.

Other important shortcomings are the effects of rebound, where the repairing of old equipment increases their lifespan yet increases their energy use during the usage phase. The index considers the design aspects of the products, although it fails to address the systemic problems that result in excessive consumption such as advertisement, fashion cycles, and growth economy-driven systems.

Environmental Impact

The environmental benefits of the Repairability Index include several dimensions. First, the primary positive environmental consequence relates to the decrease in electronic waste because prolonging the use of one's smartphone by just one year prevents the release of emissions from mining, production, processing, and transportation of another phone. With more than 50 million tonnes of electronic waste produced annually, small improvements in repair rates would result in substantial amounts of waste (Bovea et al., 2025).

Resource conservation can be considered a second dimension since electronic products require various raw materials like cobalt, lithium, rare earth elements, gold, and palladium, whose extraction is both ecologically unsustainable and geographically limited. According to the AGEC Law, increasing plastic recycling rates may lead to reducing emissions by eight million tonnes of CO_2 equivalents per year in France alone (UNEP, 2021). In addition to material benefits, the index promotes repairs as something that consumers should expect, which will contribute to gradual changes in their habits (Bovea et al., 2025).

Circular Economy Implications

Repair occupies a privileged position within this hierarchy because it preserves the maximum value embodied in a product. When a product is recycled, the energy and labour invested in its manufacture are lost; only the raw materials are recovered, and often imperfectly. When a product is repaired, its full embedded value; materials, manufacturing energy, design, and assembly; is preserved (Bovea et al., 2025).

France's AGEC Law explicitly frames the Repairability Index within its Roadmap for the Circular Economy, developed through extensive stakeholder engagement in 2017-2018 (UNEP, 2021). The European Union's Circular Economy Action Plan further reinforces this approach by committing to ensure consumers receive "trustworthy and relevant information on purchased products, including their lifespan and availability of repair services, spare parts, and repair manuals" (EEA, n.d.).

Employment Generation in the Repair and Recycling Ecosystem

The impact of the Repairability Index on employment cannot be understated, but is often underrated. To have a repair economy, you need people with diagnostic abilities, mechanics, supply chains for parts, and customer support. In contrast to the production process, which is very much mechanized and often outsourced to other countries, repair is localized and relies heavily on labor. Thus, it is accessible to small enterprises and entrepreneurial start-ups with limited capital (Bovea et al., 2025). As such, recycling, more than production, has a lot of implication in terms of employment generation.

Connecting with International Climate Resolutions

The Paris Agreement

Adopted by 195 countries at COP21 held in December 2015, the Paris Agreement aims to keep global warming below 2°C compared to the pre-industrial level, and if possible, within 1.5°C (United Nations Framework Convention on Climate Change [UNFCCC], 2015). Meeting the objectives will require peaking greenhouse gases emissions before 2025 and then reducing them by 43% by 2030. UNFCCC has stated explicitly that transitioning towards a circular economy is indispensable for the realization of the goals under the Paris Agreement (UNFCCC, 2019). According to the Circularity Gap Report 2019, 62% of all global greenhouse gas emissions, except the ones resulting from land use and forestry activities, result from the extraction, processing, and manufacturing of products (Circle Economy, 2019). Through the extension of life cycles of products and reduction of demand for new manufacturing, the Repairability Index directly helps reduce emissions from the production sector.

United Nations Sustainable Development Goals

The Repairability Index aligns with various SDGs. For instance, SDG 12 (Responsible Consumption and Production) seems to be the SDG whose interests can be directly advanced by the use of such an index since the latter supports responsible consumption and production of products. SDG 13 (Climate Action) can also benefit from the use of the index through reduced emissions due to increased product life span. SDGs 8 (Decent Work and Economic Growth) and 9 (Industry, Innovation, and Infrastructure) will also benefit from employment in the repair industry and innovative product design (Bovea et al., 2025).

Understanding the Indian Framework of Repairability Index

In September 2024, the Department of Consumer Affairs set up a committee headed by Mr Bharat Khera, Additional Secretary, which would come out with guidelines for establishing a Repairability Index. The members of the committee included people from MeitY, MSME, National Test House, Indian Cellular Electronics Association, as well as industry associations such as Apple, Samsung, Google, Vivo, HMD Mobiles, Dell, and HP, along with consumers' bodies like EPIC (PIB, 2024; PIB, 2025a). The committee submitted its report to Secretary Nidhi Khare in May 2025.

Sectors and Products Covered

The early adopters of this index are smartphones and tablets. The reason for selecting such products is due to the size of the Indian smartphone market and increase in consumer complaints from 19,057 in 2022-23 to 22,864 in 2024-25 as cited by the National Consumer Helpline (PIB, 2025a). In addition, the vision involves four sectors that have already been included in the portal of the Right to Repair in India which includes Automobiles, Mobile and Electronics, Consumer Durables, and Farming Equipment (DoCA, 2024).

The Six Criteria

The six criteria considered while determining repairability through the Indian approach include: (a) Disassembly Depth; which entails the number of components that need to be disassembled in order to reach the component that requires repair; (b) Repair Information; which determines whether any manual is available for repair; (c) Spare Parts Availability; which examines how easily spare parts can be accessed and how much time they take in delivery; (d) Software Updates; which determine the time taken for software and operating system update; (e) Tools; which assess whether standard or proprietary tools are required and; (f) Fasteners, which assess whether standard or proprietary fasteners are required (Civilsdaily, 2025). The scoring process involves the following 11 priority components: battery, display, front camera, rear camera, charging port, microphone, speaker, SIM tray, buttons, back panel, and hinge mechanism (Insights on India, 2025).

Scoring Scheme and Display Criteria

The final score of the Repairability Index is determined on a five-point numerical scale based on the summing up of weightage scores assigned to priority parts. If the Score is 1, it means that the product poses high risks of damage and will need to be dismantled into many parts; if it is 5, it means that products can provide direct access to important parts without having to dismantle the product. Original Equipment Manufacturers (OEMs) need to declare the RI without any compliance burden additionally (PIB, 2025a).

Environmental Impact and Employment Generation

E-waste produced in India annually amounts to about 3.2 million tonnes, putting the country in the third position across the world. The RI, which promotes increased use of products and repairs, will go a long way in cutting down this figure. The RI conforms to India's commitment to the Paris Agreement and SDG 12, and is linked to other circular economy objectives like the National Action Plan on Climate Change and E-Waste Management Rules (PIB, 2025a).

Potential for job creation is high. Informal labor forms an important part of the repair ecosystem in India, and the principle of RI gives power to informal workers and facilitates their transition into formal sectors through mandatory manufacturer disclosure. Unmaking, which means designing items that can be easily repaired and reused, makes informal repairers pivotal to sustainability in the circular economy.

Connecting with Our Climate Resolutions

This concept helps shift the culture from that of treating products as disposable goods to seeing them as valuable possessions which should be maintained and cared for. According to the Indian guidelines, this goal can be achieved through a transition from "wasteful consumption" to "thoughtful use" of resources (PIB, 2025a). This terminology is consistent with sustainability theories as well as with traditional philosophies about responsible management of resources. The index also serves as an implementation of the Polluter Pays Principle because it forces producers to justify their repair score claims (DoCA, 2024). This is in line with the 1992 Rio Earth Summit, which spoke about the Polluter Pays Principle.

Repairability Index and Extended Producer Responsibility

India has one of the most elaborate Extended Producer Responsibility systems that exist in the world of developing countries. The EPR system, which is based on the polluter pays principle, makes PIBOs both legally and physically liable for the full lifecycle of their products, from waste collection to recycling, up to the proper and environmentally safe disposal of the product waste. This system is managed by the Ministry of Environment, Forest & Climate Change (MoEFCC), while enforcement is carried out Central Pollution Control Board (CPCB) and State Pollution Control Boards (PIB, 2026).

The Repairability Index and EPR are not separate and parallel policies; on the contrary, they are complementary policies working at different stages of one and the same life cycle of the goods, focusing on the general goal of transitioning towards the circular economy paradigm. While EPR works at the end-of-life stage, securing producer responsibility for collecting, recycling, and disposal of the goods, the Repairability Index works at the moment of purchase and usage, encouraging designing products with longer lifetimes and enabling consumers to choose repairable products (UNEP, 2021).

These tools together create a lifecycle approach to governance. Design stage: the RI encourages eco-design, through modular construction, standard fasteners, and easy-to-access components; EPR's eco-design incentive (producers who design their products for recyclability incur fewer costs at end-of-life) complements this from the reverse direction. Purchase stage: The RI label creates demand for repairable products in the market. Use and maintenance stage: Spare parts availability, documentation, and software updates as required by the RI keep the product functioning for more years, each one adding another year of waste reduction, thus lowering the volume that falls under EPR requirements. End-of-life stage: EPR ensures environmental disposal of the material, whereas design for disassembly as specified by the RI makes the recycling process much simpler (PIB, 2025a).

Conclusion of the Theoretical Analysis of Repairability Index

It is an extremely rare occurrence where a policy initiative like the Repairability Index, initiated in France and currently under consideration in India and elsewhere, not only meets three vital objectives but does so by addressing a problem that exists in the real world. It helps in fulfilling our international commitment toward climate change while providing employment and allowing the consumer to exercise his/her choice sustainably (EEA, n.d.; PIB, 2025a).

These limitations; such as self-reporting hazards, lack of product scope, difficulty enforcing the policy, and absence of a consumption reform mechanism; are legitimate, but they are surmountable through fine-tuning of the policy. In light of the success of the index in France, where there was an almost 20% improvement in the number of participating products within one year (EEA, n.d.), the potential is great.

Primary Survey on the Mobile Shop Owners in Pune City

Findings of this part are based on an empirical study that was conducted in Pune amongst 200 mobile shopkeepers in Pune city. The purpose of this study was to gain knowledge of the economics of repair at the very grassroots level, and the findings will provide an empirical base that can be used in the policy discussion relating to the Repairability Index which is under development by the Government of India.

As the Department of Consumer Affairs of the Government of India formulates a framework of a Repairability Index for the mobile and electronics industry in the wake of the submission of the report by the expert committee in May 2025, it is pertinent to have an idea about the reality of repair economy in the society. For instance, as one of the largest metropolitan cities of India having a total population of over 7 million people, Pune provides a useful example in this regard. There are different kinds of mobile shops in the city including single counter shops in the residential area and multi brand shops in the commercial areas.

The survey was done on the shop owners and managers at various commercial centers located in Pune. The sample size of 200 was chosen to reflect the differences in the environment for mobile retail and repair services. These differences are reflected not only in the size but also in the nature of the business conducted in these shops. Some shops concentrated on selling mobiles while others made a significant part of their income from repairing the devices.

Objectives of the Study

1. To analyze profit earned from mobile sales and repair services
2. To study income generated from e-waste
3. To understand salary structure of mobile repair technicians
4. To identify major sources of income for mobile shopkeepers

Findings of the Study

Following are some of the major findings of the survey conducted:

1. Profit Analysis: Mobile Sales versus Repair Services

The most notable aspect regarding the findings of this survey is the huge difference in the profit margins for the sale of mobile phones and the repair service. The figures obtained in this regard are as provided below in table 1. In this case, it should be pointed out that despite being more apparent, new mobile sales make less profit than repair services.

Table 1
Profit Analysis: Mobile Sales versus Repair Services

Category	Monthly Profit (₹)	Margin	Remarks
New Mobile Sales (Small Shop)	20,000 - 60,000	3-8%	Depends on sales volume and brand mix
New Mobile Sales (Medium Shop)	60,000 - 1,50,000	3-8%	Better location and footfall advantage
Repair Services (Small Shop)	30,000 - 80,000	30-60%	High margin; skill dependent
Repair Services (Busy Shop)	80,000 - 2,00,000	30-60%	Premium location; advanced skill set

Profit margins for new mobile phones, regardless of whether they are sold in small or medium establishments, remain very low at about 3%-8%. In small shops dealing in new phones, the profit margin recorded was between ₹20,000 and ₹60,000 per month. These margins depended on sales volumes, brand variety, and demand for products. In medium-sized shops, which had advantages like better locations and high customer traffic, along with more options when it comes to selecting their brands, their profit margins ranged between ₹60,000 and ₹1,50,000 per month. Even at this profit margin, there is a ceiling since manufacturers use standardized pricing policies for their products, and the level of price competition in the Indian mobile market is very intense.

In contrast, the profit margins for repair service range between 30% to 60%; 10 times greater compared to new devices sold. According to small repair stores, their profit margins from repair services were around ₹30,000 to ₹80,000 per month, whereas busy repair stores located at commercial places reported profits ranging from ₹80,000 to ₹2,00,000 per month due to their repair services. This substantial disparity in the margins earned from repairs is because repairing involves laborious activities, which require the skills of professionals; the rate of repair services depends on their expertise rather than any standard margin.

Such a finding clearly has distinct ramifications for the Repairability Index. It can be seen from the survey results that repair activities are already a more profitable endeavor for mobile shops in Pune. Assuming that the Repairability Index accomplishes its aim of raising consumer interest in repair practices by making

products more visible as repairable options through the use of an index rating system, as well as through requirements for spare parts and proper repair record keeping, it will be even more successful in providing a sound economic basis to an enterprise that has already been profitable for a large portion of the surveyed shops.

2. Technician Salary Structure and Skill Hierarchy

A well-defined three-level wage scale was evident from the survey results for mobile technicians in Pune, indicative of the skill ladder prevalent within India's informal repair sector. The details are shown in Table 2 below.

Table 2
Mobile Repair Technician Salary Structure by Experience Level

Experience Level	Monthly Salary (₹)	Remarks
Beginner (0-1 year)	8,000 - 15,000	Trainee / Helper
Intermediate (1-3 years)	15,000 - 25,000	Regular technician handling standard repairs
Experienced (3+ years)	25,000 - 40,000+	Advanced repairs including micro-soldering

At the beginner level of the industry, where workers have a working experience of zero to one year and work as apprentices, they are paid between ₹8,000 and ₹15,000 monthly. This is because these workers are involved only in carrying out repetitive jobs like applying screen guards, transferring data, software installation, and carrying out minor diagnostic jobs. The low pay is indicative of the learning process that they go through as well as the low significance of their contribution to the value chain, but it also shows how easily accessible the job is.

Technicians with intermediate levels of experience, which range between one and three years, are paid a salary ranging from ₹15,000 to ₹25,000 per month. They are capable of performing basic repairs, such as changing screens, batteries, fixing charging ports, and troubleshooting issues with the software of electronic devices. They make much more money than technicians at the beginning level of their careers.

Highly experienced technicians with more than three years of experience are paid a salary ranging from ₹25,000 to ₹40,000 per month or even more in some cases. They are experts in dealing with difficult repair cases, including motherboard-level soldering jobs, chip replacement, repairing water damages, and advanced diagnostic testing. Some highly qualified technicians even share in the revenues generated by a shop.

A very important conclusion that emerges from the results of this survey is that experience is highly valued above educational qualifications in the mobile repair sector. Most of the respondents confirmed the fact that the skill level, technical intuition, and hands-on experience of technicians, which are described as "tacit knowledge" in the wider context of the Indian repair economy, are what make a technician valuable and pay the wages. It is especially important for planning skill certification schemes linked to the Repairability Index because any certification scheme should include experiential learning rather than just classroom qualifications.

3. Electronic Waste Earnings

The research looked at the amount of money made through the disposal of e-waste, which included old phones and accessories that no longer function. The profits made per unit of the different types of e-waste are indicated in Table 3.

Table 3
E-Waste Earnings by Item Category

E-Waste Item	Earnings per Unit (₹)
Dead Smartphone (complete unit)	50 - 300
Motherboard	80 - 250
Battery	10 - 30
Broken Screen / Display	50 - 150
Chargers / Cables	5 - 20

Dead phones vary in price from ₹50 to ₹300 each, based on brands, models, ages, and conditions, once sold to aggregators and scrap merchants. Motherboards; which contain metals that can be extracted such as gold, copper, and palladium; cost relatively more with prices ranging from ₹80 to ₹250 each. Batteries, despite having valuable metals such as lithium and cobalt that can be recycled, command lower prices at ₹10 to ₹30 each because of their lower volume and ineffective logistics system for collection. Broken screens and displays are worth ₹50 to ₹150 each and can either be repaired or have their parts salvaged. Chargers and cords are considered the least valuable and earn the lowest income of ₹5 to ₹20 each.

E-waste income, as reported by surveyed shops, falls within the range of ₹1,000 to ₹15,000 per month, making it clearly a supplementary source of income and not a primary profit center for shops. The wide variation is largely determined by factors such as shop size, number of customers, and whether the shopkeeper actively engages in collecting e-waste. E-waste appears to be a by-product of repair shops' services, earning incidental income for the shopkeepers whenever they choose to sell them to wandering scrap merchants.

This is a very important consideration in the context of using the Repairability Index in the Indian EPR framework. The E-Waste (Management) Rules, 2022, in which producer responsibility is assigned for the collection and environmentally safe recycling of the e-waste, depend significantly on the channeling of the waste through formal channels from the point of origin to the officially registered recyclers. In this regard, the survey results reveal that even though mobile shops play an important role in the process of generating e-waste, there is no adequate economic incentive for shopkeepers to become engaged in the formal EPR system. Shopkeepers earn little money from each unit of informally recycled e-waste, and therefore they are unable to contribute adequately to the formal EPR system.

Major Findings and Discussion

Four key results emerge from the survey, which need to be mentioned when considering the implications of the Repairability Index for circular economy policies.

To begin with, the provision of repair services is significantly more profitable than the sale of new mobile phones. Whereas repair generates up to a 60% profit margin, selling mobile phones brings only 3-8% profit. These numbers indicate that the economics of repair, rather than sales, is already what sustains the operations of the mobile phone shops. This refutes the idea, prevalent among policymakers, that the shop

owners should be convinced into embracing repair, for they would do this anyway. What needs to happen is to enhance their incentives to do repair by stimulating consumer demand for repairable products.

Second, accessories and supplementary services account for a substantial share of income as well. In addition to the sale of devices and repairs, some income is generated from accessory sales such as phone cases, screen protectors, charging cords, earphones, additional services such as data transfers to cloud storage and software installation, and, in some cases, sales of used devices. The wide variety of sources for income implies that the mobile shops are multi-service businesses, not single-product stores.

Thirdly, the e-waste system yields supplemental revenues but does not contribute much to the bottom line. Although the amount of e-waste generated from 200 stores may be non-negligible, the value per store is low. The discrepancy between the environmental benefits (material recovery, pollution prevention, EPR fulfillment) that should accrue from responsible e-waste recycling and the actual revenues obtained by the shops constitutes a market failure that needs to be corrected. Until it is more lucrative for the shops to dispose of e-waste through the proper channels, their informal and inefficient e-waste disposal practice will continue.

Fourth, practical knowledge and experience play a more significant role in determining the competence and pay of the technicians than formal schooling. In this respect, the current study confirms what has been shown elsewhere in the literature about the informal repair economy in India. The Repairability Index, through its requirements for documentation of repairs and technical information, provides an avenue to link the practical knowledge possessed by skilled technicians to formal information systems required by policymakers. The task will be to design this link such that existing repair workers are empowered rather than sidelined by 'not having the right credentials'.

Conclusion of the Survey

Empirically speaking, the primary survey carried out by interviewing 200 mobile shopkeepers in Pune is encouraging as well as instructive in many ways for building the Repairability Index. The repair industry in economic terms is very active with profit margins much higher than in case of sale of new devices. It comprises of multi-level workers who acquire their skills not through theoretical training but rather through on-the-job experience.

On the other hand, there is clearly a need for a number of policy interventions. As far as the issue of e-waste disposal is concerned, the approach of mobile shops to this problem is largely unstructured and economically marginal. There should be certain incentives provided to mobile shops in order to integrate them into the EPR system. In addition, there is clearly room for improvement in remuneration of mobile repair technicians despite their structured skill hierarchy.

Collectively, all this confirms the key tenet of the Repairability Index, which holds that an appropriate regulatory mechanism, through its ability to increase product repairability visibility, availability of spare parts, creation of repair manuals, and enabling the work of the repair labor force, can turn the mobile repair industry into a legitimate, scalable, and government-endorsed component of the circular economy of India. The lessons learned from mobile repair workshops in Pune indicate that the necessary economic conditions for such a shift are already present, and only a proper institutional framework remains missing.

Conclusion of the Study

For India, in particular, the prospects are indeed revolutionary. As a country that possesses not only a very strong repairing tradition but also a huge number of informal repair workers, a steadily growing problem of e-waste, and youth population that needs employment, India has much to gain from a properly designed and implemented Repairability Index working together with an effective EPR system. The committee's

report of May 2025 gives a great starting point; however, the effectiveness of the next steps will define the extent to which the potential of this policy tool is achieved.

The Repairability Index cannot be considered, by itself, a remedy to the problem of global warming or the issue of e-waste. Nevertheless, the tool represents one of the most realistic approaches to making the move from a linear system to a circular one. In the mathematics of global warming, however, the sum total of such approaches makes all the difference. Combined with ground level work such as upskilling of the repair shop employees, incentivizing repair rather than repurchase, may go a long way in our quest towards sustainability.

References

1. Baral, S. R., & Misra, S. C. (2025). Electronics "Repairability Index" for India: A sustainable and consumer reliable framework for controlling e-waste generation. *ResearchGate*. https://www.researchgate.net/publication/393167675_Electronics_Repairability_Index_for_India_A_sustainable_and_consumer_reliable_framework_for_controlling_e-waste_generation
2. Bovea, M. D., Ibanez-Fores, V., Perez-Belis, V., & Quemades-Beltran, P. (2025). Repairable electronic products for the circular economy: A review of design for repair features, practices and measures to contrast obsolescence. *Discover Sustainability, 6*(1). https://doi.org/10.1007/s43621-024-00753-x
3. Circle Economy. (2019). *The Circularity Gap Report 2019.* https://www.circularity-gap.world/2019
4. Civilsdaily. (2025, June 9). Repairability Index (RI) for mobile and electronics sector. *https://www.civilsdaily.com/news/repairability-index-ri-for-mobile-and-electronics-sector/*
5. Department of Consumer Affairs. (2024, September). *Centre constitutes committee for formulating framework on Repairability Index in mobile and electronics sector* [Press release]. Press Information Bureau. https://www.pib.gov.in/PressReleasePage.aspx?PRID=2058218
6. Enviropass. (2024, November 5). Durability Index and repairability in France. *https://getenviropass.com/durability-index/*
7. European Environment Agency. (n.d.). Data on products evaluated against the French repairability index. *Circularity Metrics Lab.* https://www.eea.europa.eu/en/circularity/
8. Halte à l'Obsolescence Programmée. (2022). *The French repairability index* [Report]. https://www.halteobsolescence.org/
9. iFixit. (2022). French Repair Index: One year later. *https://www.ifixit.com/News/64508/french-repair-index-one-year-later*
10. Insights on India. (2025, May 5). Repairability Index in India: Boosting consumer rights and e-waste management. *https://www.insightsonindia.com/2025/05/05/repairability-index/*
11. Journal of Circular Economy. (2024). Repairability index and circular economy transitions. https://circulareconomyjournal.org/ojs/JoCE/article/view/221
12. Manglai. (n.d.). Repairability Index: What is it? *https://www.manglai.io/en/glossary/repairability-index*
13. *Procedia CIRP* article on repairability assessment frameworks. (2024). Elsevier. https://www.sciencedirect.com/science/article/pii/S2212827124001355
14. Press Information Bureau. (2024). Centre constitutes committee for formulating framework on Repairability Index (PRID 2058218). Government of India.

15. Press Information Bureau. (2025a, May 3). Report for framework on Repairability Index (RI) in mobile and electronic sector submitted (PRID 2126409). Government of India. https://www.pib.gov.in/PressReleasePage.aspx?PRID=2126409
16. Press Information Bureau. (2026, March 23). Circular economy framework and Extended Producer Responsibility [Parliament question] (PRID 2244104). Government of India. https://www.pib.gov.in/PressReleasePage.aspx?PRID=2244104
17. Repairability index. (n.d.). https://www.oneplanetnetwork.org/sites/default/files/from-crm/23_02_02_Case_Index.pdf
18. Right to Repair Europe. (2023, February 7). The French repair index: Challenges and opportunities. *https://repair.eu/news/the-french-repair-index-challenges-and-opportunities/*
19. TÜV SÜD. (n.d.). Repairability testing. *https://www.tuvsud.com/en-in/services/testing/repairability-testing*
20. United Nations Environment Programme. (2021). The French approach to circular economy and coherent product policies. *UNEP Circularity Platform.* https://buildingcircularity.org/
21. United Nations Framework Convention on Climate Change. (2019). Circular economy crucial for Paris climate goals. *https://unfccc.int/news/circular-economy-crucial-for-paris-climate-goals*
22. Université catholique de Louvain Thesis. (n.d.). *Repairability assessment and circular economy frameworks*. https://thesis.dial.uclouvain.be/bitstreams/ade0141c-7977-4e9d-af48-0a869bd2aa68/download