

RETHINKING E-WASTE:

Adressing the policy gap in E-waste
managment frameworks in Albania,
North Macedonia, and Serbia

RETHINKING E-WASTE: ADDRESSING THE POLICY GAP IN E-WASTE MANAGEMENT FRAMEWORKS IN ALBANIA, NORTH MACEDONIA, AND SERBIA

This Policy Paper is prepared by the Digital Transformation & Green Transition Team of the Regional Youth Leadership Mobility Programme 2025/2026 (RYLMP).

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The views in this document are solely of the authors and do not necessarily reflect the views of the project cohort nor the Open Society Foundation Western Balkans (OSFWB).

List of Abbreviations

Abbreviation	Full Term
AKEM	National Waste Economy Agency (Albania)
AKM	National Environmental Agency (Albania)
CABI	Centre for Agriculture and Bioscience International
EPR	Extended Producer Responsibility
EU	European Union
EEE	Electrical and Electronic Equipment
IES	Integrated Environmental System (Albania)
ILO	International Labor Organization
INSTAT	Institute of Statistics (Albania)
IPA III	Instrument for Pre-Accession Assistance III
ITU	International Telecommunication Union
NALED	National Alliance for Local Economic Development
NRIZ	National Register of Pollution Sources (Serbia)
OSF	Open Society Foundations
PRO	Producer Responsibility Organization
SEPA	Serbian Environmental Protection Agency
SIM	Integrated Environmental System (Albania)
UNEP	United Nations Environment Programme
UNITAR	United Nations Institute for Training and Research
WB	Western Balkans
WEEE	Waste Electrical and Electronic Equipment

Executive summary

Albania, North Macedonia, and Serbia share a common policy gap in e-waste management: despite incorporating EU standards into national legislation, implementation remains fragmented. Weak extended producer responsibility (EPR) systems, inadequate digital reporting, limited enforcement capacity, and unclear municipal responsibilities prevent legal commitments from translating into effective e-waste management. As the fastest-growing waste stream globally and a key component of EU accession Chapter 27, closing this implementation gap is both an environmental priority and a test of administrative capacity. While the three countries are at different stages of implementation, they face broadly similar structural challenges. Albania has recently established EPR through Law No. 74/2025, but implementation is deferred until December 2026 and key bylaws remain pending. Serbia has significant legislative gaps, with 103 of 248 WEEE Directive obligations not transposed and no fully functioning WEEE compliance scheme. North Macedonia has an established EPR framework, yet its collection rate of approximately 17% remains well below the 40% target for 2025. The paper proposes four priorities: establishing a regional e-waste data registry with harmonized reporting standards; operationalizing EPR through mandatory producer registration and financial guarantees; strengthening municipal responsibilities and resources; and coordinating a regional public awareness campaign. Regional cooperation is essential because e-waste flows cross borders, while shared Chapter 27 obligations provide an existing basis for coordinated action. Addressing these gaps would improve environmental protection, resource recovery, and progress toward EU accession requirements.

1. Introduction

1.1 Background

Electronic waste (e-waste), known in EU law as Waste Electrical and Electronic Equipment (WEEE), comprises discarded electrical and electronic devices and their components, including household appliances, IT equipment, mobile phones, batteries, and consumer electronics (Directive 2002/96/EC, later recast as Directive 2012/19/EU). As digital technologies become increasingly embedded in everyday life, e-waste has emerged as the fastest-growing waste stream globally.

According to the Global E-waste Monitor 2024 (Baldé et al., 2024), a record 62 million tonnes of e-waste was generated globally in 2022, which represents an 82% increase since 2010. Yet, only 22.3% was formally collected and recycled. This means that for every tonne responsibly processed, roughly four more go unmanaged, releasing toxic substances such as lead and mercury, and forfeiting USD 91 billion in recoverable critical raw materials annually. The primary drivers of this phenomenon are accelerating digital consumption, shorter product lifespans, and inadequate waste management infrastructure across much of the world. With volumes projected to reach 82 million tonnes by 2030 (ITU & UNITAR, 2024), the gap between e-waste generation and documented recycling is widening at a pace that demands urgent intervention.

Within the EU, e-waste governance forms a central pillar of the Circular Economy Action Plan and the Directive 2012/19/EU (the WEEE Directive), which require Member States to establish extended producer responsibility (EPR) systems, meet collection and recycling targets, and implement transparent reporting mechanisms. These measures are directly linked to the EU's broader objectives of reducing dependency on primary raw material extraction and achieving climate neutrality by 2050. Effective e-waste management is therefore not only an environmental necessity but also a strategic component of economic resilience and resource security.

For EU accession countries in the Western Balkans, alignment with these standards represents both an obligation and a structural challenge. While Albania, North Macedonia and Serbia have all incorporated EU waste standards into their national legislation under Chapter 27 (in the EU accession process, the policy area dedicated to Environment and Climate Change), the extent of their regulatory alignment varies significantly, and practical implementation remains uneven. Regional monitoring data (Iattoni et al., 2023) indicate a substantial increase in e-waste generation across the Western Balkans over the past decade, while formal collection systems, digital reporting infrastructure, and enforcement capacity remain underdeveloped. This creates a dual pressure: accelerating digital transformation increases device turnover and e-waste volumes, while institutional systems struggle to manage end-of-life equipment effectively.

E-waste sits at the intersection of the three defining policy agendas shaping EU accession today: environmental protection, circular economy, and digital transformation. For accession countries, the ability to operationalize effective e-waste governance serves as both a test of regulatory alignment and an indicator of administrative capacity.

1.2 Problem Statement

Current e-waste management systems in Albania, North Macedonia, and Serbia share a set of interconnected challenges: extended producer responsibility schemes are either absent or at the initial stage of implementation, while reporting and data collection systems lack clarity and reliability, thereby limiting the ability of governments to verify figures on how much e-waste is generated, how much is collected, and whether licensed operators are treating it as required. Furthermore, institutional capacity is uneven, with enforcement concentrated at the national level while municipalities, the bodies closest to actual waste flows,

face ongoing challenges in fully leveraging existing capabilities and instruments to ensure effective compliance. Finally, the critical lack of collection points and specialized recycling facilities remains a crucial systematic constraint in all three countries.

These issues carry concrete environmental and institutional costs. Unmanaged e-waste is a direct source of hazardous substances including lead, cadmium, and brominated flame retardants that contaminate soil and groundwater when improperly dumped or informally dismantled. At the same time, the absence of functioning systems means that valuable critical raw materials are lost rather than re-entering the supply chain, undermining both environmental sustainability and economic efficiency.

A comparative analysis of Albania, North Macedonia, and Serbia suggests that their weaknesses, while shaped by different national histories and legislative timelines, stem from the same structural causes: unresolved EPR issues, insufficient digital reporting, and fragmented institutional responsibilities. This makes it possible to identify common solutions rather than treating each country as an isolated case. Furthermore, a regional comparison allows neighboring regions to harmonize their strategies and invest in the coordinated infrastructure necessary to transform waste challenges into sustainable opportunities. Practically, e-waste does not respect national borders: informal cross-border flows of end-of-life electronics are documented across the Western Balkans, meaning that a strong framework in one country can be undermined by the absence of one in a neighboring state.

1.3 Policy Gap

The policy gap this paper addresses is the absence of a fully aligned, comprehensive, and effectively enforced e-waste management framework across Albania, North Macedonia, and Serbia that integrates: 1) extended producer responsibility (EPR), 2) digital reporting and transparency mechanisms, and 3) clearly defined institutional obligations at both national and local levels.

2. Literature Review

The literature for this review was selected through an approach focused on relevance to e-waste governance in the Western Balkans, with priority being given to authoritative regional sources that provided harmonized, cross-country data and comparable regional indicators. These reports were complemented with national legislation, government reports, and country-specific studies in order to capture the implementation and institutional realities at the local level.

The rapid growth of electronic waste has positioned e-waste governance at the center of global environmental policy debates. At the regional level, the ITU/UNEP/UNITAR Regional E-waste Monitor for the Western Balkans (Iattoni et al., 2023) offers the most comprehensive assessment. ITU's Policy Practices for E-waste Management (2025) situates this within a broader international framework, identifying digital reporting systems and functional EPR as the two most critical enablers of WEEE compliance globally. Two further sources, namely the OSF Western Balkans report on open data and digitalization (2024) and the Policy Report on Digital Transformation in the Western Balkans (Bajic et al., 2024), establish that digital infrastructure for regulatory compliance remains underdeveloped across the region, directly affecting the ability of governments to track e-waste flows and enforce producer obligations. These sources confirm that the failures documented at a national level are structural and shared, making a coordinated regional response both analytically justified and practically necessary.

2.1 Extended Producer Responsibility (EPR)

In the realm of environmental policy, EPR represents a shift from traditional waste management to a "modern" accountability model. Fundamentally, EPR is a policy approach

that reassigns the financial and physical responsibility for a product's end-of-life treatment from the public sector to the original producers and importers.

In theory, this creates a strong economic incentive: by making manufacturers pay for the disposal of their own goods, they are encouraged to adopt sustainable strategies that improve product durability, ease of repair, and recyclability. However, transitioning from theory to practice often reveals a significant "implementation gap". Furthermore, compliance is frequently undermined by the dominance of the informal sector, which strips valuable materials without meeting environmental standards. For this policy framework to succeed, it must move beyond legal transposition to establish digital tracking systems and sustainable financial mechanisms that ensure all market players are held to the same rigorous standards.

2.2 E-Waste Governance in Albania, North Macedonia, and Serbia

Albania

The management of electronic waste (WEEE) in Albania is currently shifting from a collection of outdated directives to circular economy by prioritizing the circular principles of reduce, reuse and recycle.

The enforcement of Law No. 74/2025 "On Integrated Waste Management" aims to address the long-standing implementation gap by operationalizing EPR, thereby establishing a strategic long-term framework for sustainable resource recovery while contributing to the European Union's 2050 climate neutrality objectives. The law repeals and replaces Law No. 10463, dated 22.09.2011 "On Integrated Waste Management;" Law No. 10431, dated 09.06.2011 "On Environmental Protection;" Decision of the Council of Ministers No. 418, dated 25.06.2014 "On Differentiated Waste Collection at Source;" and Decision of the Council of Ministers No. 957, dated 19.12.2012 "On Waste from Electrical and Electronic Equipment," consolidating the regulatory framework for integrated waste management. However, it is important to note that Law no 74/2025 will take effect starting from 1 December 2026.

Furthermore, Albania is a Party to the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal, the Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade, and the Minamata Convention on Mercury.

Over the past two years, Albania has also established two central institutions: the National Waste Economy Agency (AKEM) and the National Environmental Agency (AKM), as part of the Law No. 74/2025 "On Integrated Waste Management." At the central level, the authorities responsible for integrated waste management are primarily tasked with policy-making, regulatory oversight, monitoring, and enforcement. The Ministry of Tourism and Environment develops policies, legislation, and standards, prepares the National Strategy and action plan for integrated waste management, and promotes public awareness and education campaigns. AKEM coordinates with central and local authorities, international partners, and investors in the planning, development, operation, and monitoring of end-of-line and end-of-pipe waste treatment infrastructure, supports municipalities in implementing separate collection and recovery programs, and promotes the market for recovered products.

According to the Albanian government, the "Strategic Policy Document and National Plan for Integrated Waste Management 2020-2035" will require all businesses that import or generate e-waste, in accordance with the EPR principle, to establish separate or joint management schemes with municipalities and other stakeholders to ensure proper recovery, recycling, and treatment of waste by 2035.

Despite these policy and institutional reforms, implementation remains a significant challenge. Latest estimates show that Albania generated approx. 24 million kg of e-waste in 2022, equivalent to 8.3 kg per capita, while lacking the robust collection infrastructure required to manage this stream (Iattoni et al., 2023).

Overall, Albania is progressing toward alignment with EU standards through ongoing improvements in its legislative framework. However, implementation remains limited, with insufficient infrastructure and ongoing challenges in the development and effective functioning of separate waste collection systems, including for e-waste (European Commission, 2025).

North Macedonia

In North Macedonia, e-waste management is regulated through a framework aligned with the EU acquis, primarily via the Law on Management of Electrical and Electronic Equipment and Waste Electrical and Electronic Equipment, the Law on Extended Producer Responsibility, and the Law on Waste Management. These laws require producers and importers to finance and organize separate collection, treatment, and environmentally sound disposal of e-waste under the supervision of the Ministry of Environment and Physical Planning. The framework sets progressively increasing collection targets (40% in 2025 to 65% by 2028), reflecting the country's formal alignment with EU directives.

The implementation of this framework relies on three main Producer Responsibility Organizations (PROs) and licensed companies involved in collection and treatment, while municipalities are legally obliged to provide separate e-waste collection points. Electrical and electronic equipment (EEE) placed on the market in 2021 was around 32.5 kt, with 18.6 kt of e-waste generated. Much of this e-waste is physically processed domestically before being exported for further treatment. Formal collection structures have improved collection and reduced the informal sector's role, but data systems are weak and personnel training on data collection is insufficient.

Despite this institutional framework, implementation continues to lag behind legislative ambitions. The current e-waste collection rate is approximately 17%, well below the statutory targets. Data quality also remains weak due to the incomplete adoption of secondary legislation, the absence of harmonized measurement tools, and insufficient personnel training for data collection and reporting.

Key weaknesses include the absence of bylaws specifying technical treatment standards, transport and storage requirements, reporting formats, reuse documentation, and licensing criteria, leading to limited transparency and inconsistent enforcement. Although several EPR organizations and recyclers, such as Elkolekt and Нула Отпад (Zero Waste), together with social enterprises and NGOs contribute to collection, reuse, and awareness efforts, systemic challenges persist. These include low recycling rates, insufficient digital reporting infrastructure, weak public advocacy, and limited research output.

Serbia

Serbia's e-waste system faces barriers that are legal, organizational, and societal in character. On the legal side, the country missed its January 2022 deadline to harmonize national legislation with the EU's WEEE Directive (2012/19/EU). Marinković et al. (2023) document that Serbia has fully transposed only 115 out of 248 obligations defined by the Directive, partially transposed 30, and has not transposed 103, leaving fundamental elements such as a national producer register, financial guarantees, and a functioning compliance scheme either absent or incomplete.

On the organizational side, studies on e-waste management in Serbia (Nišić et al., 2024) find that infrastructure for separate collection is practically non-existent at the household and municipal level, with coverage concentrated in urban areas and rural populations effectively excluded. Collection remains fragmented among private companies driven by profit, with no central coordination body, resulting in overlapping collection routes, inflated logistics costs, and significant illegal e-waste flows that distort reporting. The ILO AMT Diagnostic (2025) projects that without structural intervention, collection rates will stall at 36% by 2031, well below both national targets and EU benchmarks, where the average collection per capita is 11 kg compared to Serbia's 6.3 kg.

Public awareness compounds these structural problems: approximately 80% of e-waste still ends up in landfills, and research on Serbian students (CABI, 2018) found that knowledge of proper e-waste disposal remains low even among technically educated young people.

Overall, Serbia shows partial legal alignment with the EU WEEE Directive and faces major organizational gaps, including underdeveloped collection infrastructure, fragmented private-sector activities, and low public awareness, resulting in persistently low collection rates and widespread informal or illegal e-waste flows.

2.3 Digitalization and Environmental Governance

Albania

In Albania, data and reporting procedures are defined in the Law No. 74/2025 “On Integrated Waste Management”. Under this framework, AKM collects, processes, stores, and analyzes data on waste generation, treatment, reuse, recycling, recovery, and disposal; maintains national and municipal waste data registers; conducts environmental impact assessments; and issues licenses and permits. All businesses operating within municipalities report annually on their waste streams, while AKEM and AKM compile and publish nation level data in compliance with Law No. 124/2024, “On the Protection of Personal Data”, thereby supporting transparency and accountability within the integrated waste management system.

In practice, however, the Law No. 74/2025 has not yet taken effect, and this is evident in the data that reaches the public: information on e-waste management is not consistently available across municipalities, and details on waste separation procedure remain difficult for the public to access.

North Macedonia

In North Macedonia, e-waste monitoring is carried out through mandatory annual reporting by licensed operators and PROs. Operators involved in the collection, treatment, or export of e-waste must submit annual reports to the Ministry of Environment and Physical Planning of North Macedonia, where the data is reviewed by the Department of Waste. These reports track waste categories such as discarded equipment containing hazardous components (code 16 02) and other discarded electrical and electronic equipment (codes 20 01 35 and 20 01 36) based on the European List of Waste classification system. In addition, PROs are legally required to conduct public awareness campaigns on e-waste management and report annually on their activities and progress.

The collection, processing, and dissemination of national e-waste statistics are managed by the State Statistical Office of North Macedonia, which also reports the data to Eurostat. The country does not yet apply a specialized national methodology for measuring e-waste flows. The Statistical Office gathers additional information through questionnaires, but limited staff training in data collection and processing affects the overall data quality. E-waste indicators were first included in the national Environmental Indicators report in 2020, with data covering earlier years. To support analysis, tools developed by UNITAR-SCYCLE Programme, together with official import and export statistics, have been used to estimate key e-waste indicators, with available datasets covering approximately 2010–2021.

Serbia

In Serbia, the Serbian Environmental Protection Agency (SEPA) collects data but operates without a centralized control body with meaningful enforcement authority, and inspectorates lack the specialized monitoring software needed to track e-waste flows effectively. The European Commission's Serbia 2025 Report confirms this pattern, noting that while legislative progress has been made, implementation remains slow and the EPR system for specific waste streams (the category under which e-waste falls) has yet to be operationalized.

Serbia's experience with the National Register of Pollution Sources (NRIZ) platform developed through the NALED project (2018–2020) and relaunched in January 2025 illustrates both the potential and the limits of the digital reporting system. Before NRIZ, only 49% of Serbia's 11,000+ registered producers and importers filed annual reports in 2017, leading to systematic under-reporting and unfair competition since the environmental fee can represent over 10% of a product's retail price (NALED, 2020). The platform's introduction achieved 94% software uptake among registered companies and connected four institutions, the Ministry of Environment, SEPA, the Customs Administration, and inspectorates into a single registry.

The 2025 upgrade added e-ID digital signature, auto-fill functionality, and enhanced data security, further reducing administrative friction. This allowed government institutions to cross-reference producer registrations, customs import data, and reported environmental fees within a single system, making it significantly harder for producers to avoid registration or underreport equipment placed on the market. Even so, Serbia's NRIZ platform tracks who is reporting and what fees are being paid, but does not follow individual waste streams from household collection through to recycling.

2.4 EU Framework

Within the EU, e-waste governance is anchored in Directive 2012/19/EU (WEEE Directive), which establishes binding collection, recovery, and reporting targets for Member States. The Directive requires functional EPR systems, national producer registers, verified data reporting, and minimum treatment standards. These obligations are further reinforced by the EU Circular Economy Action Plan and linked to broader strategic priorities, including critical raw material security and climate neutrality. For EU accession countries, compliance with the WEEE Directive forms part of Chapter 27 (Environment and Climate Change) of the *acquis communautaire*. Importantly, accession conditionality extends beyond legislative transposition to demonstrated implementation capacity. European Commission progress reports consistently assess not only legal alignment but also enforcement structures, administrative capacity, and operational outcomes.

The EU's Circular Economy Action Plan positions e-waste recovery as critical to securing critical raw materials, such as cobalt, palladium, and rare earth elements, essential for clean energy and digital infrastructure, of which less than 1% of global demand is currently met through recycling. This strategic alignment serves as a cornerstone of the 2026 Circular Economy Act, fostering the data transparency and operational efficiency essential for doubling the EU's circularity rate and securing 25% of the total emissions reductions required to achieve 2050 climate neutrality.

3. Methodology

3.1 Research Design

This research applied a comparative qualitative case study approach to examine e-waste governance frameworks in Albania, North Macedonia, and Serbia. The study focused on identifying policy and implementation gaps across the three countries, particularly in light of their EU accession ambitions.

The comparative design allowed for systematic identification of similarities and differences across legal frameworks, institutional structures, and practical implementation outcomes. It was particularly appropriate for this study because it enabled cross-national analysis of recurring structural constraints and policy failures, making it possible to isolate weaknesses that persisted across the three different national contexts.

3.2 Data Collection

Desk Research

The desk research involved a comprehensive review of available literature, including national legislation on waste and e-waste management, EU progress reports (including the 2025 country reports), national strategies and policy documents, regional e-waste monitoring reports, and relevant academic literature. This approach enabled the mapping of formal legal obligations across the selected countries and supported the identification of structural inconsistencies between legislative frameworks, policy objectives, and implementation practices.

Secondary research was complemented with primary data collection, including:

Semi-Structured Interviews

Albania: Four interviews were planned with stakeholders in NGOs and private companies, but only one responded. An interview was obtained with a waste management and circular economy expert and found of a company promoting zero-waste approaches aligned with the UN SDGs across Albania and the Western Balkans.

North Macedonia: Interviews were conducted with Elkolekt, Nula Otpad, and Ekocentar 97, the country's leading e-waste PROs. The interview questions (Appendix A) were distributed to each PRO via email, followed by additional clarification through follow-up calls and written communication where necessary.

Serbia: No interviews were conducted. Thus, the findings presented in this paper rest entirely on desk research and official information requests submitted to governmental institutions.

Official Information Requests

Information requests were sent via official emails to both governmental institutions and the private sector. Private sector entities did not respond.

Albania: Requests were directed to Albania's principal environmental bodies. The Ministry of Tourism and Environment is the main institution responsible for environmental protection, climate policy, waste management and sustainable development working in coordination with the Ministry of Infrastructure and Energy. AKM is the central monitoring institution responsible for environmental data collection and the implementation of environmental legislation under Ministry's policies and supervision. Only AKM responded: its reply primarily described its institutional role and responsibilities and noted that relevant data are published through its official website.

Requests were sent to 4 municipalities, selected to reflect Albania's geographic and economic diversity: Tirana, the largest municipality and the country's administrative, economic, and cultural center; Durrës, a major coastal and port city; Shkodra, in the north, known for cultural heritage and tourism; and Elbasan, with an industrial and agricultural profile. Only two of them responded.

Finally, the Institute of Statistics (INSTAT), one of the national authorities responsible for collecting and publishing official statistics, was also contacted and responded to the information request.

North Macedonia: Requests for information were sent to designated representatives at the Ministry of Environment and Physical Planning and the Ministry of Digital Transformation via official email addresses listed on the respective ministry websites. Both responses were obtained within the prescribed timeframe. The Ministry of Environment and Physical Planning provided a complete response to all submitted questions. The Ministry of Digital Transformation provided a partial response, with the explanation that some of the requested information did not fall within its area of responsibility.

Serbia: Three requests for access to information of public importance were submitted via email to the Ministry of Environmental Protection, SEPA, and the Provincial Secretariat for Energy, Construction and Transport. All three responded within two weeks. The Ministry of Environmental Protection initially provided a partial response, redirecting the request to SEPA, but subsequently submitted a supplementary response. SEPA provided complete answers to all submitted questions. The Provincial Secretariat for Energy, Construction and Transport responded that the requested information was not in their possession.

Public Survey

A public survey was conducted to gather insights on the awareness of e-waste risks, assess knowledge of legal disposal options, identify disposal behaviors through formal and informal channels, evaluate trust in government waste management systems, and assess awareness of digital reporting platforms (Appendix B).

The survey was distributed online, in English, over a period of about 6 weeks (April 6 - May 19, 2026) through digital channels such as social media platforms, email networks, and professional or academic contacts. Participation was voluntary and self-selecting. A total of 212 responses were collected.

The survey response data was cleaned, analyzed and visualized using R. Descriptive statistics were calculated to summarize respondents' demographic characteristics and survey responses. Percentages presented in the analysis have been rounded to the nearest whole number. Minor discrepancies in totals can be attributed to rounding.

3.3 Limitations

Two decisions shaped the scope of this study and should be taken into account when interpreting its findings. In selecting governmental institutions, priority was given to those directly responsible for managing the system and coordinating relationships between the different stakeholders, particularly the responsible ministries and dependent agencies. Municipalities were selected based on their population size, on the assumption that larger populations are associated with higher volumes of waste.

The study faced several limitations. First, there were varying levels of responsiveness from institutions. While many institutions provided relevant information, others did not respond. For those cases the analysis relied only on information available through online transparency platforms and official publications. A second limitation was that much of the data provided consisted mainly of annual reports and total waste quantities, whereas the study aimed to examine the broader e-waste management process, and the institutional cooperation involved.

Third, the survey component carries its own constraints. It was distributed online, relied on voluntary participation, and was available only in English. The resulting sample should therefore be considered non-random and may not be representative of the broader populations in each country. This introduces potential sampling bias, including overrepresentation of individuals with internet access or a particular interest in the survey topic. The total number of responses was also relatively small, especially in North Macedonia and Serbia, meaning that the findings are indicative only and should not be considered statistically significant or generalizable. The sample composition reinforces this caution. Respondents skewed younger and highly educated, particularly in Albania and Serbia. Female participants were notably overrepresented across all three all countries. Both patterns may influence environmental attitudes, awareness levels, and reported e-waste disposal behaviors, and should be considered when interpreting the results.

4. Findings

4.1 EPR Implementation

Albania

As mentioned in previous sections, by 2035, all businesses that import or generate e-waste in accordance with the principle of EPR, are required to establish separate or joint management schemes with municipalities and other stakeholders to ensure proper recovery, recycling, and treatment. Yet, no implementation data is yet available on EPR, since the Law No. 74/2025 that regulates it will only take effect on 1 December 2026.

In their response to our requests for information, AKEM stated that the legal framework is in place; yet, the municipality of Durrës claimed that they are awaiting the adoption of bylaws, without which EPR cannot be enforced.

Information on the stakeholders responsible for e-waste management is not fully public, making it difficult to verify the implementation and trace the e-waste management cycle from collection to final treatment and recovery. The expert interview confirmed reliable data and proper waste categorization are still lacking, though e-waste currently represents only a small share of total waste generated. The interviewee emphasized the need for more developed government-led strategies with clearly defined outcomes, given the risks that improper e-waste management poses to the population.

The Durrës municipality reported that it mainly manages municipal solid waste, which is disposed without separation. Similarly, the Shkodra municipality referred primarily to general waste management operations, without specific procedures and outcomes related to e-waste management processes. INSTAT indicated that e-waste accounted for approximately 9% of total e-waste in 2013, while this share has significantly decreased over time, reaching 0.43% in 2024.

North Macedonia

In North Macedonia, the EPR system for e-waste is legally established and operational, with several licensed collective schemes and waste management operators active in the sector. However, both institutional and industry responses indicate that implementation and enforcement remain limited. Producers, importers, collective operators, recyclers, and municipalities are formally included within the legal framework, yet enforcement of producer registration and reporting obligations is insufficient due to limited inspection capacity, incomplete reporting, and the continued presence of “free-riders” operating outside the formal system.

PROs appear functional and capable of managing collection and treatment activities, but stakeholders emphasized that current financial mechanisms, particularly eco-fees, are too low to support effective collection infrastructure, recycling targets, and operational sustainability. Financing constraints are compounded by underdeveloped infrastructure, especially insufficient collection points, limited treatment capacity, and inadequate digital reporting systems. The informal sector remains highly significant, with informal collectors extracting valuable materials outside the formal system while hazardous and non-commercial fractions are often improperly disposed of in landfills, creating environmental and public health risks.

Serbia

In Serbia, the EPR system for e-waste is legally established; however, implementation across different waste streams remains uneven. EPR was initially introduced into Serbian law with the adoption of “green” legislation in 2009, with the Law on Waste Management and the Law on Packaging and Packaging Waste forming the foundational legal basis. While the EPR system for packaging waste is fully operational with licensed PROs such as Sekopak and Interzero active in the sector, comprehensive collective compliance schemes for WEEE remain in the developmental and transitional phase.

SEPA serves as the central body for WEEE data collection and reporting. A public registry of licensed WEEE operators is maintained through SEPA's Waste Management

License Registry¹. However, findings from official information requests reveal a fragmented institutional landscape. The Ministry of Environmental Protection initially stated it did not possess the requested information and redirected the inquiry to SEPA, while SEPA confirmed that supervision and control are not within its jurisdiction, placing that authority with the Ministry's Sector for Supervision and Preventive Action. This pattern of institutional redirection indicates that oversight responsibilities are fragmented rather than coordinated.

Producer registration and compliance monitoring show notable gaps. According to SEPA's official response (17.04.2026), quantities of WEEE generated by legal entities were recorded as 6,117 tonnes in 2022, 9,878 tonnes in 2023, and 6,777 tonnes in 2024. SEPA noted that quantities collected from households by waste management operators are not included in these figures, as that data is not in SEPA's possession, a significant gap given that household collection is a core obligation under EPR frameworks.

Since the formal system does not capture informal collection activity and household-level data is absent from official records, the informal sector's contribution to e-waste management in Serbia remains unmeasured.

4.2 Digital Reporting and Data Transparency

Albania

The National Environmental Agency (AKM) is the central public institution that collects, processes, stores and analyzes data on the generation and treatment of waste related to the implementation of environmental permits, and informs the Ministry of Environment and other interested parties. In February 2026, AKM launched the Integrated Environmental System (Sistemi i Integruar Mjedisor – SIM). The system includes a publicly accessible portal through which processed environmental data is intended to be displayed

An assessment of the platform revealed the absence of the required data on e-waste streams. According to representatives of the Ministry of Environment, the platform remains partially operational due to persistent issues concerning the completeness and reliability of the data.

North Macedonia

In North Macedonia, digital reporting systems for e-waste management remain underdeveloped and only partially operational. According to responses from both the Ministry of Environment and Physical Planning and a leading PRO, data on electrical and electronic equipment placed on the market, collected e-waste, treatment activities, exports, and recycling is collected primarily through annual reports submitted by collective operators, waste operators, and importers. Although some data is processed electronically, reporting to the Ministry is still largely conducted through printed forms prescribed by legislation, indicating continued reliance on paper-based administrative procedures rather than fully integrated digital systems.

Both respondents emphasized the lack of interoperability between institutions and the absence of a centralized electronic reporting platform linking ministries, customs authorities, inspectors, municipalities, producers, and operators. While certain information is publicly available through environmental reports and the national Waste Registry, access to detailed, up-to-date, and standardized datasets remains limited. The Ministry of Environment and Physical Planning acknowledged that data quality and completeness continue to present significant challenges, largely due to incomplete producer reporting, insufficient inspection oversight, and the presence of unregistered “free-riders” operating outside the formal EPR system.

Serbia

¹ Please see: <https://sepa.gov.rs/otpad-registar/>

In Serbia, environmental data collection and reporting on waste management is handled primarily through the National Register of Pollution Sources (NRIZ), maintained by SEPA. The system collects data on types and quantities of waste generated by legal entities during their operations and serves as the central platform for statutory reporting obligations. SEPA prepares environmental management reports based on submitted data, published under its Publications section, including the Environmental Status Report and Waste Management 2011–2024 (SEPA, official response, 17.04.2026).

However, NRIZ represents a functioning but incomplete digital reporting system. Data on business-generated WEEE is collected and partially published, but household collection data, informal sector activity, and cross-institutional reporting remain outside its scope, leaving a significant gap between official figures and the actual state of e-waste management on the ground.

The gap between what is reported and what is happening on the ground is further illustrated by inspection data provided by the Ministry of Environmental Protection in a supplementary official response. A total of 138 inspections on WEEE management (as per their subject) were conducted between 2022 and 2025: 47 in 2022, 45 in 2023, 28 in 2024, and 18 in 2025 (Ministry of Environmental Protection, supplementary official response, 21.04.2026). The consistently declining number of inspections over this period raises questions about enforcement capacity and whether reduced inspection activity reflects improved compliance, reduced resources, or a deprioritization of WEEE oversight.

The information request process itself revealed the fragmented nature of data governance in Serbia. The Ministry of Environmental Protection initially redirected the inquiry to SEPA, while SEPA confirmed that supervision and control are not within its jurisdiction.

4.3 Institutional Capacity and Local-Level Implementation

Albania

Law No. 57/2025 “On Integrated Waste Management” stipulated that municipalities are responsible for organizing and ensuring the functioning of waste separation at source and its differentiated collection as part of the integrated waste management system within their respective jurisdictions. At the same time, AKEM supports coordination efforts between central and local governments, international partners, and investors in the planning, development, operation, and monitoring of waste treatment infrastructure. In addition, it supports municipalities in implementing separate collection and recovery programs and promotes the development of markets for recovered materials and products. However, their financial and technical capacities remain limited and continue to depend heavily on infrastructure investments and national funding. (Law No. 139/2015 on local self-government & Law No. 10463/2011, on integrated waste management.)

This challenge was highlighted in one response to the information requests: the second-largest municipality in the Durrës municipality reported being unable to provide precise data on e-waste streams due to the absence of specialized weighing equipment. Under the provisions of Law No. 418/2020 and the National Waste Management Strategy, municipal capacities for waste separation, collection, and recycling are intended to be strengthened through improved infrastructure, technical assistance, and financial support.

North Macedonia

In North Macedonia, municipalities are formally assigned a role in the broader waste management system, but both Ministry and PRO responses indicate that they are not adequately equipped—financially, technically, or operationally—to effectively manage e-waste collection. While the legal framework envisions shared responsibility across municipalities, producers, collective schemes, and operators, in practice municipalities lack sufficient infrastructure such as dedicated collection points, logistics capacity, and technical equipment for handling electronic waste streams. Financial constraints are also implied

through repeated references to low eco-fees and insufficient funding mechanisms, which limit the ability to expand local collection systems or support municipal-level operations.

Enforcement responsibility primarily sits at the national level, particularly with environmental inspectorates under the central government, rather than being meaningfully decentralized to municipalities. However, both responses highlight that enforcement capacity is weak in practice due to limited inspections, incomplete monitoring of producer compliance, and the presence of free-riders operating outside the formal EPR system. Municipalities therefore play a more passive or supportive role rather than acting as effective enforcement actors.

Coordination between national and local institutions exists in formal terms through reporting obligations and administrative procedures, but it is characterized by fragmentation and weak interoperability. The Ministry notes ongoing efforts to develop electronic systems for linking stakeholders and improving reporting, yet current practice still relies heavily on paper-based submissions and disconnected databases. This limits real-time coordination and reduces the ability of institutions to jointly track material flows or enforce compliance effectively.

Serbia

In Serbia, responsibilities for e-waste management are concentrated at the national level, while municipalities play a limited and largely undefined role in practice. No coordinated collection system with clearly defined municipal roles exists, which is identified as one of the key missing elements of Serbia's e-waste management architecture (Marinković et al., 2023). Municipalities are not adequately equipped, financially, technically, or legally, to manage e-waste collection. State-level infrastructure has been described as practically non-existent, with collection instead driven by private recycling companies operating independently, primarily in urban areas. Rural areas are left almost entirely without coverage (Nišić et al., 2024).

Coordination mechanisms between national and local institutions are largely absent. Producer fees collected from importers and manufacturers are directed to the general state budget rather than a dedicated compliance fund, meaning there is no financial mechanism channeling resources from the national level down to municipalities for infrastructure or collection (Marinković et al., 2023). The NRIZ platform connects the Ministry, SEPA, Customs Administration, and inspectorates at the national level, but does not extend meaningfully to local government (NALED, 2020).

The urban-rural divide is significant. Collection infrastructure and private recycling activity are concentrated in cities, while rural communities lack both collection points and awareness infrastructure. A majority of e-waste still ends up in landfills, and without defined municipal roles or funding mechanisms, this gap is unlikely to close without structural reform. ILO's AMT Diagnostic for Serbia projects that even under optimistic scenarios, collection rates will reach only 41–45% by 2031, and only if public investment in collection point networks increases substantially (ILO, 2025).

4.4 Citizen Awareness and Disposal Behavior (Survey Results)

The survey findings presented in this section provide insight into citizen awareness, disposal behavior, trust in institutional systems and openness to digital solutions related to e-waste management across Albania, North Macedonia, and Serbia.

Of the 212 total responses, 105 (49.5%) were from Albania, 50 (23.6%) from North Macedonia, and 57 (26.9%) from Serbia. There are notable differences in the demographic composition of respondents across the three countries (summarized in Table 1). In Albania and Serbia, the great majority of respondents were under 41 (87% and 88%, respectively), whereas in North Macedonia over half were older than 40, and 14% were over 65 - an age group entirely absent from the other two samples. The gender distribution was nearly identical across the three countries, with women representing 64-65% of respondents in each.

Educational background also varied across countries. Albanian respondents were predominantly Master's (58%) or Bachelor's (24%) degree holders; Bachelor's holders formed the largest group in North Macedonia (50%); and Serbia was more evenly split between high school (37%), Bachelor's (32%), and Master's (30%) graduates.

Table 1. Demographic characteristics of survey respondents.

	Albania	North Macedonia	Serbia
Age			
18-25	42%	14%	51%
26-40	45%	32%	37%
41-65	13%	40%	12%
65+	None	14%	None
Gender			
Female	64%	64%	65%
Male	36%	36%	34%
Education			
High school	13%	20%	37%
Bachelor's	24%	50%	32%
Master's	58%	30%	30%
PhD	5%	None	2%

Albania

Survey results from Albania indicate that 70% of respondents had heard of the term e-waste, suggesting a relatively high level of general familiarity. However, risk perception was more limited: 55% believed e-waste poses significant environmental or health risks, 31% believed it poses some risks, and 11% were uncertain. The gap between nominal awareness and substantive understanding of hazards is significant. It suggests that familiarity with the term has not translated into informed concern, and that awareness-raising efforts in Albania would need to move beyond basic recognition toward targeted communication on the concrete consequences of improper e-waste disposal.

Figure 1. Have you heard of the term electronic waste (e-waste or WEEE)?

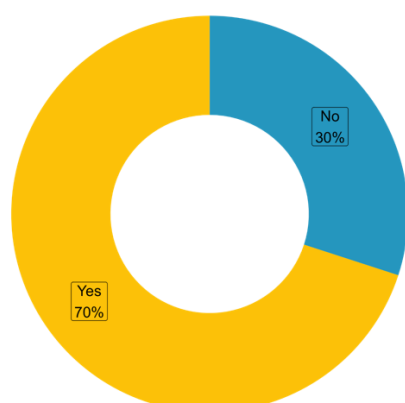
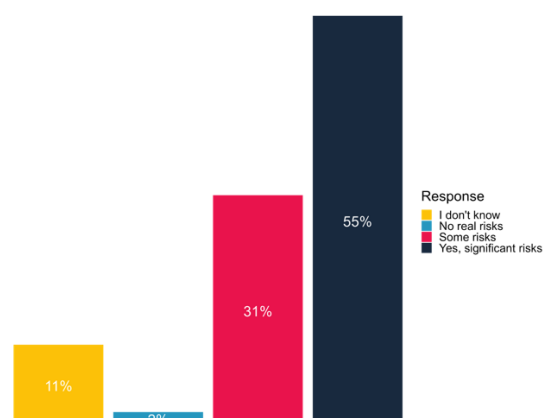


Figure 2. Do you believe e-waste can pose environmental or health risks?



The results imply that survey respondents are familiar with the concept of e-waste, but not the potential repercussions for their health or environment. For Albania, the implication is that public communication should therefore move beyond simply raising awareness of e-waste

and instead address the practical consequences of improper disposal: what happens when a phone ends up in a landfill, and who bears the environmental and social costs?

Items most commonly identified as e-waste included mobile phones (65 respondents), followed by batteries (61 respondents), and laptops and computers (58 respondents). Household appliances such as washing machines and fridges (43 responses), or light bulbs (31 respondents) were recognized less often. 14 respondents reported not being sure. As the question allowed multiple selections, some respondents may have combined item choices with “I am not sure”.

The lower recognition of certain items as e-waste implies that, in practice, even citizens willing to dispose of electronics responsibly may be more likely to return a phone through an appropriate channel while disposing of an old refrigerator with regular household waste. Collection infrastructure and public messaging should therefore focus not only on familiar electronic devices but also on less-recognized categories of e-waste, such as household appliances.

Knowledge about official e-waste management systems among Albanian respondents remains limited. Around 60% of respondents stated that they are unaware of any official e-waste collection services in their municipality, while 20% were uncertain. Similarly, approximately 76% of respondents reported that they were unaware of official e-waste collection points, 18% believed that no such collection points exist, and 57% were unsure about their availability.

More than half of Albanian respondents cannot confirm whether any official e-waste collection service or collection point exists in their municipality. At first glance, these findings may suggest low public awareness of formal e-waste management infrastructure. However, they may also reflect the limited availability of such infrastructure. These findings point to a need for both the expansion of e-waste collection infrastructure, as well as improved information availability regarding available collection and disposal options.

Figure 3. Are you aware of any official e-waste collection points in your municipality?

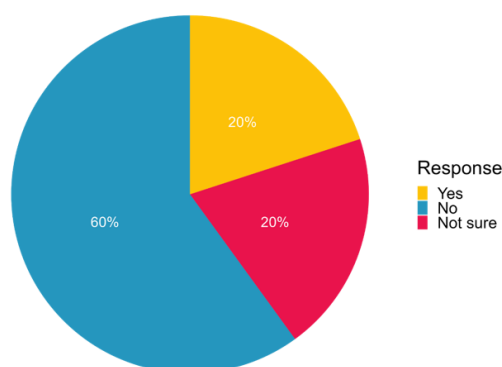
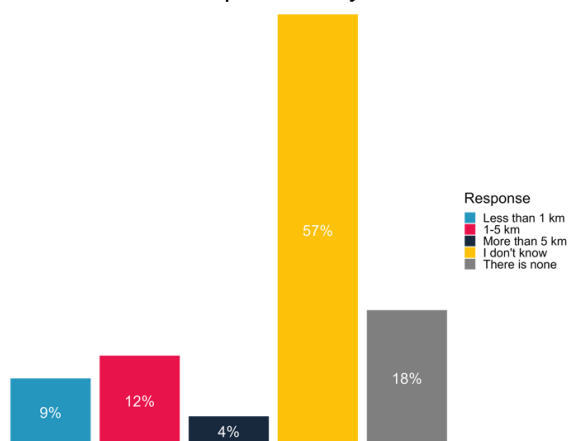


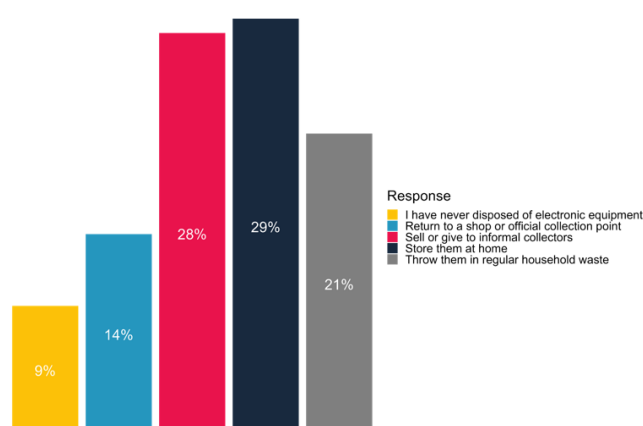
Figure 4. How far is the nearest official e-waste collection point from your home?



When asked about the practices around the disposal of old electronic devices, 30 respondents (29%) reported storing electronic devices at home. Another 29 (28%) sell or give their e-waste to informal collectors, while 22 respondents (21%) dispose of electronic waste together with regular household waste. Only 15 respondents (14%) return their electronic devices to shops or official collection points, while 9 respondents (9%) reported that they had never disposed of electronic equipment. As such, informal or unregulated routes account for over 77% of Albanian respondents, demonstrating that Albania’s formal e-waste management

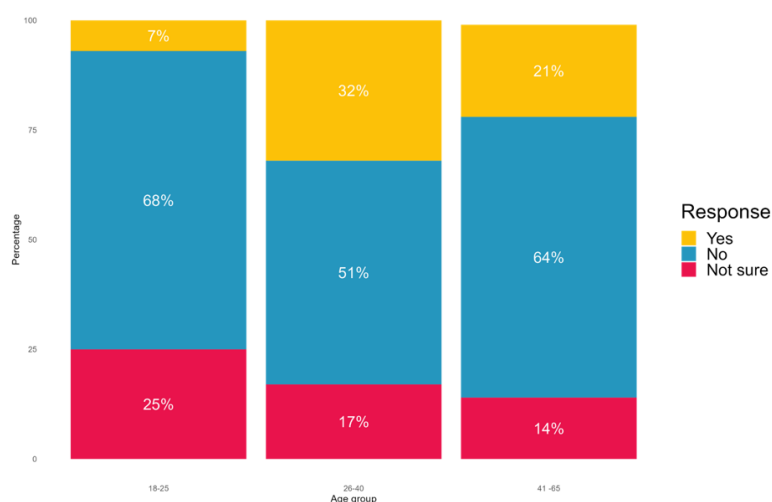
system is not yet a functioning alternative for the majority of citizens, despite the legislative progress made in Law No. 74/2025.

Figure 5. What do you usually do with old electronic devices?



Young Albanian respondents aged 18–25, demonstrated lower awareness and participation in formal e-waste management systems compared to older age groups. Only 3 respondents (7%) in this age category are aware of official municipal e-waste collection services, compared to 32% among individuals aged 36–40 and 21% among those aged 41–65.

Figure 6. Awareness of official e-waste collection points, distributed by age.



Trust that officially collected e-waste is properly recycled was generally moderate: moderate trust was the most common response, few respondents reported high or full trust, and a notable share expressed little or none. The pattern holds true also on the respondents' level of trust that e-waste is properly recycled. Moderate trust was the most common response across every age group, high or full trust never exceeded 19%, and low or no trust was widespread.

Regarding responsibility for managing e-waste, 21% see the government as primarily responsible, while 25% see e-waste management as a shared responsibility among stakeholders, suggesting that citizens recognize e-waste as a complex issue requiring

coordinated action. Only a relatively small proportion of respondents were unsure who should be responsible.

Figure 7. How much do you trust that electronic waste collected in official channels is properly recycled?

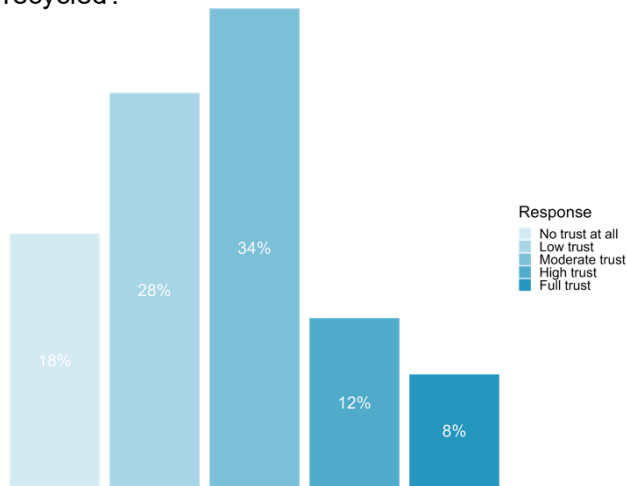


Figure 8. In your opinion, who should be primarily responsible for managing e-waste?

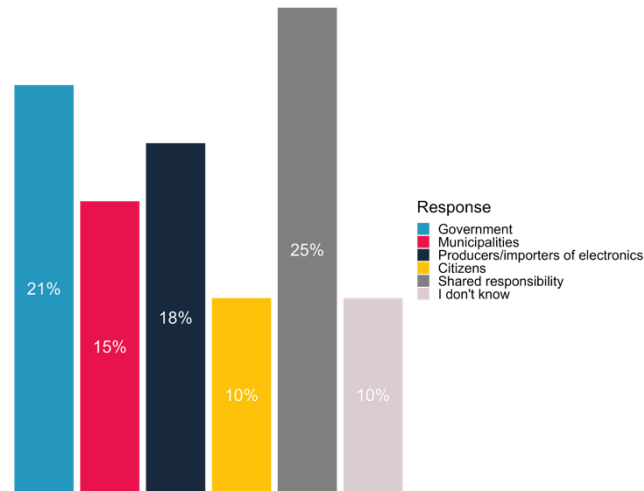
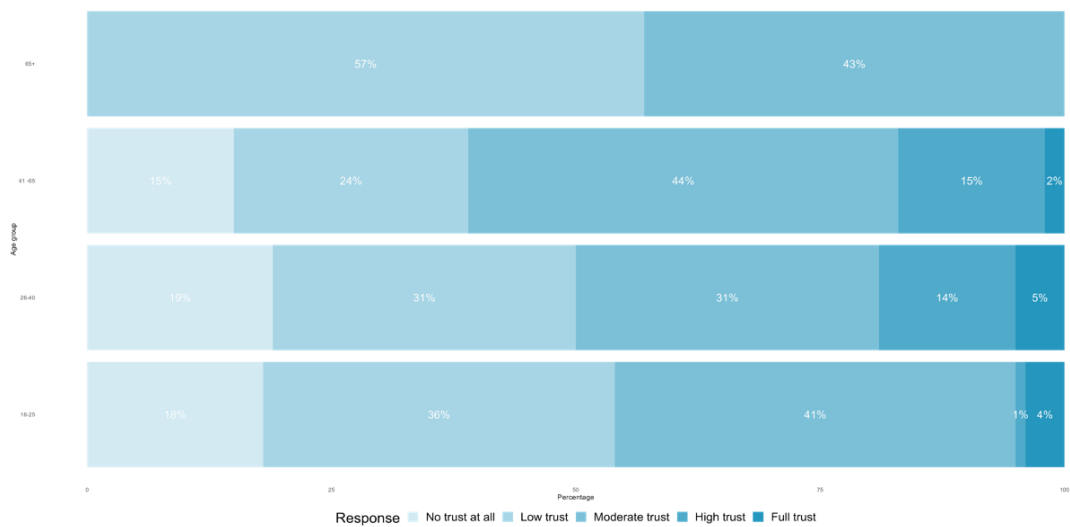


Figure 9. Trust that collected e-waste is properly recycled, distributed by age group.



The survey findings indicate that a small subset of the respondents (20%) is aware of online platforms for reporting e-waste, 20% are not sure, while 50% are unaware. Furthermore, most respondents demonstrated that they would consider using digital solutions for e-waste collection and recycling.

Figure 10. Are you aware of any online platform or system where companies report electronic waste or environmental fees?

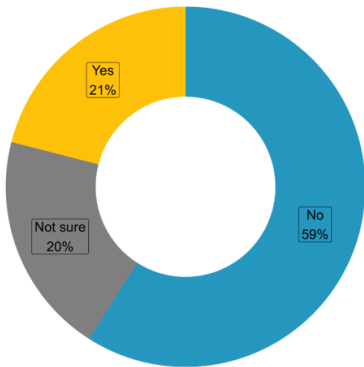
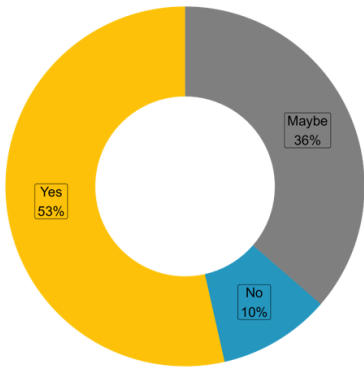


Figure 11. Would you use a mobile app or digital platform to locate e-waste collection points or schedule pick-up?



North Macedonia

Survey results indicate a high level of general familiarity with e-waste in North Macedonia. 86% of respondents had heard of the term electronic waste, while 14% had not, suggesting widespread baseline awareness. When asked about environmental risks associated with e-waste, 64% of respondents believed it poses significant risks, 30% believed it poses some risks, 2% believed there are no real risks, with 4% being uncertain. Overall, these findings indicate both a strong understanding of what e-waste is, as well as a recognition of its associated environmental and health risks.

Figure 12. Have you heard of the term electronic waste (e-waste or WEEE)?

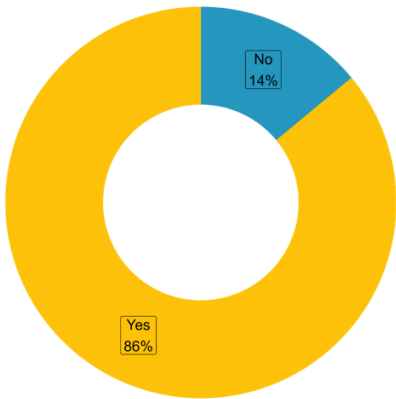
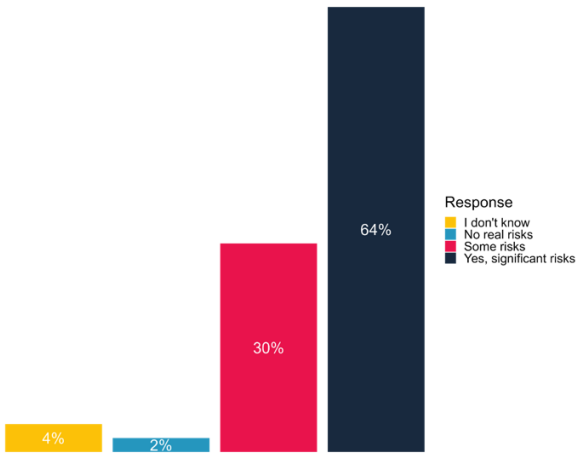


Figure 13. Do you believe e-waste can pose environmental or health risks?



Laptops and computers were the most commonly identified items of electronic waste, with 48 responses, followed by mobile phones (44 responses) and batteries (42 responses). Household appliances (37) and light bulbs (21) were again less recognized; only 2 respondents were unsure.

Despite this, public knowledge regarding e-waste management infrastructure in North Macedonia was mixed. Survey results show that 40% of respondents were aware of official e-waste collection points in their municipality, while 30% were unaware and an additional 30%

were uncertain. Responses concerning the distance to the nearest collection illustrate the same problem: 52% of respondents did not know where the nearest collection point was located, and only 6% reported one less than 1 km away. In this sense, limited awareness of collection points appears to be an important barrier to proper e-waste disposal among Macedonian survey respondents.

Figure 14. Are you aware of any official e-waste collection points in your municipality?

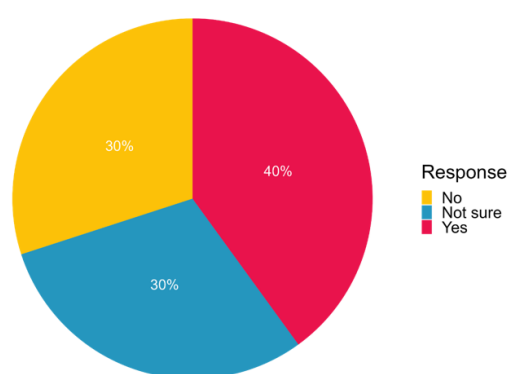
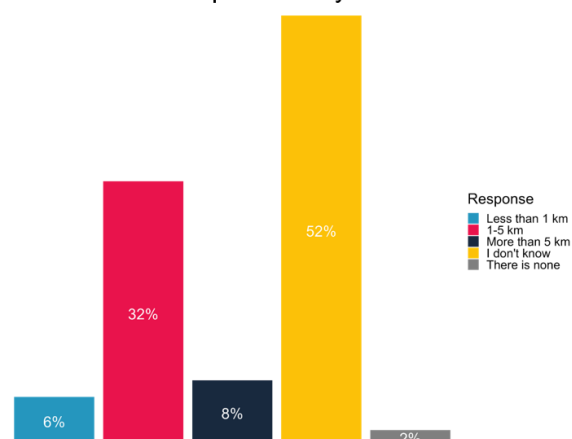
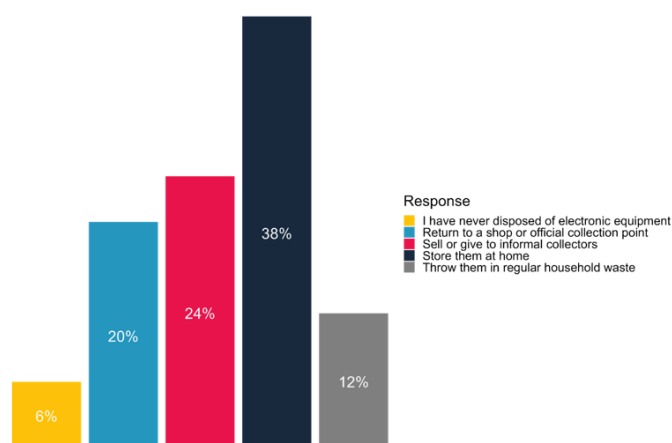


Figure 15. How far is the nearest official e-waste collection point from your home?



Survey results in North Macedonia indicate that home storage and informal disposal practices remain more common than the use of official e-waste collection options. Home storage was the most common practice (38%), followed by sale or donation to informal collectors (24%) and disposal with regular household waste (12%). One in five respondents (20%) returned devices to shops or official collection points – a limited proportion, but higher compared to the other two countries.

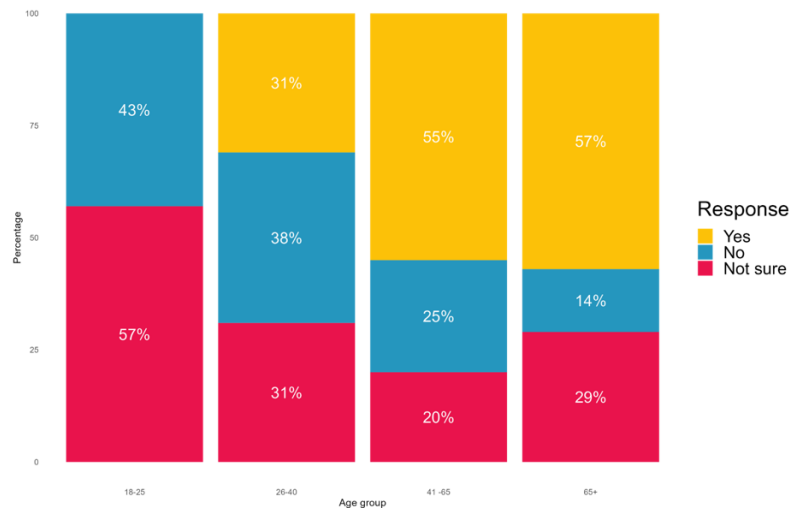
Figure 16. What do you usually do with old electronic devices?



There seem to be important demographic differences related to public participation in formal e-waste management systems among Macedonian survey respondents. For instance, we noted that awareness of official collection points increases with age. None of the respondents aged 18–25 reported being aware of official collection points, while 57% were unsure and 43% stated they were not aware. Awareness improves among older age groups, reaching 55% among respondents aged 41–65 and 57% among those aged 65 and above.

This trend suggests that younger citizens may be less exposed to municipal waste communication channels or less engaged with formal recycling practices. The high levels of uncertainty, particularly among younger respondents, indicate insufficient public information campaigns and limited visibility of collection systems.

Figure 17. Awareness of official e-waste collection points, distributed by age.



The survey results reveal a mixed level of public confidence in the management of electronic waste in North Macedonia. Most respondents (58%) reported only moderate trust that e-waste collected through official channels is properly recycled, while 24% expressed low trust and 12% indicated no trust at all. Only 6% demonstrated high confidence in the system, and none reported having full trust. These findings suggest that skepticism remains regarding the actual processing of collected e-waste among the population.

Trust remains moderate even when disaggregated by age group. High trust is limited, reaching 15% among respondents aged 41–65 and 43% among those aged 65 and above; the stronger trust among older respondents may reflect longer-term familiarity with municipal services.

Public perceptions of responsibility for e-waste management are evenly divided between municipalities (36%) and shared responsibility among stakeholders (36%) as having primary responsibility over e-waste management. A smaller share identified government institutions alone (16%) or producers/importers (10%) as primarily responsible, while 2% were uncertain. These results indicate that citizens largely expect local authorities to play a central operational role but also recognize that effective e-waste management requires coordinated action.

Figure 18. How much do you trust that electronic waste collected in official channels is properly recycled?

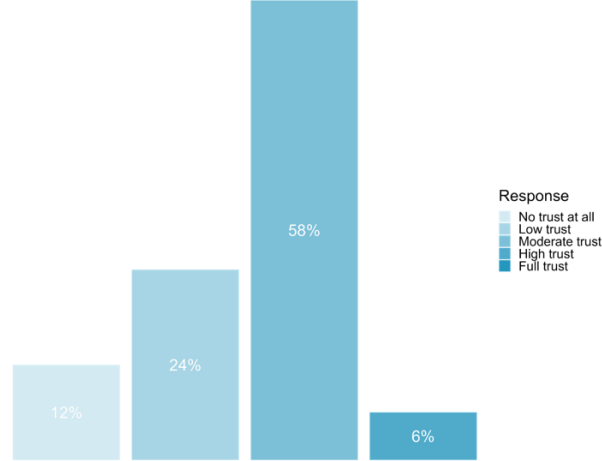


Figure 19. In your opinion, who should be primarily responsible for managing e-waste?

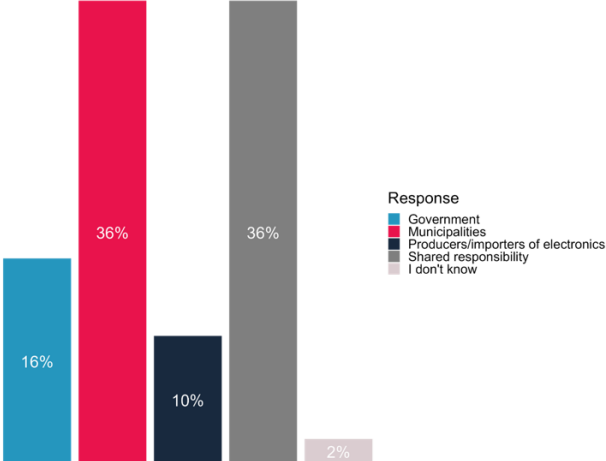
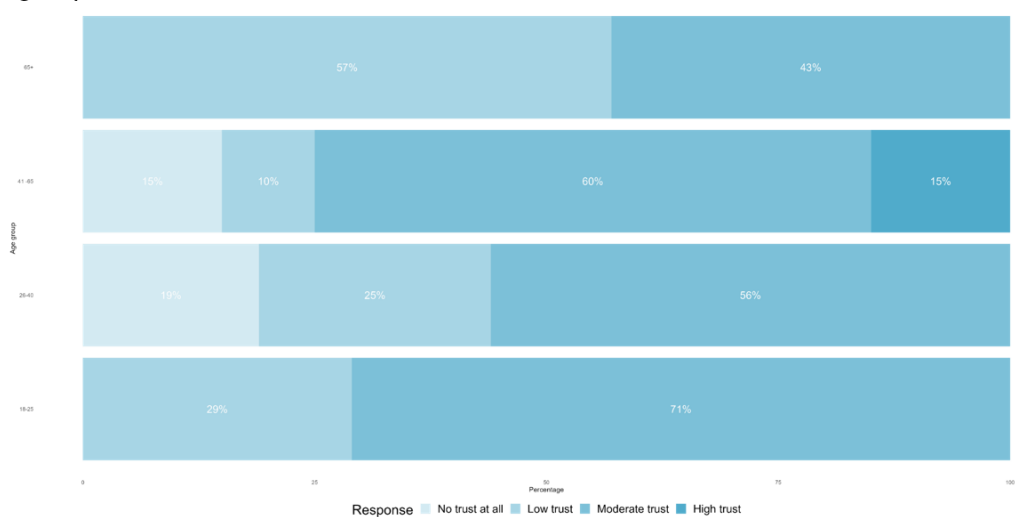


Figure 20. Trust that collected e-waste is properly recycled, distributed by age group.



The survey findings indicate a substantial gap in public awareness of digital environmental reporting systems as well as a strong potential for the adoption of digital tools. Most respondents (68%) stated that they are not aware of any online platform through which companies report electronic waste or environmental fees, while only 14% reported awareness of such systems and 18% were uncertain.

Figure 21. Are you aware of any online platform or system where companies report electronic waste or environmental fees?

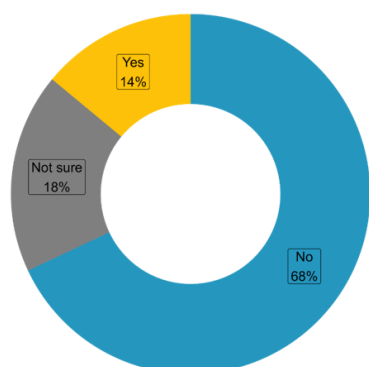
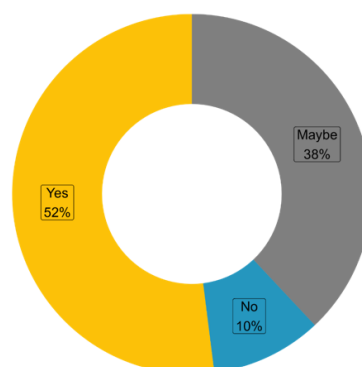


Figure 22. Would you use a mobile app or digital platform to locate e-waste collection points or schedule pick-up?



At the same time, the data demonstrates strong public openness toward digital solutions that could facilitate citizen participation in e-waste collection and recycling. More than half of respondents (52%) stated that they would use a mobile application or digital platform to locate e-waste collection points or schedule pick-up services, while an additional 38% responded “maybe,” indicating a generally positive attitude toward technology-enabled waste management services.

These findings suggest considerable potential for digital innovation in the sector. The combination of low awareness of existing systems and high willingness to engage with digital platforms indicates that North Macedonia has an opportunity to strengthen e-waste governance through more visible, accessible, and citizen-oriented digital infrastructure. Such tools could improve public trust, increase collection rates, and support more efficient coordination between municipalities, producers, recyclers, and consumers.

Serbia

Approximately 74% of Serbian survey respondents are familiar with the concept of e-waste, while 26% reported being unfamiliar. Furthermore, 79% believed that e-waste posed significant environmental or health risks, 18% believed it could pose some risks, while 4% didn't know.

Figure 23. Have you heard of the term electronic waste (e-waste or WEEE)?

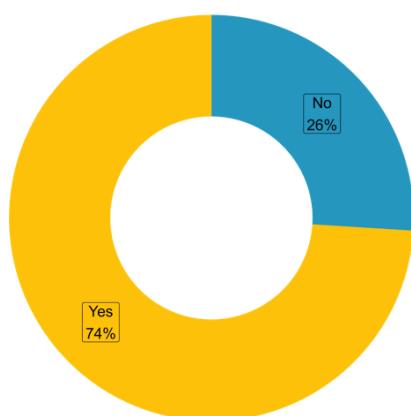
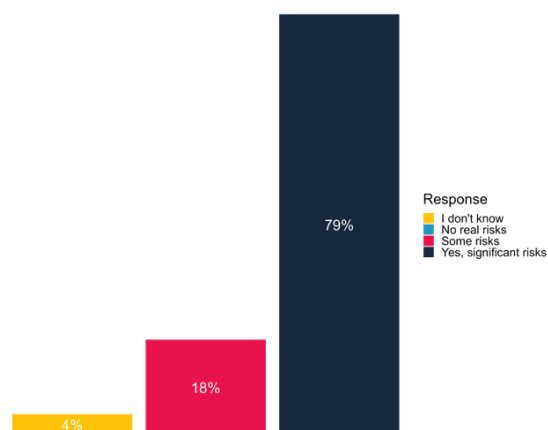


Figure 24. Do you believe e-waste can pose environmental or health risks?



Mobile phones (49 responses), laptops and computers (48), and batteries (48) were again the items most commonly identified as e-waste, with household appliances (36) and light bulbs (24) less recognized; only 4 respondents were unsure. In this sense, survey respondents appear to know what e-waste is and to believe it is dangerous; the gap between intent and action may therefore be structural.

Figure 25. Which of the following items do you consider electronic waste?



The majority of respondents (77%) were unaware of official e-waste collection points in their municipality. Only 18% claimed to be aware, and 5% said they were not sure. Similarly, 79% reported not knowing how far the nearest official e-waste collection point is from their home; another 16% stated that there is no collection point nearby. Only a very few respondents reported that the nearest collection point is less than 1 km away, 1–5 km away, or more than 5 km away.

Figure 26. Are you aware of any official e-waste collection points in your municipality?

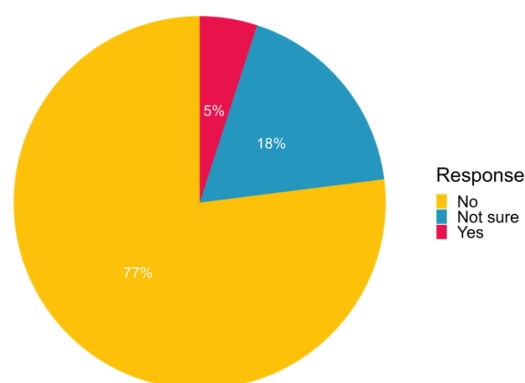
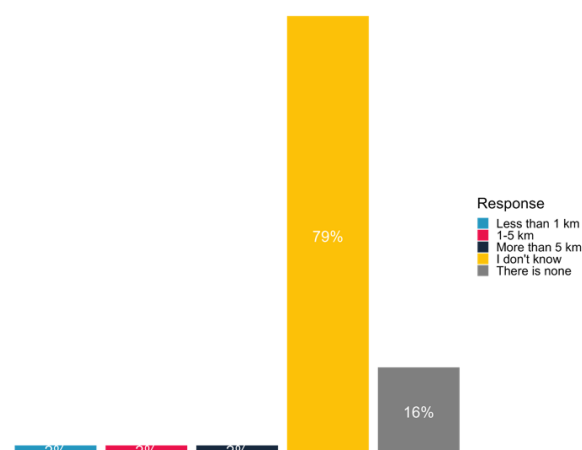


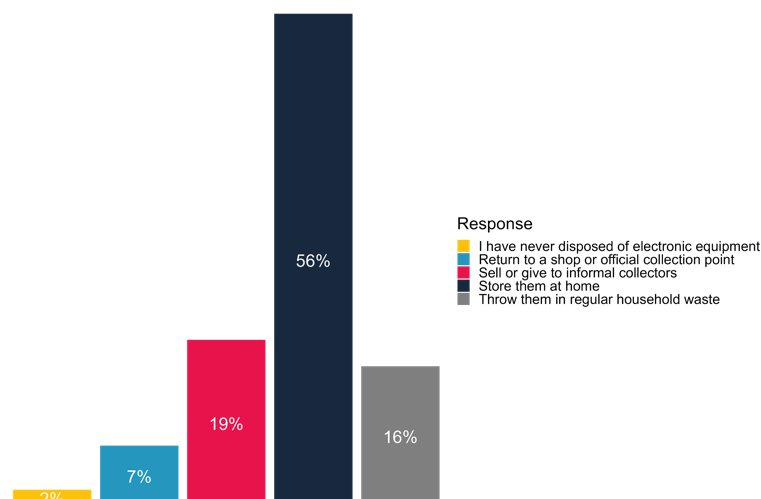
Figure 27. How far is the nearest official e-waste collection point from your home?



Over half of respondents (56%) reported storing old electronic devices at home, 19% indicated that they sell or give them to informal collectors, and around 16% throw them in regular household waste. Only 7% return them to a shop or official collection point, whereas 2% stated that they had never disposed of electronic equipment. Overall, approximately 90% of Serbian respondents deal with old electronics through informal or unregulated channels: storing at home, selling to informal collectors, or discarding with regular waste. These findings reflect a system that fails to provide accessible and trusted disposal options for ordinary citizens. The high rate of home storage is important, because it means that many devices do not even enter informal collection channels as the effort required to find suitable disposal

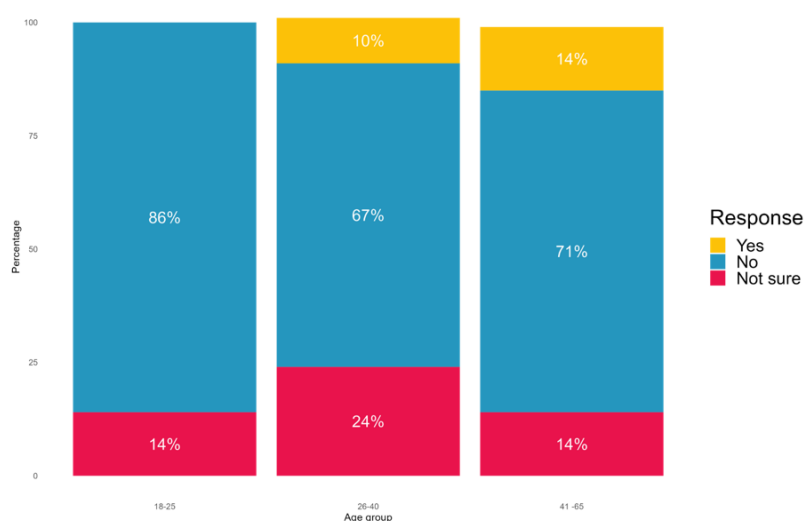
routes exceeds what citizens are willing or able to invest. At the same time, the informal collector rate shows that when a convenient route is available, even if unofficial, citizens are willing to use it.

Figure 28. What do you usually do with old electronic devices?



Awareness on official e-waste collection points varied across age groups. Among respondents aged 18–25, 86% reported being aware of official e-waste collection points, while 14% said they were not aware. In the 26–40 age group, 67% answered yes, 24% answered no, and 10% were not sure. For respondents aged 41–65, 71% said yes, 14% said no, and 14% were not sure. The fact that 77% of Serbian respondents cannot name an official e-waste collection point in their municipality should be read as a direct measure of EPR failure, not of public ignorance. The EPR framework for packaging in Serbia works: compliance schemes exist, collection happens, and infrastructure is visible. The equivalent framework for WEEE does not exist, and the survey shows exactly what that absence looks like from a citizen's perspective: near-total invisibility.

Figure 29. Awareness of official e-waste collection points, distributed by age.



Respondents showed moderate trust in official e-waste recycling systems: nearly half (49%) reported moderate trust, while only 5% expressed high trust. This suggests that although many people believe official collection channels generally function, confidence in the recycling process remains limited, pointing to a need for greater transparency and public communication about recycling processes.

When disaggregated by age group, distrust seems to dominate: 69% of respondents aged 18–25, 71% of those aged 26–40, and 57% of those aged 41–65 reported low or no trust, while high trust never exceeded 14%.

Regarding responsibility for managing e-waste, respondents were torn between shared responsibility vs. municipal leadership, each selected by 36% of participants. In contrast, only 10% believed that producers or importers of electronics should be primarily responsible. This indicates that respondents are likely to view e-waste management as a collective challenge requiring cooperation among multiple stakeholders, particularly local authorities.

Figure 30. How much do you trust that electronic waste collected in official channels is properly recycled?

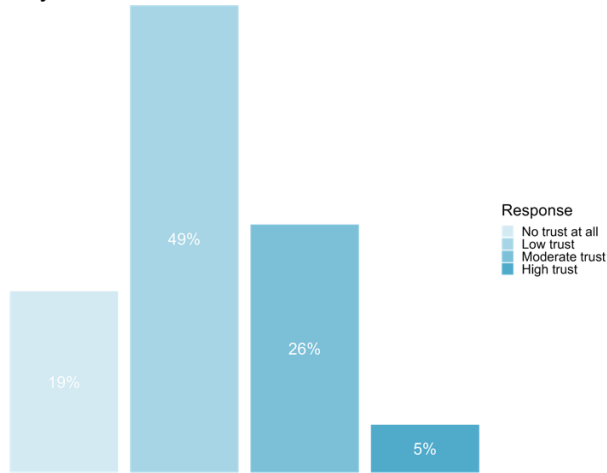


Figure 31. In your opinion, who should be primarily responsible for managing e-waste?

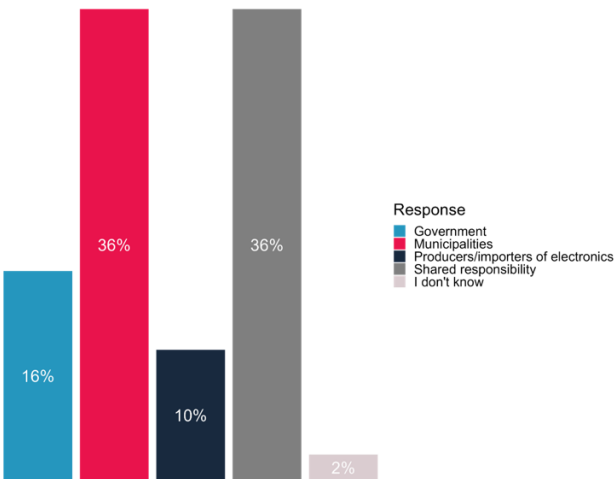
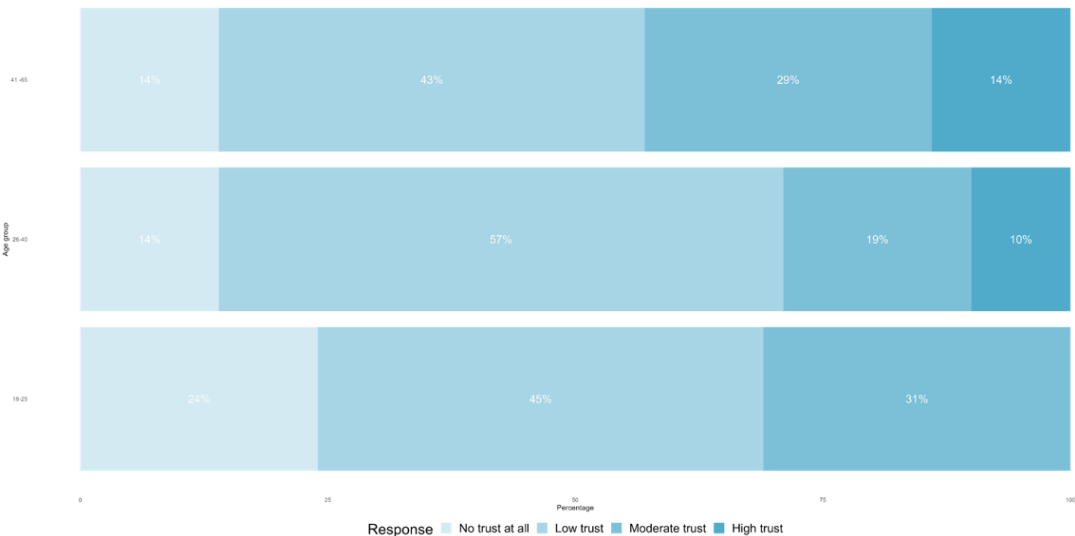


Figure 32. Trust that collected e-waste is properly recycled, distributed by age group.



Awareness of digital reporting was lowest in Serbia, with 81% of respondents unaware

of any online platform or system for reporting electronic waste or environmental fees. Yet, openness to digital tools was also highest: 72% said they would use a mobile app or digital platform to locate e-waste collection points or schedule pick-up, with another 26% being possibly open (responded “Maybe”).

Figure 33. Are you aware of any online platform or system where companies report electronic waste or environmental fees?

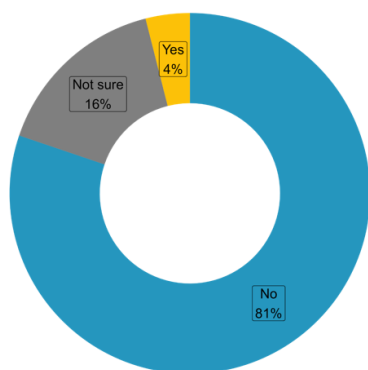
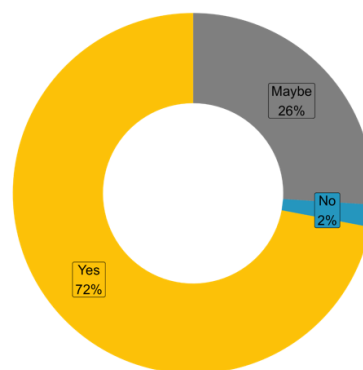


Figure 34. Would you use a mobile app or digital platform to locate e-waste collection points or schedule pick-up?



5. Comparative Analysis

The findings across Albania, North Macedonia, and Serbia reveal a consistent pattern: the gap between legislative ambition and operational reality is not a country-specific failure but a structural one, rooted in the same underlying dysfunctions regardless of national context. This section draws out the cross-cutting patterns and divergences without repeating the country findings in detail.

5.1 Shared Structural Failures

On EPR, all three countries have legally established frameworks, yet in none of them does the system operate as intended for WEEE. In Albania, EPR is embedded in Law No. 74/2025 but is not yet operational; the law takes effect only in December 2026, municipalities are still awaiting the implementing bylaws. In North Macedonia, EPR is legally established and PROs are active, yet free-riders persist due to insufficient inspection capacity and eco-fees too low to sustain collection infrastructure. In Serbia, EPR works for packaging waste, but no compliance scheme has been established for WEEE specifically, and producer fees flow into the general state budget rather than funding dedicated collection. In all three cases, the “polluter-pays” principle exists on paper but is not operationalized.

On data, no country can produce a fully accurate picture of e-waste flows. Albania’s Integrated Environmental System, launched in February 2026, does not yet contain the required e-waste data, and municipalities confirmed they do not differentiate between waste streams. North Macedonia’s reporting still relies heavily on paper-based submissions, with no centralized electronic platform linking ministries, customs, and operators. In Serbia, SEPA’s official response (17.04.2026) confirmed that household collection data is not in its possession, meaning the most critical part of the collection chain is absent from official figures.

On institutional fragmentation, enforcement is concentrated at the national level in all three countries, while municipalities lack the financial resources, technical capacity, and legal mandate to act. In Albania, the Durrës Municipality could not provide precise waste stream data due to the absence of a specialized scale. In North Macedonia, municipalities are formally assigned collection responsibilities but lack infrastructure and funding. In Serbia, there is no

financial mechanism channeling resources from national to local level, and the NRIZ platform does not extend meaningfully to local governments.

These three dysfunctions reinforce one another: without reliable data, enforcement is weak; without enforcement, EPR remains symbolic; without resources reaching the municipal level, collection systems cannot function. This interdependence explains why the failures are structural rather than incidental and confirms the central finding of the ITU/UNEP/UNITAR Regional E-waste Monitor for the Western Balkans (Iattoni et al., 2023), which identified the implementation gap, the distance between legal transposition and functional systems, as the defining challenge across the region.

5.2 Country-Level Divergences

Legislative alignment with EU acquis

On legislative alignment, the three countries are at different stages, reflecting different timelines rather than different levels of commitment. Serbia has had the longest engagement with EU accession under Chapter 27 but has accumulated the largest documented transposition gap: out of 248 obligations under the WEEE Directive, only 115 have been fully transposed, 30 partially, and 103 not at all (Marinković et al., 2023); furthermore, Serbia missed its January 2022 harmonization deadline. North Macedonia has an operational EPR framework with progressively increasing collection targets, 40% by 2025, rising to 65% by 2028, though the current collection rate of approximately 17% reveals a substantial gap between target and practice. Albania's framework is the most recently restructured, with Law No. 74/2025 consolidating earlier instruments.

Digital reporting

On digital reporting infrastructure, Serbia's NRIZ platform is the most developed in the region. However, it tracks administrative compliance rather than physical waste flows, leaving a gap between what is reported and what actually happens on the ground. North Macedonia relies on mandatory annual reporting but still processes submissions largely through paper-based forms with no centralized electronic platform. Albania's Integrated Environmental System launched in February 2026 in line with national obligations under Law No. 57/2025 on Integrated Waste Management, but it is not easily accessible by the public sector.

Role of civil society organizations

In North Macedonia, NGOs contribute to collection, reuse, and public awareness alongside the formal PRO system. In Albania, the absence of reliable data and the need for clearer government strategy is visible, but civil society engagement in actual collection remains limited. In Serbia, three NGOs were contacted during the research process and none responded, which may reflect limited organizational capacity in this area or difficulties in identifying active actors.

Across all dimensions, legislative alignment, institutional capacity, digital reporting, and civil society, the differences between the three countries are best explained by legislative timing, available external funding, and the time each country has had to build operational infrastructure, rather than by political will alone. None of the three has yet translated its legal framework into a fully functional WEEE management system, but each is constrained by a different combination of factors.

5.3 The Case for a Regional Approach

All three countries share the same external driver: EU accession conditionality under Chapter 27 (Environment and Climate Change). Compliance with the WEEE Directive is not optional for any of them: it is a binding accession obligation. European Commission progress reports assess not only legal alignment but also enforcement structures, administrative capacity, and operational outcomes. All three countries are currently assessed as having

significant implementation gaps. This shared obligation creates a structural incentive for coordination: harmonizing approaches to producer registration, reporting standards, and collection targets reduces duplicated effort, lowers the overall cost of compliance, and strengthens each country's accession trajectory. The EU accession framework itself therefore functions as an external architecture for regional cooperation, one that already exists and can be built upon.

The findings identify concrete opportunities for shared infrastructure. Serbia's NRIZ platform, which achieved 94% reporting uptake among registered companies after external project support and now connects four national institutions (NALED, 2020), represents a model that Albania and North Macedonia are both still working toward, with the former's Integrated Environmental System still incomplete and the latter relying on paper-based submissions. A regional e-waste data registry built on shared reporting standards would address the data gap documented in all three countries simultaneously, at lower cost than three parallel national systems. Similarly, treatment infrastructure, currently underdeveloped across the region, with limited domestic capacity and reliance on exports of removed components (SEPA, official response, 17.04.2026) could be co-financed and shared across borders, making facilities viable that would not be economically justifiable for any single country's volume alone.

Precedents for regional environmental governance in the Western Balkans already exist. The ITU/UNEP/UNITAR Regional E-waste Monitor for the Western Balkans (Iattoni et al., 2023) and the OSF (2024) and Policy Report on Digital Transformation in the Western Balkans (Bajic et al., 2024) both confirm that the failures documented at a national level are structural and shared, and that a coordinated regional response is both analytically justified and practically necessary. These regional assessments represent a foundation of shared analysis that has not yet been translated into operational coordination.

6. Policy Recommendations

- Establish a regional e-waste data registry with shared reporting standards, building on Serbia's NRIZ model

What: Create a regional e-waste data registry with harmonized reporting categories for WEEE generation, collection, treatment, and cross-border flows, building on Serbia's NRIZ model and extending it to include household-level collection data currently absent from all three national systems.

Who: SEPA (Serbia), the Ministry of Environment (North Macedonia), AKM (Albania), coordinated through an agreed intergovernmental working group.

How: A technical assistance project modelled on the NALED project that built NRIZ (2018–2020), extended to cover all three countries with a shared digital platform and common data fields aligned with WEEE Directive reporting requirements.

EU leverage: The European Commission's Chapter 27 progress assessments include data reporting capacity as a monitored indicator. IPA III funding for digital governance and environmental monitoring can be used to co-finance the platform. Shared standards would directly support each country's compliance with WEEE Directive reporting obligations.

- Operationalize EPR schemes with mandatory producer registration and financial guarantees in all three countries

What: Each country should establish a mandatory, publicly accessible producer register for EEE importers and manufacturers, with financial guarantees (eco-fees or compliance fund contributions) ring-fenced for collection and treatment infrastructure rather than directed to the general budget. Free-riders should face disqualification from public procurement as an enforcement mechanism.

Who: Ministries of Environment in each country, with customs administrations responsible for tracking imports and environmental inspectors responsible for enforcement.

How: Secondary legislation (bylaws) to operationalize existing legal frameworks, particularly in Albania where the legal basis exists but implementing regulations have not been issued. In Serbia, amendment to the fee allocation mechanism to redirect producer contributions from the general budget to a dedicated EPR compliance fund.

EU leverage: Operational EPR is a core WEEE Directive requirement and a Chapter 27 benchmark. The European Commission's annual progress reports can be used to create direct political pressure for bylaw adoption and fee reform. Peer review mechanisms within the accession process can be used to share the North Macedonia PRO model with Albania and Serbia.

- Devolve implementation mandate and resources to municipal level with dedicated e-waste collection infrastructure

What: Establish a legal mandate for municipalities to provide e-waste collection points, with corresponding funding transferred from EPR compliance funds to local governments. Prioritize rural municipalities where collection infrastructure is currently absent in all three countries.

Who: Ministries of Environment and Ministries of Local Self-Government in each country, in coordination with PROs and municipal associations.

How: Legislative amendment to waste management laws in each country to assign e-waste collection as a defined municipal service obligation, with inter-governmental transfer mechanisms linking EPR fee revenue to municipal collection infrastructure investment. The EU model of PRO reimbursement to municipalities for collection costs, already operational in Sweden and Germany, provides a direct template (Marinković et al., 2023).

EU leverage: IPA III funds can co-finance the rollout of municipal collection point networks, particularly in rural areas. The WEEE Directive's household collection targets provide a direct compliance incentive, and progress on collection rates is tracked in Chapter 27 assessments.

- Launch a regional public awareness campaign coordinated through existing Western Balkans civil society networks

What: A coordinated regional public awareness campaign on e-waste, what it is, why improper disposal is harmful, and where and how to hand it in, delivered through existing civil society networks in all three countries simultaneously, with country-specific messaging adapted to local languages, collection infrastructure, and cultural context. The campaign would include a visible regional identity while allowing national actors to lead local delivery, avoiding the disconnect that comes from centrally produced content that does not reflect local realities.

Who: Existing civil society organizations active in e-waste in each country, with Ministries of Environment providing official backing and PROs contributing co-financing where operational. A regional coordinating body would manage shared branding, campaign materials, and cross-country learning.

How: A dedicated IPA III regional civil society action grant funding campaign design, translation, local delivery, and impact measurement over a minimum two-year cycle. Campaign channels would be tailored to each country context but could include social media, school programmes, municipal collection drive events, and partnerships with electronics retailers at point of sale. Critically, the campaign would only be launched in parallel with improvements to actual collection infrastructure, so that raised awareness translates into collection rather than frustration.

EU leverage: Public awareness is an explicit requirement of the WEEE Directive, and its absence is a documented weakness in Chapter 27 assessments for all three countries. A regionally coordinated campaign funded through IPA III would fulfil this obligation at lower cost than three separate national campaigns, while also generating the kind of visible, citizen-facing EU accession dividend that strengthens public support for the broader reform process.

7. Conclusion

Albania, North Macedonia, and Serbia share a common policy gap: the absence of a fully aligned, enforced, and operationally functional e-waste management framework integrating extended producer responsibility, digital reporting, and clearly defined institutional obligations at both national and local levels. This gap is not a symptom of legislative neglect – the three countries have incorporated EU standards into national law – but of the persistent distance between legal transposition and functional implementation. As the fastest-growing waste stream globally, and as a direct obligation under EU accession Chapter 27, e-waste governance represents both an environmental necessity and a strategic test of administrative capacity.

Albania's framework is the most recently restructured, with Law No. 74/2025 “on Integrated Waste Management” consolidating earlier instruments and establishing EPR in law, but enforcement is deferred to December 2026 and implementing bylaws remain pending. Serbia has the longest accession engagement under Chapter 27 but the largest documented transposition gap, with 103 of 248 WEEE Directive obligations not transposed and no functioning compliance scheme for WEEE specifically. North Macedonia has an operational EPR framework with PROs active in the field, yet its collection rate of approximately 17% falls far short of the 40% target set for 2025, illustrating the gap between formal structure and operational outcome. In all three countries, municipalities, the actors closest to actual waste flows, lack the financial resources, technical capacity, and legal mandate to act effectively.

This paper proposes four interconnected recommendations: establishing a regional e-waste data registry with harmonized reporting standards built on Serbia's NRIZ model; operationalizing EPR with mandatory producer registration and ring-fenced financial guarantees in all three countries; devolving implementation mandates and resources to municipal level; launching a regional public awareness campaign coordinated through civil society.

The regional dimension matters beyond the three countries. E-waste does not respect national borders: informal cross-border flows are documented across the Western Balkans, meaning a strong framework in one country can be undermined by weak governance in a neighboring state. The EU accession process provides a ready-made architecture for regional cooperation, shared Chapter 27 obligations and comparable compliance benchmarks, that remains underused. If the policy gap documented in this paper is not addressed, these countries will continue to lose recoverable raw materials, face growing environmental and public health costs from unmanaged e-waste and fall further behind the EU implementation benchmarks that accession requires. The decisions made in the next legislative cycle will determine whether legal alignment translates into functional systems, or whether the implementation gap becomes permanent.

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Appendix A - Stakeholder Interview Questions

I. Ministry of Environment

1. What is the current government vision for aligning national e-waste policy with the EU WEEE Directive and the Circular Economy Action Plan?
2. Are there plans to update national legislation to clarify responsibilities for producers, municipalities, recyclers, and importers?
3. What are the biggest constraints in harmonizing e-waste flows with EU Member States and regional neighbors?
4. What challenges have been identified in enforcing EPR and ensuring producers fulfil their obligations?
5. Are there plans to strengthen monitoring and sanctioning mechanisms for non-compliant producers/importers?
6. How significant is the issue of unreported or informally handled waste?
7. How is inter-ministerial coordination handled (Environment, Economy, Finance, Customs, Local Government)?
8. What systems are currently used to monitor e-waste generation, collection, and transboundary movement?
9. Which infrastructure gaps (collection points, sorting facilities, recycling plants) are considered most urgent?
10. What support would be most useful (technical, financial, legislative) to improve implementation?

II. Ministry of Digitalisation

1. What systems are currently used to monitor e-waste generation, collection, and reporting?
2. Are there gaps in national data collection?
3. How interoperable are environmental databases with customs, tax authorities, and inspection bodies?
4. Is reporting fully digital or partially manual?
5. Is the Ministry considering digital traceability tools (QR codes, blockchain tracking, harmonized reporting systems)?
6. What are the main technical bottlenecks in digitalizing environmental reporting?
7. How secure and verifiable is current reporting data?
8. Is e-waste data publicly accessible?
9. Are there plans to introduce public dashboards or open-data tools for environmental reporting?

III. Producer Responsibility Organisations (PROs)

1. How clear and effective do you find the existing e-waste legislation?
2. How well do Producer Responsibility Organisations operate in your experience?
3. Are collection and recycling targets realistic and achievable?
4. What barriers hinder producers or distributors from fulfilling obligations (e.g., free riders, informal sector competition)?
5. How significant is the issue of unreported or informally handled waste?
6. Are current financial mechanisms (EPR fees, subsidies, municipal budgets) adequate?
7. What incentives would encourage higher collection or recycling rates?
8. How do you collect and report data on e-waste flows?
9. What parts of the reporting system work well, and where are the bottlenecks (IT systems, definitions, verification)?
10. What technical, financial, or administrative support would most improve your operations?

11. What technological or policy innovations do you see as most promising for improving e-waste management?

IV. Producers / Importers / Distributors

1. How clear and effective do you find the existing e-waste legislation?
2. What are the key compliance challenges you face (clarity of obligations, enforcement, financial burden)?
3. Are collection and recycling targets realistic and achievable?
4. What barriers hinder producers or distributors from fulfilling obligations (e.g., free riders, informal sector competition)?
5. How significant is the issue of unreported or informally handled waste?
6. Are current financial mechanisms (EPR fees, subsidies, municipal budgets) adequate?
7. What incentives would encourage higher collection or recycling rates?
8. How do you collect and report data on e-waste flows?
9. What parts of the reporting system work well, and where are the bottlenecks?
10. What changes would significantly improve the functioning of the system?

V. Environmental NGOs / Experts

1. How clear and effective do you find the existing e-waste legislation?
2. How well do Producer Responsibility Organisations operate in practice?
3. How significant is the issue of unreported or informally handled waste?
4. How do informal recyclers influence the system?
5. Are collection and recycling targets realistic and achievable?
6. What are the biggest compliance weaknesses in the system?
7. What is the current level of public awareness about proper e-waste disposal?
8. Which awareness campaigns have been effective?
9. What technological or policy innovations are most promising?
10. What changes would significantly improve the functioning of the system?

Appendix B - Public Survey Questions

Introduction

This questionnaire is part of a research conducted within the Regional Youth Leadership and Mobility Programme (RYLMP). The programme brings together young researchers from North Macedonia, Albania and Serbia, who work on developing data-driven research and initiatives in areas such as regional cooperation, education, employability, migration, youth participation, as well as the digital and green transition.

RYLMP is implemented by the Youth Education Forum (YEF) from North Macedonia, the Center for Science and Innovation for Development (SCiDEV) from Albania and the Youth Initiative for Human Rights (YIHR) from Serbia. The purpose of this research is to provide a better understanding of electronic waste (e-waste) management and to contribute to the improvement of policies and practices in this field.

Electronic waste (e-waste) refers to discarded electrical and electronic devices such as mobile phones, computers, televisions, batteries, household appliances, and other electronic equipment. This survey aims to understand citizens' awareness, disposal behavior, and trust in institutional waste management systems.

SECTION A: Demographics

Gender

- ☐ Male
- ☐ Female
- ☐ Other

Age Group

- ☐ 18-25
- ☐ 26-40
- ☐ 41-65
- ☐ 65

Country of Residence

- ☐ Albania
- ☐ Serbia
- ☐ North Macedonia

Education Level

- ☐ High School
- ☐ Bachelor
- ☐ Master
- ☐ PhD
- ☐ Other

SECTION B: Awareness of e-waste risks

1. Have you heard of the term "electronic waste" (e-waste or WEEE)?

- ☐ Yes
- ☐ No

2. Which of the following items do you consider electronic waste? (Select all that apply)

- ☐ Mobile phones
- ☐ Laptops and computers
- ☐ Household appliances (e.g., washing machine, fridge)
- ☐ Batteries
- ☐ Light bulbs
- ☐ I am not sure

3. Do you believe e-waste can pose environmental or health risks?

- ☐ Yes, significant risks
- ☐ Some risks
- ☐ No real risks
- ☐ I don't know

SECTION C: E-waste disposal behavior and knowledge of legal e-waste disposal options

4. What do you usually do with old electronic devices?

- ☐ Store them at home
- ☐ Throw them in regular household waste
- ☐ Sell or give to informal collectors
- ☐ Return to a shop or official collection point
- ☐ I have never disposed of electronic equipment

5. Are you aware of any official e-waste collection points in your municipality?

- ☐ Yes
- ☐ No
- ☐ Not sure

6. How far is the nearest official e-waste collection point from your home?

- ☐ Less than 1 km
- ☐ 1–5 km
- ☐ More than 5 km
- ☐ I don't know
- ☐ There is none

SECTION D: Trust in institutional systems

7. How much do you trust that electronic waste collected in official channels is properly recycled? (Scale 1–5)

- ☐ 1 - No trust at all
- ☐ 2 - Low trust
- ☐ 3 - Moderate trust
- ☐ 4 - High trust
- ☐ 5 - Full trust

8. In your opinion, who should be primarily responsible for managing e-waste?

- ☐ Government
- ☐ Municipalities
- ☐ Producers/importers of electronics

- ☐ Citizens
- ☐ Shared responsibility
- ☐ I don't know

SECTION E: Digitalization and transparency

9. Are you aware of any online platform or system where companies report electronic waste or environmental fees?

- ☐ Yes
- ☐ No
- ☐ Not sure

10. Would you use a mobile app or digital platform to locate e-waste collection points or schedule pick-up?

- ☐ Yes
- ☐ Maybe
- ☐ No