



Construction and demolition waste management in Kosovo: a survey of challenges and opportunities on the road to circular economy

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Abstract

Managing Construction and demolition waste (CDW) is a severe and growing urban challenge, particularly in post-conflict countries. Though Kosovo has significantly rebuilt and developed after the Liberation War, these initiatives have accompanied suboptimal waste management. This research evaluates CDW management in Kosovo by assessing current practices and operations vis-a-vis the legal framework and EU requirements. It identifies instruments and policies capable of ameliorating gaps and proposes a more sustainable and circular CDW management system for Kosovo. Information was primarily collected during on-site visits to Pristina and the surroundings by a cohort of Urban Management Students from the Technische Universität Berlin, students from Kosovo, and the local office of the Gesellschaft für Internationale Zusammenarbeit, GIZ. The analysis identified gaps in Kosovo's CDW management and its observance and enforcement of existing CDW legislation, including an ambiguous licensing system impeding sustainable demolition, storage, and transport; the absence of approved CDW storage options leading to uncontrolled disposal; and an underdeveloped market for recycling and reuse, deterring stakeholders from further pursuit of circular practices. These gaps were compounded by poor recordkeeping, obscuring precise information on CDW streams. Possible instruments and incentives to support Kosovo's transition to a more sustainable CDW management system were then identified.

Keywords Construction and demolition waste (CDW) · Waste management · Recycling and reuse · Kosovo · Circular economy

Introduction

Modern cities face many challenges in meeting the needs of growing populations with increasingly limited resources and fragile environments. Key among these is addressing the rapidly increasing waste flows produced by citizens, businesses, and the very infrastructure of cities, including notably, those arising from construction activities.

In the case of Kosovo, a Balkan country “in transition” [22], construction and demolition waste (CDW) management is crucial to the formation of a national, sustainable waste management strategy due to the unique problems it presents. Uniquely, some 70,000 homes of Kosovo's building stock were destroyed during the conflict [19], producing vast quantities of demolition debris and making CDW management an urgent issue. Though precise amounts of CDW generated in Kosovo are not known, it is estimated that roughly 170,000 metric tons of CDW is generated per year, and as of 2017, 1572 dumpsites exist in the country holding some 140,000 m³ of CDW [23]. Though no official figures are kept, it was estimated by a previous study, co-authored in part by the authors, that the total amount of CDW in Kosovo in 2019 was 583,200 tons [22]. While CDW is not particularly difficult to recycle for many more modernized countries, Kosovo, due to its unique economic and political history, has both an abundance of CDW and has not yet shown itself capable of dealing with this particular set of

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waste fractions. Moreover, due to its rapid development and fast growth, Kosovo also faces rapid urbanization, creating an influx of CDW from building activities [35]. This influx needs to be met with proper and efficient waste management if the country is to move toward a circular economy.

This paper presents a case study of CDW management in Kosovo, particularly in the cities of Pristina and Fushe Kosove, evaluating current practices from a legal and operational standpoint, to ascertain gaps, limitations and possible improvements in line with current political, economic and environmental priorities.

The objectives of the paper include:

1. Presenting an overview of the existing management of CDW from both legal and operational perspectives along the waste management process
2. Evaluating the operational execution of the management of CDW relative to the legislation,
3. Identifying approaches necessary to circumventing gaps in the legislation and/or operations; and
4. Determining approaches, instruments, or incentives for sustainable management of CDW in the country, aligned with the EU's goals of a circular economy.

As a potential candidate for EU Accession, Kosovo must meet the criteria of economic, social and political stability and in turn receives institutional and legal guidance from the EU. An example of this partnership is waste management legislation, which was drafted and harmonized according to EU and US standards. However, the existence of an EU-inspired legal framework does not automatically translate

into efficient implementation of such laws, which is particularly evident in Kosovo's handling of its CDW, or lack thereof (see Fig. 1).

Theory

Waste hierarchy and circular economy

Current literature considers effective waste management to be of significant importance to the health and economic wellbeing of society but also to larger systems of resilience and environmental sustainability [1]. This is reflected in the underlying paradigms of the EU's Waste Management legislation, which link waste management concepts—primarily, the Waste Hierarchy and Circular Economy—to the overarching concept of sustainability. Throughout the research, Kosovo's performance in CDW management was evaluated in accordance with this legislation, and how well the country is meeting the EU requirements.

Waste management practices in the context of EU legislation are prioritized according to the Waste Hierarchy. In addition, the EU Waste Framework Directive of 2008 [13] sets boundary conditions for waste management relative to:

- a. The usage of waste as a secondary raw material
- b. The status of waste as a hazard to human health and the environment
- c. The effects of waste on the land and other places of special interest.

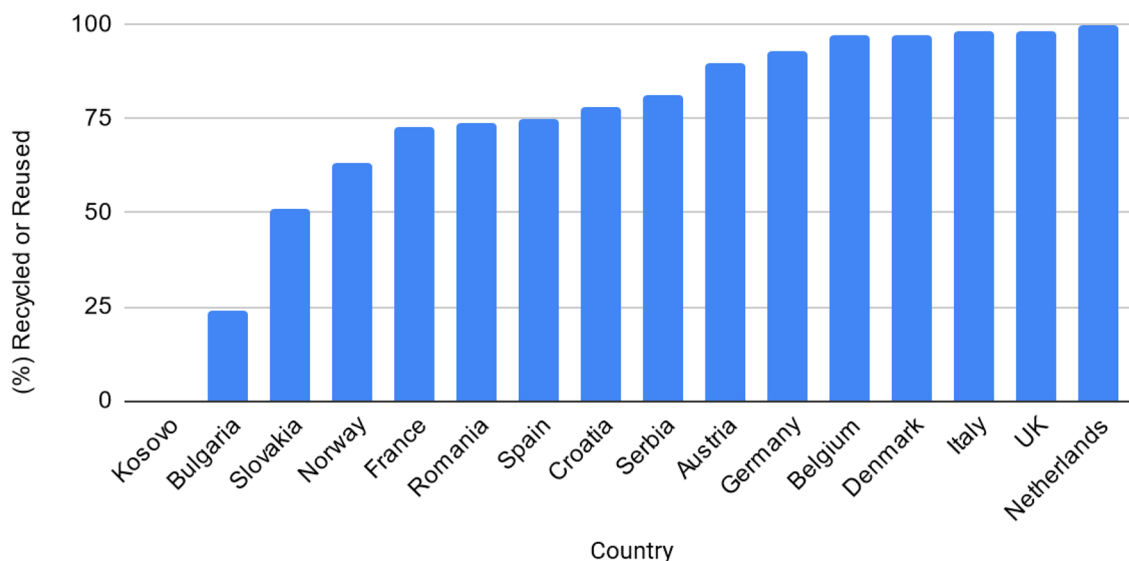


Fig. 1 Chart displaying the percentage of CDW Recycled and Reused (including Backfilling) in various European countries. Kosovo's percentage is, noticeably, unknown, likely due to poor recordkeeping [15]

The concept of Circular Economy, on the other hand, looks at the wider economic system and aims to extend material life cycles through an economy of “loops”, to reduce resource depletion, prevent waste and improve economic outcomes—in essence minimizing what actually becomes waste [33, 37]. The EU has advocated the transition to a circular economy through various publications, including 2015’s Closing the Loop—An EU action plan for the Circular Economy [7], which is closely linked to various objectives of EU policy, including economic and social agendas, climate and energy, and global efforts toward sustainable development. In the 2020 Circular Economy Action Plan, the EU makes the case for a circular economy by outlining the impacts of Construction and Buildings (C&B) economic activity. These include the consumption of roughly 50% of all extracted materials—which accounts for over 35% of the total waste generated in the EU, and between 5 and 12% of all GHG emissions in the EU, of which some 80% could be saved by enhancing material efficiency [11]. Moreover, the Action Plan sets out several goals and strategies to help bridge the transition to a circular economy. Pertaining to CDW, these include initiatives towards high-quality recycling, remanufacturing, reduction of carbon footprints, integration of life-cycle assessment in public procurement, and the creation of digital logbooks for buildings.

Waste Hierarchy and Circular Economy operate at fundamentally different levels: the Waste Hierarchy concerns day-to-day waste management practices, while the Circular Economy concept functions at a macro level. Subsequently, the concepts can be synthesized, creating a linkage between waste management activities and their direct preferability for a transition to a circular economy. One such schematization of this duality has been created by the German Advisory Council of the Environment, as seen in Fig. 2 [16].

Legal framework

According to representatives from the Legal and Administration Reform Project, Kosovo’s waste management laws borrow much of their wording and substance from EU and US directives. This provides Kosovo with a *seemingly* robust legal framework, published through the Official Gazette, a portal aggregating pertinent documents for the central, local and judicial realms. However, when discussing Kosovo’s implementation of the CE, there are still vast gaps in the legal framework. The concept is not addressed explicitly in legislation -the closest indication is a very circumspect mention of recycling—mentioned only as a principle and not fully detailed on how it should be legally carried out.

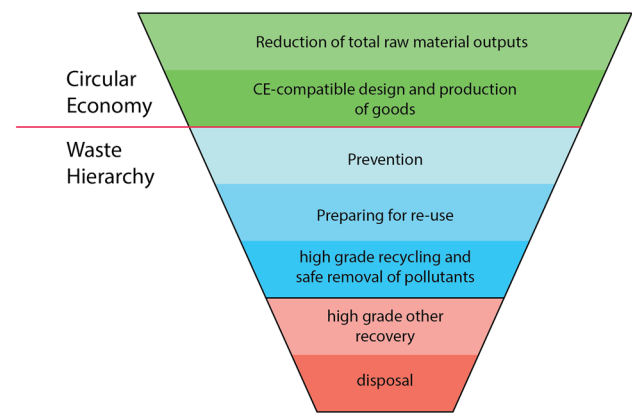


Fig. 2 Graphic displaying the Waste Hierarchy and its Integration with the Circular Economy, adapted by the authors from German Advisory Council for the Environment (2020) Towards an Ambitious Environmental Policy in Germany and Europe [16]

Legal hierarchy and competencies

The most pertinent laws governing CDW management are the *Law on Waste* and the *Law on Construction* [22]. Additionally, a sub-legal act called an Administrative Instructions (AI) is issued by Ministries to inform precise municipal action. Relevant AIs include landfill construction, waste storage management, instructions for drafting municipal plans and procedures, fee and payment regulation, and municipal waste collection processes, among others. These laws are summarized in Annex I.

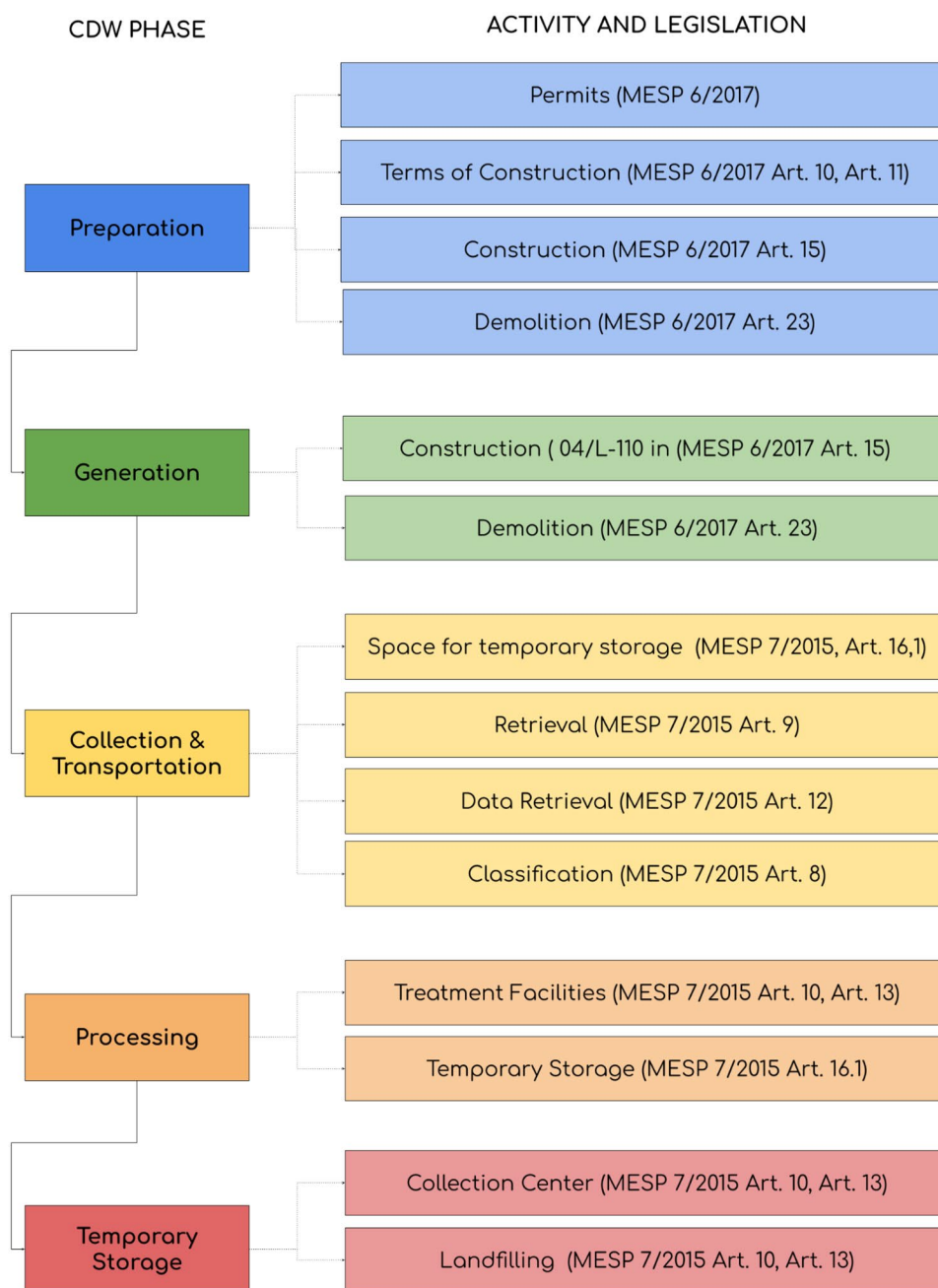
The legal framework also defines the role of stakeholders across different levels of governance and assigns responsibilities throughout the waste management chain accordingly. For CDW, the Ministry of Environment and Spatial Planning (MESP) is tasked with issuing legislation, licensing waste managers (collectors, for instance) and approving larger infrastructure projects.

The municipalities, however, bear the brunt of the responsibility; they are meant to implement and enforce legislation, eliminate illegal dumps as well as allocate land for temporary storage sites, and issue Construction and Demolition permits for local projects, among others. Additional competencies are assigned to project leaders (investors, developers) and waste collectors.

Legal prescription: CDW management

There exist specific and explicit legal prescriptions for the management of CDW in Kosovo, defined through a series of Administrative Instructions, which assign competencies and describe procedures. Figure 3 provides an overview of the relevant legal articles governing the different aspects of CDW management in Kosovo.

Fig. 3 Schematic outlining the current management of CDW in Kosovo according to the CDW phase and its relevant activities. This figure connects the general phase of CDW management (as conceived by authors) on the left with its constituent activities and their associated legal prescriptions on the right [22]



The five CDW phases denoted in Fig. 3 include the main elements in the flow of CDW:

- *Preparation*: planning, permitting, and licensing of operators and activities required;
- *Generation*: activities leading to the generation of CDW;
- *Collection & Transportation*: Collection is the bringing together of separate fractions of CDW on the construction/demolition site; transportation refers to the movement of CDW from the construction/demolition site to the temporary storage or processing site;

- *Processing*: the submission of the CDW to specific physical or chemical processes aiming at enhancing further processability or use;
- *Storage*: A site for the temporary storage of the CDW fractions for later processing and use.

Materials and methods

Research data on the practices of CDW management in Kosovo was largely sourced from a book written, in part, by the authors of this article [22]. The book was developed

in collaboration with the local office of the German Internationale Zusammenarbeit, GIZ, which provided access to the stakeholders and information necessary for elucidating the situation in Kosovo.

Due to the absence of prior studies on the topic, field observations from site visits and interviews with local stakeholders were used to analyze the pertinent issues concerning CDW management in Kosovo. During initial data collection, the absence of official data required annual CDW quantities to be estimated indirectly through building permits, mapping and quantifying illegal dumpsites, and analyzing data collected by the GIZ in previous years, using the model developed by Solís-Guzmán et al. [32]. However, these methods were judged insufficient in generating reliable quantitative data, thus necessitating a greater reliance on qualitative work. Data was collected through 26 semi-structured interviews with various stakeholders, including state officials, municipality workers, construction personnel, private developers, academics, and informal actors. The interviews sought to collect knowledge on legal and operational processes of CDW management in the country, difficulties and dynamics between stakeholders, and, where possible, figures that could help in scaling the problem correctly.

Additionally, the study.

- 1) Reviewed the CDW legislation to determine how CDW management is intended to function.
- 2) Analyzed the existing operational reality of CDW management in Kosovo, and.
- 3) Expanded the focus of CDW Management in Kosovo to include an EU Circular Economy approach.

From the learnings of (1) and (2), the ‘gaps’, namely, stages where the legal requirements were not implemented, were identified. The gaps were examined in conjunction with currently observed capacities to determine both the underlying obstacles leading to poor CDW management and the potential for the eventual transition into a more circular waste management system.

Limitations

The most fundamental limitation is that Kosovo does not systematically collect data on the generation and disposal of CDW, hampering the quantitative accuracy and representativeness of the empirical findings. A second limitation is the lack of prior peer-reviewed research on Kosovo’s management of CDW. The Government of Kosovo reports yearly on municipal waste management in the country, but CDW does not feature prominently in these reports [18]. NGOs such as the German Society for International Cooperation (GIZ), have taken a more active interest in the issue, commissioning several studies but these are not peer-reviewed.

The final limitation was the inherent constraints of the stakeholder interviews as a qualitative tool. As the field research was conducted over a single week of unstructured interviews, the information gathered was illustrative rather than exhaustive. Since considerable amounts of waste were visibly dumped in illegal sites, an admission of the end destination of CDW was a sensitive topic, leading to sometimes ambiguous responses, no responses and possibly false responses. Interviewees were somewhat reticent to answer all questions, likely because of the perceived official capacity of the researchers.

Results

Legal framework and operational flow of CDW

The analysis found apparent disconnects between legal requirements and the operational reality. Interviews with stakeholders in the construction industry revealed procedures that conflicted with the law, as shown in Fig. 4, column “Operation”. Key actors across public and private sectors and civil society reported cited economic constraints and a lack of political interest in promoting sustainable practices as primary challenges. These were due, in part, to prioritizing the rapid redevelopment of the country in the years following the war.

The following section highlights the main findings on Kosovo’s CDW management and the gaps between legal requirements and observed operational practices. These findings are schematized in Fig. 4.

Preparation

A series of bureaucratic steps are legally required including applications for Constructions and Demolition Permits. According to AI 06/2017, Art. 10, these applications require specific documentation and must be inspected by either Municipal or Ministerial officials [26]. Observed practice, however, shows that the Kosovar legal framework is not always complied with. According to interviews with workers, the only permit obtained before Construction or Demolition is the Construction Permit, which only requires a property title and a project plan. It is not mandatory to include a plan for the collection, use or disposal of the waste produced due to construction or demolition. Moreover, several interviewees mentioned that there were insufficient building inspectors to cover the entirety of Kosovo, likely contributing to the poor enforcement of permitting and license acquisition.

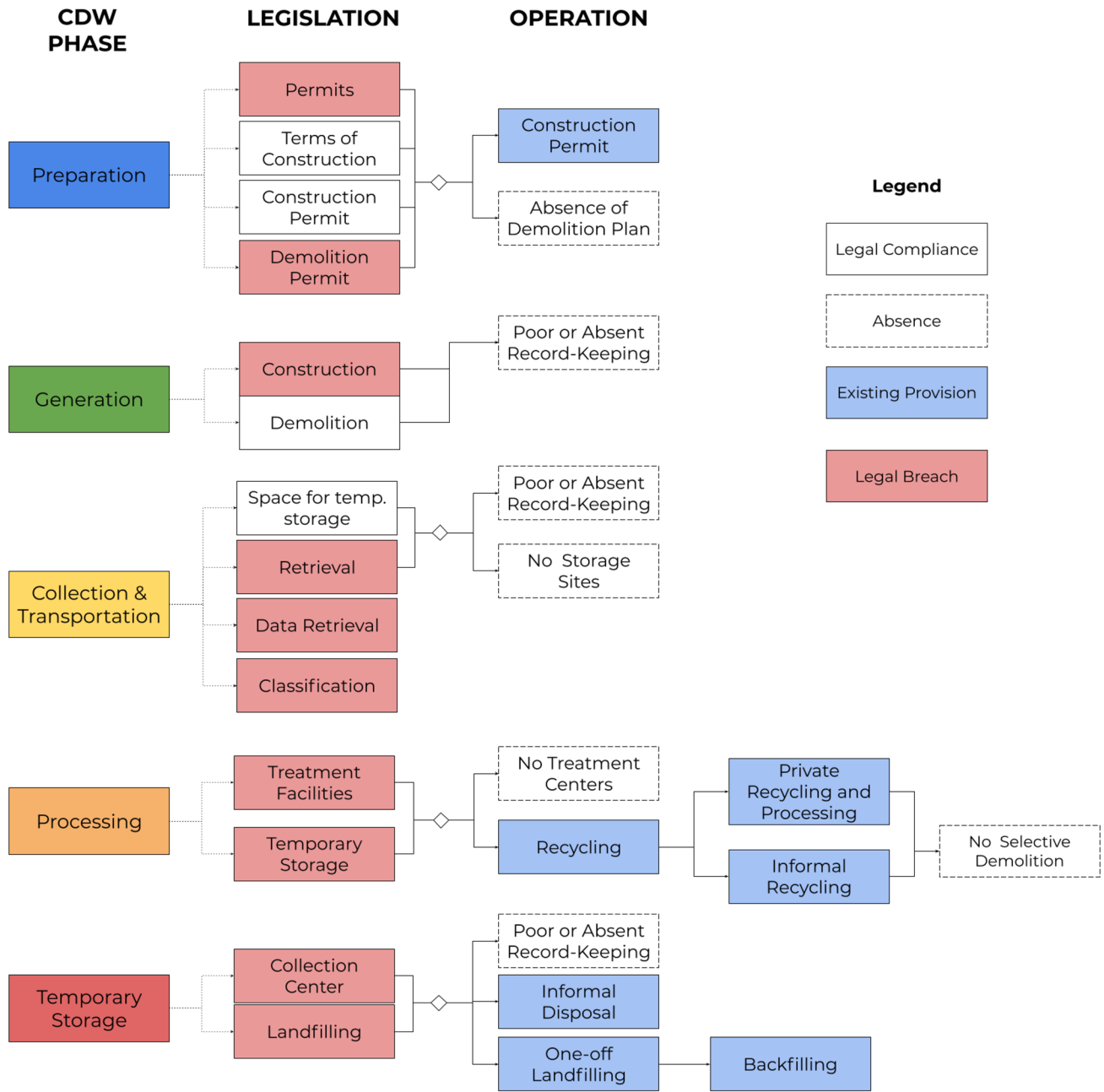


Fig. 4 Schematic outline of Kosovo’s implementation and enforcement of its CDW legal framework and resulting operational flow, adapted by authors. Notably, there are legal breaches in many areas of legislation which manifest in operational gaps or absences

Generation

According to the Law on Waste No. 04/L-060, developers are expected to keep careful records of CDW generated during construction and demolition in the Construction Book [2]. Nevertheless, on-site visits showed that records of amounts and types of CDW produced were seldom kept. According to interviewees, legal enforcement of record-keeping through inspections was infrequent. Without these

processes in place, however, it is challenging to determine detailed information on the waste streams generated and implement corrective strategies.

Collection and transportation

Legally, on-site collection for the safe removal and transport of CDW to storage sites must be organized jointly by the developer and a licensed CDW transport company [25].

Since there were no licensed transport companies in Kosovo, there did not appear to be any standardized process for collecting CDW from construction sites. Although construction and demolition activities generate various material fractions, CDW is usually gathered indiscriminately in one or two piles, depending on the sites' available space. Coupled with poor record-keeping, this makes it challenging to track CDW flows.

Regulations dictate that companies plan for waste management, including securing proper space and containers for different materials, during all stages of construction [2]. However, representatives from construction companies asserted that only individual workers, operating on their own initiative rather than company policy, took part in dismantling and selling valuable materials that can be easily handled and recirculated, such as metal, plastics, and wood. This ad hoc recycling did not, however, extend to concrete and other inert fractions, which are among the most problematic fractions to manage [14, 34].

According to interviewees, the government has made licenses for collection and transport available, but no companies have expressed an interest in applying for these licenses. Since Kosovo continues to generate CDW, other stakeholders must step in to remove it. Pastrimi, the municipal waste management company, infrequently transports CDW to the local landfill, either by a special contract to help stabilize the landfill or unknowingly, by transporting small-scale home-renovation CDW mixed into municipal waste containers.

Despite these practices, many interviewees mentioned that CDW transport is not financially attractive enough for a more expansive formal market, thus relegating it to the informal sector. In the absence of licensed companies, some construction companies hire unlicensed private transport companies, which have the necessary equipment to transport large fractions of CDW but have not undergone the processes of receiving their licenses and offering this service in a formalized way, either due to the costs or that formalization would put more restrictions on how to handle the CDW. Informal collectors also play a role in removing more valuable CDW fractions such as metals and wood, respectively, sold or used for heating. Although some materials are collected and transported by informal actors, sent to recycling companies or reused, substantial amounts end up "elsewhere", often meaning, are disposed of illegally.

Processing

CDW must undergo specific physical and chemical processing in order for it to be disposed of in an environmentally safe manner, reused, or recycled. However, the term processing is poorly defined in the Kosovar legal framework. There are only indications that it is necessary throughout the process: according to AI 07/2015, Art. 15, disposal must

occur at a site defined by the municipality and must be based on environmental regulations and population density [25].

Processing of CDW is perhaps most legally robust when it comes to asbestos, present in many older buildings. The Kosovar Environmental Protection Agency (KEPA) estimates that some 4000–9000 tons of asbestos are being removed from buildings every year [24]. The government of Kosovo has taken legislative steps to address this issue, though as of 2016, these provisions have not been as robust as those of other Western countries [5].

In practice, CDW processing seems to be a by-product of other practices, such as the ad hoc selective demolition practiced by private companies and the informal sector. While these practices contribute to the improved separation of different CDW fractions, this outcome is incidental rather than deliberate.

Storage

There are no licensed storage or disposal sites for CDW in Kosovo, despite Kosovo's legislation requiring each municipality to be responsible for the selection, preparation, and subsequent management of a site to store or dispose of locally-generated CDW, separated in defined material fractions. Sites must be selected according to environmental regulations and population density (AI MESP 07/2015, Art. 15). Storage is, in principle, temporary, meaning that as soon as processing facilities and capacity are available, the stored CDW fraction can be collected from the storage site and transported to a facility for further processing or preparation for environmentally safe disposal. The absence of designated storage sites frequently leads to the illegal dumping of CDW. The lack of storage and disposal sites was, according to interviewees, a result of municipalities having a difficult time deciding on the location of such sites as well as the fact that private companies did not generally find these storage and disposal-related activities profitable, hindering solutions from the private sector.

Circular economy

Upon receiving the appropriate licensing, CDW storage sites should be used to store 'clean' fractions of well-separated CDW awaiting further processing and eventually reuse, recycling, or disposal. Reuse and recycling of processed CDW is the beginning of material recycling and, thus, an essential step in implementing the Circular Economy [11].

Repurposing

While the legal framework anticipates recycling and reuse, it does not define clear procedures for conducting these

processes. Private enterprises, alongside informal workers, are presently the main actors providing CDW recycling. For instance, two construction companies in the Peja region, Ndertimtari Beton and Fidani-Beton, possess concrete crushers in their installations. As part of their demolition works, these companies separate CDW into fractions and use the ‘cleaned’ fractions where possible, for example, backfilling, leveling, and the production of bricks.

Interviews revealed that the informal sector plays an essential role in what little recycling and reuse of CDW materials occurs. The informal sector directly benefits from selling valuable materials like metal, using wood for heating purposes, and reusing concrete for home renovation. The involved quantities are nevertheless negligible relative to the amounts of CDW generated from demolition as they do not cover larger fractions.

However beneficial repurposing CDW might be on the pressure for raw materials, it is nevertheless essential to consider the quality of repurposed materials, including the environmental quality. Environmentally toxic compounds may leach out from CDW, either during storage, reuse, or recycling. For that reason, materials meant for repurposing need to be certified and regulated for their long-term suitability [39].

Field observations demonstrated several challenges with the implementation of repurposing such as recycling and reuse activities:

- Multiple stakeholders asserted that the demand for recycled aggregates might be limited by a widespread perception that such products are of a lower quality than the fresh aggregate.
- The legally prohibited but widespread practice of unregulated demolition and disposal prevents material separation at source and makes it both mechanically and financially infeasible for CDW to be sorted for recycling.
- As stated by the law, on-site sorting of materials is required, yet inspections are not conducted regularly, and there is a poor market for recycled products. It follows that there is little incentive for the formal sector to take recycling seriously, which might also help explain suboptimal demolition practices and illicit dumping of CDW.
- Consequently, recycling activities are only handled in a limited capacity by the informal sector, which may salvage valuable materials from the site. Field observations showed that selective demolition and recycling were only carried out in an informal and limited capacity through stripping, sorting, and selling materials from demolition sites. However, these remain low-impact practices.

A limited number of existing projects have implemented measures to prevent and reduce CDW by renovating existing

buildings in place of demolishing and reconstructing. Examples include Klan Kosova’s new building, an existing industrial building that was renovated with recycled and reused construction materials [28], and Ndermarrja Publike Banesore (Public Housing Enterprise), a program supporting public housing associations in building and renovating energy-efficient structures, made possible through resident co-funding and financial support from World Bank and the government [27].

These examples were followed by awareness campaigns, focusing on the benefits of improved energy performance, particularly the reduction of long-term expenses and improvement of building lifespan.

According to interviewees, private companies would be willing to expand their recycling operations if the demand for such products would increase and if the regulations for demolition made on-site sorting and materials recovery mandatory. However, current recycling investments in the private sector are minimal and limited to a handful of mobile crushers.

Discussion

The overarching findings indicate that Kosovo is not adequately implementing the national legislation for CDW management. Furthermore, under current conditions, significant reforms within and outside the system are needed to create a circular economy around CDW.

The most pressing issues obstruct the current system’s ability to function correctly and must be resolved to mitigate the economic and environmental effects of poorly managed CDW and also facilitate the shift to a circular system. There are several regulatory and operational areas where current legislation is either poorly implemented and enforced or absent from the system. Beyond these immediate legislative and operational issues, the discussion identifies and contextualizes systemic challenges to CDW management in relation to the circular economy.

Figure 5 schematizes the most pressing issues identified during the analysis of Kosovo’s CDW management system and its observable gaps, as well as a provisional set of actions to address these issues.

Legislative issues

Permitting

The legislative implementation issue most commonly mentioned by stakeholders is the lack of motivation for private CDW producers and operators to acquire the relevant licensing and permitting for their waste management activities,

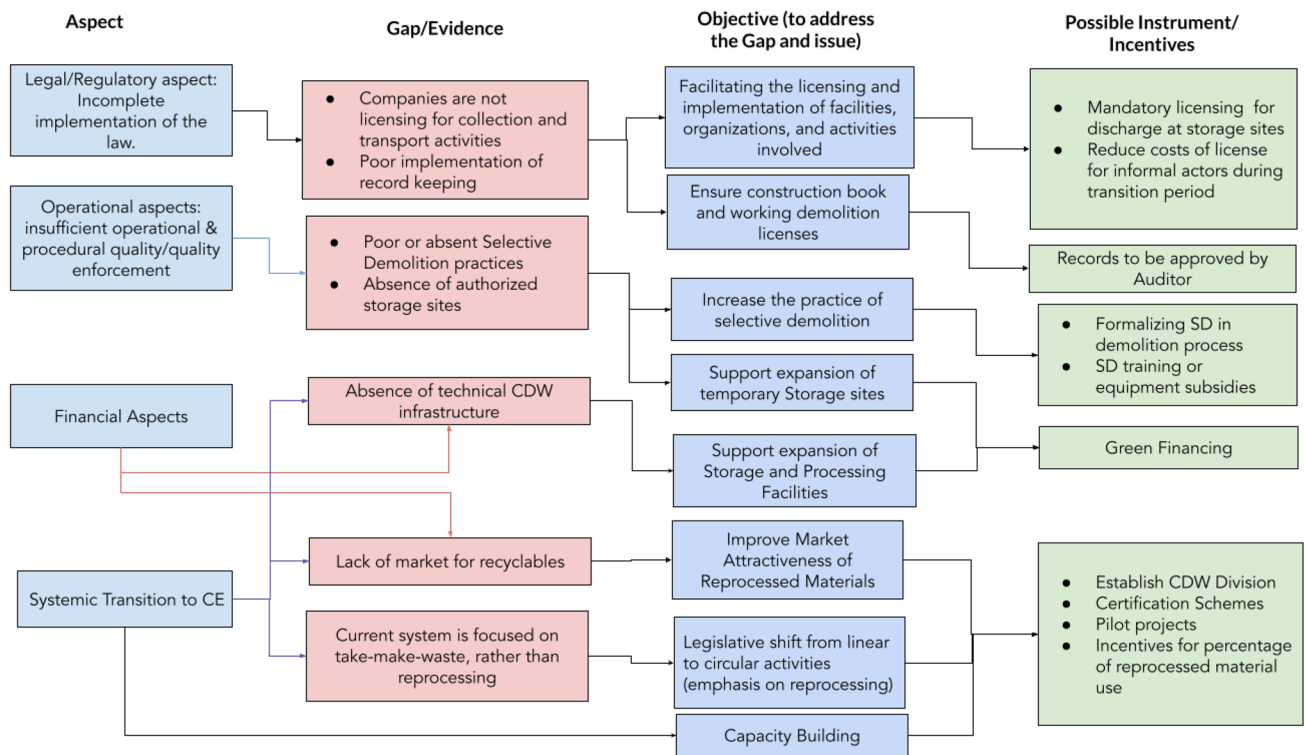


Fig. 5 Schematic breakdown of the observed issues of CDW management in Kosovo, evidence and suggested solutions, created by authors. Gaps were observed in 4 distinct areas: legal and regulatory;

operational; finances; and the framework for a transition to a circular economic thinking of waste

including the collection, transport, and storage of building and demolition byproducts. This absence of licensed operators forces the need for informal solutions even from well-meaning CDW producers. Moreover, unwillingness to acquire the necessary permitting for demolition makes it difficult for CDW activities to be quantified and regulated. If not addressed, these legislative lapses allow for the widespread and unregulated disposal of CDW to persist.

To counter this, the government must articulate and enforce a clear regulatory vision of construction/demolition and collection/transport operations to stimulate operators into acquiring the proper licenses for their activities and storage sites. The new regulations should then implement financial incentives to ensure waste generators use the licensed services, consequently curbing existing practices of illegal and uncontrolled dumping more effectively than increasing financial penalties [31]. An additional disincentive to illegal dumping would be to improve inspection and enforcement of the demolition plan [10]. Demolition charging fees should be progressive to keep smaller and less supervised waste producers motivated to use the proper services. An additional solution could take the shape of an infrastructure fee covering disposal though this would require stringent enforcement [10] of the demolition permit, which has not yet been achieved. In any case, this complex issue requires

a very careful and well thought-out approach that must be elaborated upon through additional studies.

Record-keeping

Despite record-keeping being legally required, its absence makes it difficult to gather comprehensive quantitative data on CDW flows, hindering data-driven approaches to decision-making and subsequent optimization of CDW management in Kosovo. Improved record-keeping could start with enforcing documentation and reporting on both types and amounts of CDW produced at the source and along defined points of storage and transport. This would facilitate on-site sorting and separation of different material fractions and ultimately increased recycling activities [36].

Operational issues

Authorized storage sites

To facilitate a system where waste products are accounted for and separated by their material characteristics, CDW management operations would need to contend with the absence of authorized disposal and storage sites for CDW. This issue

(touched upon also in the regulatory section) is arguably the most pressing obstacle to effective waste management, directly contributing to the ongoing practices of informal and illegal dumping and jeopardizing the ability of the country to keep CDW under control. Without addressing this, Kosovo cannot achieve a basic precondition of the circular economy: linking construction and demolition practices to the reclamation and valorization of the byproducts of these activities.

- In the short term, this issue could be addressed through temporary storage sites (to await processing at a later point in time) rather than simply relying on final disposal [22].
- The set up of authorized storage sites is an opportunity for transition to CE as these plans for temporary storage could be designed with CE in mind from the start, rather than trying to rehabilitate already inefficient systems.

Selective demolition

Whether Kosovo will seek to transform its current system outright or iterate in small steps, a critical component of circular operations will be the inclusion of selective demolition (SD) as a standardized method for construction and demolition. Kosovo does not currently practice SD with any degree of regularity [15], and the overarching legislation does not explicitly address SD procedures as part of the CDW management process. Despite this, the transition to a CE requires this practice, as SD ensures optimal materials recovery [34].

For SD to be willingly adopted by stakeholders, the cost of disposal must become higher than the cost of recycling, which would also require increasing the value of recycling activities by imbuing waste products with value. Both local and central government could take a proactive role in this through various strategies, including:

- Incentivizing the addition of recycled materials into current building practices through pilot projects and subsidies for such projects and products
- Providing necessary training to ease the transition towards SD;
- As a stopgap, the current CDW informal sector (the main party engaged in basic but organized SD practice) could receive support through improved equipment, training, and funding to carry out a more efficient and comprehensive SD process.

Circular product markets

Various stakeholders asserted that the market for recycled material was not presently lucrative enough to merit further investment (personal communication). The two most

frequently cited barriers to the recycled materials market were: the high cost of tech investment (evidenced by the absence of adequate processing facilities); and the lack of faith in recycled and reprocessed materials, perceived to be of lower quality. In addition to the standard push–pull approach (subsidy and tax) [4, 21], Kosovo can address these concerns using a mix of additional approaches:

- Green banks can play an essential role in financing investments but cannot be expected to function only at the discretion of individual actors. The public sector must prioritize sustainable/green procurement and construction, which stretches along the entirety of the supply chain and affects the whole economy [6].
- Requirements must be set for a minimum percentage usage of recycled materials in public works. This practice would facilitate new markets, and normalize recycled products in the public eye. These requirements should be accompanied by educational campaigns to inform the industry on the comparative value of such products [17, 30].
- Pilot projects can ease the implementation of these requirements and validate the feasibility of reprocessed construction material, setting precedents for more efficient design, adaptive reuse, usage of recycled materials and reprocessing of recycled material such as asphalt and brick [38].
- Concurrently, the government can introduce green public procurement and third-party product certification schemes (based on sustainability principles) to unify and verify the quality of circular products with European and other international standards [6, 11, 37].

Systemic transition to CE

Moving to a circular legal framework

The current legal framework has been drafted based on older EU policy and has often been adopted as-is, without accounting for the different context. Moreover, as evidenced by the stronger emphasis on disposal over recycling and reuse, this model is based on a linear economy model and may be obsolete for circularity. While the measures suggested above can help bridge the gap to CE, there needs to be a revision of laws to better fit a circular CDW management system [20]. Any evaluation of compliance with the current legal framework assumes that the framework is intrinsically correct and desirable, which may not always be the case. To facilitate CE, legally prescribed operational flows must be designed to maximize resource utilization rather than merely safe disposal, which will produce significant benefits including lower overall costs for resource extraction, processing

and transport and reduced environmental and health externalities [10].

- To achieve this, operations must emphasize the recovery and reprocessing of materials acquired through demolition, with the intent of eventually reusing them as products in various capacities.
- Moreover, to enhance the sustainability of the CDW management process even further, policy-makers need to emphasize reducing the need for materials, whether new or reprocessed, in the first place. This can be achieved by maximizing the functional lifespan of buildings by emphasizing maintenance, renovation, and restoration of existing buildings and more sustainable construction for new buildings [7, 12]. In addition, the administration must help municipalities create the right organizational processes and where necessary provide financial and technical support to ensure that CDW management is implemented more effectively at the local level.

The benefits of this include lower overall costs for resource extraction, processing and transport, and reduced environmental and health externalities [13, 16, 29]. It is, therefore, critical that, alongside waste management, Kosovo also investigates the technologies and expertise necessary to improve the longevity of its existing and future building stocks.

Technical implementation

The effective management of CDW (and more generally all waste streams), a necessary condition for the transition to CE, also requires addressing the absence of the necessary technical and technological capacities. In Kosovo, there is an apparent need to improve infrastructures for CDW treatment, primarily treatment and processing plants for various types of construction materials, which are not present at the scale required to service the entirety of the CDW management ecosystem. CE will necessitate larger investment in upgrading and implementing this technical infrastructure by both private and public sectors. As the requisite infrastructures to overhaul waste management at the national level are a large and complex undertaking that individual operators are ill-equipped to carry out independently, these investments must be closely coordinated among the various actors.

- A clear vision, strategy, and the responsibilities of the operational actors using this infrastructure must be defined going forward.
- The existing technical and financial capacities of relevant actors need to be evaluated both within the country and in the region, as some of Kosovo's neighbors such as Croatia and Slovenia, have progressed in establishing

these infrastructures and could be instrumental in this transition [3, 8, 9].

- Where possible, partnerships must be established to improve overall capacity and facilitate training, knowledge transfers, and economies of scale.

Capacity building

The identified issues affect legal, organizational, environmental and economic aspects, while waste management activities are presently conducted ad hoc by actors not equipped to handle CDW efficiently. Improved CDW management for Kosovo and the subsequent transition to CE will, therefore, require expanding knowledge, human and institutional capacities, and new forms of collaboration between all relevant stakeholders. A specialized CDW department (or task force) could focus on raising awareness, increasing accountability and capacity building, facilitating the financial aspects, and managing collaboration with other stakeholders such as development corporations, the private sector, and representatives of the informal sector, to name just a few.

Conclusions

For Kosovo to part with the historical challenges of CDW and turn a problematic path dependency into opportunity, the country must make headway in not only overturning its currently inefficient system but in transitioning to a more circular way of thinking about what is currently seen as just "waste". The investigation of the CDW management system revealed several critical issues which must be addressed to achieve this transition:

1. Kosovo is not adequately and comprehensively implementing its national CDW legislation, which is especially evident in licensing, permitting and record-keeping processes.
2. CDW management is constrained by several inefficiencies at the operational level, particularly the absence of temporary storage, limited implementation of SD, and generally absent record-keeping. These are among the main gaps contributing to uncontrolled dumping of CDW.
3. On a systemic level, the legal framework and the prescribed operations are aligned with a linear approach to waste management, rather than a circular one, designed to extract continuous value from materials, even as they move from product to what used to be called "waste" but is actually a secondary resource.
4. An underdeveloped market for repurposed or secondary goods complicates the transition to a more circular sys-

tem, making circular practices financially unattractive for the private sector.

5. Lastly, the above developments require significant improvement in collaboration and communication between stakeholders to ensure that the necessary knowledge, resources, and technical capacities are implemented to manage CDW more efficiently and sustainably.

All of these factors demonstrate that Kosovo can still significantly improve its CDW system. To do so, future research should prioritize gaining an accurate quantitative account of CDW flows as well as evaluate the costs and benefits of possible instruments and incentives that could, in the short term facilitate a sustainable system of CDW management (particularly in limiting illegal) dumping and in turn move towards a measured, sustainable conversion of this waste stream into a more circular system.

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