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# Types of Construction Waste from Buildings in Bujumbura and Their Impact on Costs

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**Abstract: In Burundi, the construction sector is characterized by the presence of highly skilled human capital. However, the sector is also marked by inefficient resource management, with construction waste being perceived as an unavoidable problem rather than a potential source of profit. In view of this observation, the present study assesses the financial impact of these losses in Bujumbura, Burundi's economic capital, with a view to identifying operational levers that can transform this constraint into an opportunity for profitability. The research is grounded in a mixed methodology, integrating a perception survey of 47 professionals within the sector and in-depth audits of 11 construction sites overseen by seasoned executives.**

**The findings of the data analysis suggest a phenomenon that can be termed the "expert paradox": despite the fact that 90% of site managers are seasoned engineers, the reality on the ground demonstrates a persistent managerial deficiency. Indeed, the findings of the audit revealed that 91% of the sites had no formal waste management system in place, and 82% lacked documentation to track actual consumption. This disorganization has been shown to result in considerable financial losses, with material losses estimated at between 5% and 20% of the total project budget, primarily attributable to a paucity of daily supervision and operational rigour.**

**In conclusion, the study demonstrates that waste minimization is not a challenge of technical competence, but of site governance. The principal contribution of this study is to demonstrate the necessity of transitioning to a culture of traceability and systematic control. The replacement of current informal practices with rigorous management strategies is a potential catalyst for transformation of waste into a strategic investment for construction companies in Burundi. This, in turn, can ensure their overall performance and economic viability.**

***Keywords:*** *The Following Themes are to be Considered: Construction Waste, Economic Impact, Construction Sites, Sustainable Practices and Waste Minimization.*

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## I. INTRODUCTION

The economic development of any country is contingent on construction projects [1]. The construction sector offers a plethora of employment opportunities and contributes significantly to the economy [2], [3]. In developing countries, construction activities account for 80% of total capital assets, 10% of their Gross Domestic Product (GDP), and more than 50% of wealth invested in fixed assets [4]. In the United States, Europe, the United Kingdom, Australia, Hong Kong, and other large economies with strong construction sectors, the management of construction and demolition waste is often well defined. Construction waste is typically a substantial component of total solid waste, which is a contributing factor to environmental degradation [5],[6].

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Moreover, material wastage exerts a deleterious economic effect by engendering augmented project expenses [3],[7]. For instance, research indicates that construction waste contributes to 30% of the total cost overruns for a project [3], with approximately 10-15% of materials procured for a construction project being classified as waste [8]. In this regard, construction waste has been identified as a primary contributing factor to economic decline and commercial failure within the construction sector [9],[10].

The objective of this research is to identify the various categories of construction waste and their economic impact on the overall cost of construction.

## II. LITERATURE REVIEW

### ➢ *Categories of Construction Waste*

Waste is defined as any inefficiency that results in the use of equipment, materials, labour, or capital in quantities greater than those considered necessary for the construction of a building [11]. The classification of construction waste is determined by various attributes, including the type and quantity of waste. Despite the differences in classification systems, a significant proportion of these systems are based on a similar fundamental concept [12], [13]. The commonalities between these classifications are material loss, debris, and design [14],[15]. In addition to a comprehensive grasp of the overarching concept of waste, it is advantageous to employ a systematic classification of waste into distinct categories, thereby facilitating a nuanced understanding of the extensive array of corrective measures associated with its prevention [16].

The findings of an exhaustive study undertaken in the United States, the United Kingdom, China, Brazil, Korea, and Hong Kong, which compared the types and volumes of construction waste in these countries and categorised construction and demolition waste into three classifications, are as follows:materials that are (1) potentially valuable in construction and easily reused/recycled, including concrete, stone masonry, bricks, tiles/pipes, asphalt, and soil; (2) cannot be recycled directly but can be recycled elsewhere, including wood, glass, paper, plastic, oils, and metal; and (3) are not easily recyclable or present particular disposal problems, including chemicals (i.e. paint, solvents), asbestos, plaster, water, and aqueous solutions [17].

The European Union [18], [19] has established a classification system for construction waste, which is divided into eight categories (Table 1).The categories are as follows:(1) Bricks, concrete, ceramics, and tiles;(2) Glass, wood, and plastic;(3) Coal and asphalt;(4) Metals;(5) Soil, including excavated soil from contaminated sites, rocks, and dredged soil;(6) Insulation materials and materials containing asbestos;(7) Construction materials containing gypsum; and (8) Waste from other construction activities.

The United Kingdom has ten categories of construction waste: The following materials are considered to be of potential concern: Insulation materials and asbestos; Concrete, brick, tile, and ceramics; Wood, glass, and plastic; Asphalt, oil, coal, and bitumen; Metals; Soil, contaminated soil, stones, and dredged soil; Gypsum; Cement ; Paints and coatings; and Adhesives and fillers, etc. [20],[21]. [22],[23] categorise construction waste into 15 distinct groups, namely: (1) asphalt-related materials, (2) soil-related materials, (3) electrical-related materials, (4) insulation-related materials, (5) brick and concrete-related materials, (6) steel-related materials, (7) paint-related materials, (8) paper-related materials, (9) petroleum-related materials, (10) roofing materials, (11) vinyl materials, (12) gypsum materials, (13) wood materials, (14) wood materials containing contaminants, and (15) miscellaneous groups.

### ➢ *The Impact of Construction Waste on Construction Costs*

Construction waste has been demonstrated to have a substantial impact on increased costs, yet it is frequently disregarded by contractors [25]. Consequently, the generation of construction waste has been demonstrated to result in cost overruns or economic inefficiency in projects [26], and construction waste has been shown to cause financial losses, leading to reduced profits and bankruptcy in the construction sector [3]. Construction waste has been identified as a primary contributing factor to the business failure of construction companies in developing countries [27]. This is due to the fact that it results in project delays, which are often attributed to the time required to clean up or remove waste, replace it, and rework it [28]. The economic repercussions of construction waste are considerable, with the loss of reputation and conflicts with the community being the least significant [3].

Indeed, a reduction in construction waste has been demonstrated to assist in the enhancement of total profits and the achievement of economic stability for a nation and its construction companies [29]. In particular, excess materials such as sand, concrete, and hazardous waste often accumulate, leading to increased disposal costs and regulatory challenges. These issues have the potential to disrupt workflows, generate noise, and impact both site efficiency and community relations [25].

## III. MATERIALS AND METHODS

The methodology employed in this study on construction waste in Bujumbura and its impact on construction costs is based on a mixed approach, combining complementary qualitative and quantitative methods. The study commenced with a comprehensive review of the pertinent literature, with the objective of identifying the various categories of waste and their theoretical ramifications for project budgets [15]. This exploratory phase formed the basis for a cross-sectional survey of a sample of 47 professionals in the sector, including contractors, engineers, and architects. The specific objective of this methodical approach was to collect data on experts' perceptions of the various types of construction waste encountered on construction sites. The survey, administered using the KoboCollect tool, examined the impact of this waste on the economic performance of projects and the significant financial consequences on construction sites.

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In order to compare the survey data with operational reality, a second phase consisted of a field study involving technical visits to 11 construction sites in Bujumbura. Direct observation in situ facilitated the physical characterisation of the waste types present, categorised as structural, finishing, or inert. During these visits, semi-structured interviews were conducted with supervisors to obtain accurate data on the discrepancies between the quantities specified in the estimate and actual expenditures. This approach enabled the quantification of the financial impact of technical waste.

As part of this study, all the data collected was subjected to rigorous statistical analysis. This methodical approach facilitated the establishment of clear correlations between waste categories and the additional costs incurred [30],[31]. The analysis of the collected data enabled the implementation of a rigorous methodology, combining the examination of the responses obtained through questionnaires with careful observation of the 11 construction sites. This approach resulted in the development of a set of material loss indicators, which were meticulously converted into a monetary value (FBu) for the purpose of facilitating a more comprehensive assessment of the damage suffered. This comparative analysis highlighted the critical financial impacts, as well as the most effective technological solutions for optimising construction costs in Burundi.

## IV. RESULTS AND DISCUSSION

- *Typological and Frequency Characterization of Construction Waste in Bujumbura.*

The construction industry in Bujumbura is responsible for the generation of a wide variety of waste, the impact of which on project costs is significant. The data collected provides a clear picture of the most common types of waste and their proportions, with the aim of guiding effective strategies for waste minimisation, cost reduction, and environmental impact mitigation. The following table illustrates a selection of construction waste types that have been reported by construction professionals in Bujumbura.

Table 1 Different Types of Construction Waste.

| No | Types of waste | Frequency | Percentage (%) |
|---|---|---|---|
| 1 | Wood | 47 | 100 |
| 2 | Glass | 47 | 100 |
| 3 | Bricks | 46 | 97.87 |
| 4 | Sand | 46 | 97.87 |
| 5 | Tiles | 46 | 97.87 |
| 6 | Soil, rock | 45 | 95.74 |
| 7 | Metal | 44 | 93.62 |
| 8 | Plastic | 44 | 93.62 |
| 9 | Solvents and paints | 44 | 93.62 |
| 10 | CEment | 44 | 93.62 |
| 11 | Paint | 44 | 93.62 |
| 12 | Dispersed screed mortar | 44 | 93.62 |
| 13 | Concrete | 43 | 91.49 |
| 14 | Tiles | 43 | 91.49 |
| 15 | Oils and other liquids | 43 | 91.49 |
| 16 | Lime | 43 | 91.49 |
| 17 | Hazardous chemicals | 42 | 89.36 |
| 18 | Reinforced concrete | 42 | 89.36 |

The survey results demonstrate that construction sites in Bujumbura generate a wide variety of waste, thereby confirming the waste classifications mentioned in [14], [15]. A systematic observation of waste flows from 47 stakeholders in the construction sector reveals that waste disposal sites are reaching saturation point. The present study demonstrates that, in accordance with the concept of Circular Transition [32], the minimisation of waste should no longer be considered as a final phase, but rather as an integrated logistics process for the purpose of the recovery of secondary resources.

The figure below presents a detailed breakdown of the frequency of waste by type, as reported by the 47 construction professionals surveyed.

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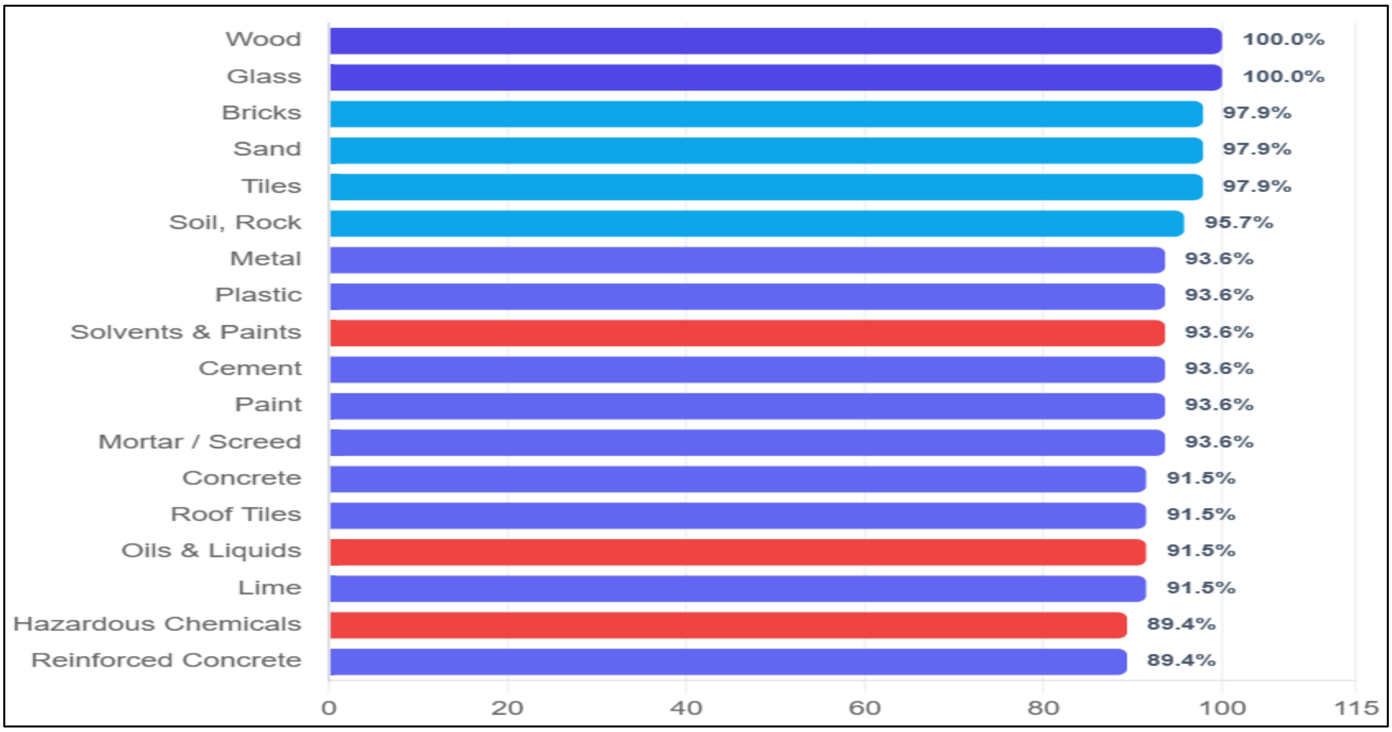


Fig 1 Detailed Frequency by Waste Type

The distribution of frequencies of occurrence highlights a standardised "metabolic signature" of contemporary construction sites. The pervasive utilisation of wood and glass (100%) underscores the imperative for the implementation of BIM deconstruction processes [33] to proactively address reuse volumes from the design phase onwards, thereby signifying inefficiencies in materials management [15], [25]. The homogeneity of deposits, with 16 of the 18 categories exhibiting a presence rate exceeding 90%, serves to validate the theory of Digital Urban Metabolism [34]. This theory posits that waste can be regarded as predictable data rather than a random event.

As asserted by the findings of [35], the efficacy of the circular economy is contingent upon the mitigation of transaction costs associated with multi-stream sorting. The high presence of diverse materials (metal, plastic, cement, paint, mortar/screed, concrete, tiles, lime, reinforced concrete) necessitates the standardisation of source separation protocols to maintain the purity of deposits and ensure their economic viability in second-generation recycling circuits. The figure below illustrates the risk profile of waste.

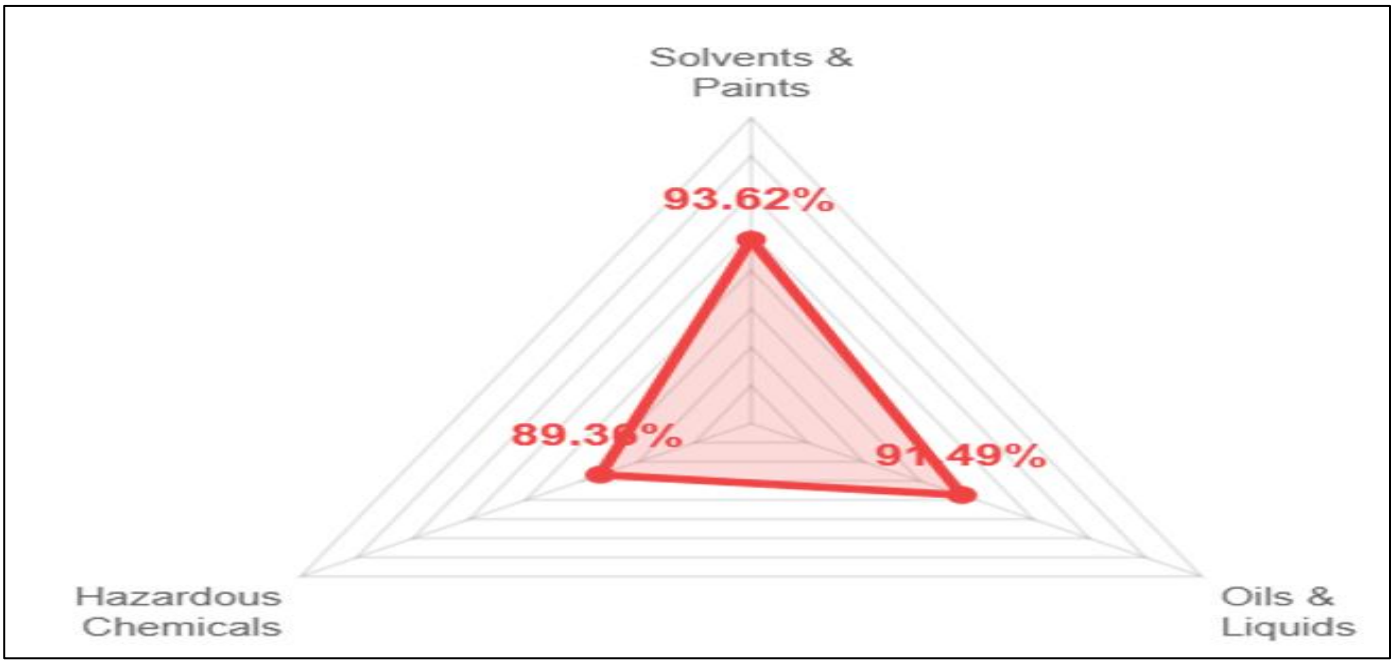


Fig 2 Risk profile

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The hazard profile indicates a critical coexistence of solvents and paints, oils and liquids, and chemicals, with concentrations ranging from 89% to 93%. In the context of Systemic Ecotoxicity as studied by [36], the management of these flows can be considered the "health lock" of circularity. It is imperative to note that even minimal contamination (less than 1%) has the potential to invalidate the recycling of substantial volumes of inert materials. It is therefore imperative that strict compliance with the Precautionary Principle [37] is observed, in order to prevent the site from becoming a source of diffuse pollution through the transfer of contaminants between healthy flows and special flows.

➢ *Assessment of the Economic Impacts and Performance Drivers of Construction Waste Minimization in Bujumbura*

- *Assessment of the Economic Impact of Construction Waste on Construction Sites in Bujumbura.*

The survey, which was conducted at 11 construction sites in Bujumbura, revealed a direct and concerning correlation between site management and the ultimate cost of the works. The findings indicate that waste production is a pervasive phenomenon, having an impact on all of the projects examined. This finding aligns with the conclusions of [38], which emphasise that the precise identification of waste types is the primary lever for economic performance on a construction site. In Bujumbura, the diversity of waste ranges from structural work, where stones, formwork wood, and concrete rebar scraps are systematic, to finishing work, marked by significant losses of cables and PVC.

From a financial perspective, this waste is no longer perceived as mere residue, but as a real loss. The study revealed that for 72.7% of respondents, the impact on the final cost of the construction site was considered to be "High" or "Very high" (18.18% considered the impact to be "Very high," 54.55% considered it to be "High," and 27.27% considered it to be "Moderate"), indicating that for over 70% of stakeholders, waste is a critical cost factor.

Quantitatively, a survey of respondents revealed that 72% estimated that 5-10% of purchased materials were discarded as waste, with this proportion rising to 20% in one-third of cases. These figures corroborate the observations of [39], whose research shows that in developing economies, the cost of material inefficiency often exceeds budget forecasts by 15%. The survey under discussion provides precise quantification of the aforementioned risk. Furthermore, 54.55% of respondents estimated the value of lost materials at more than one million Burundian francs (1,000,000 FBu), or approximately $340 since the commencement of the work, a loss that can be considered as concrete monetary erosion. The figure below illustrates the estimated financial losses incurred at the various construction sites.

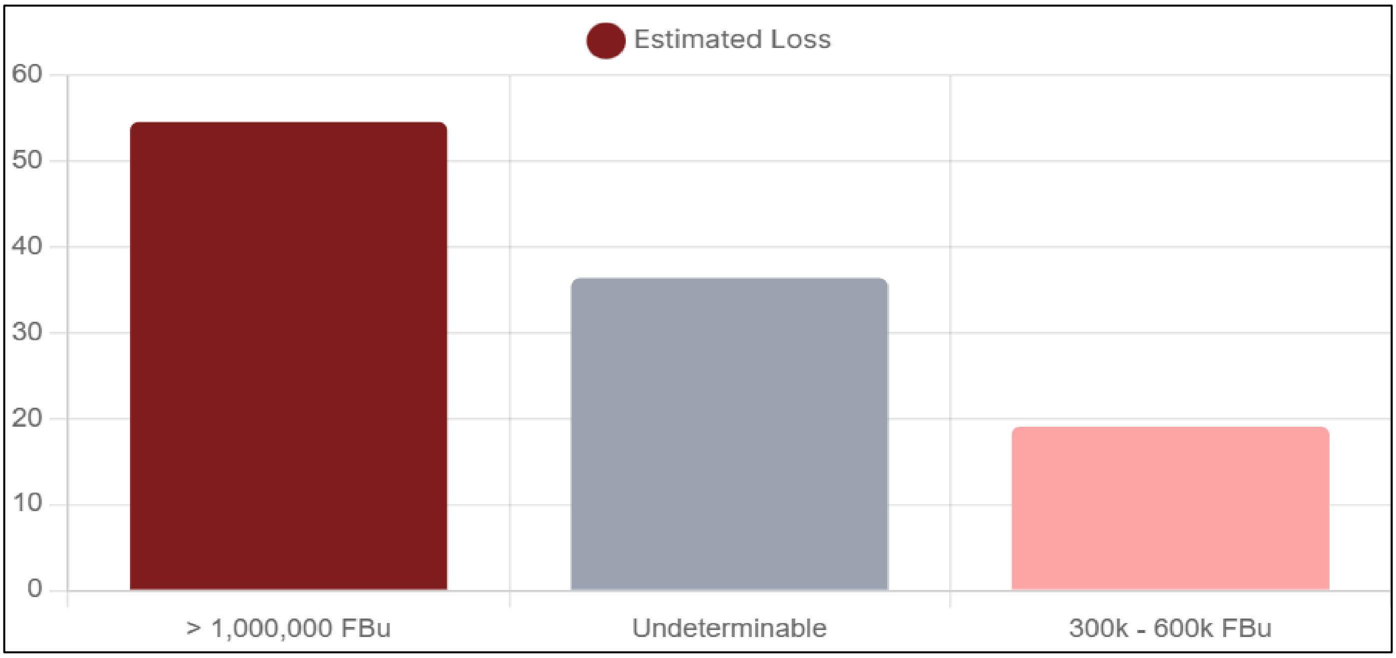

Fig 3 Loss Estimates.

This financial outflow is further exacerbated by a concerning absence of traceability, given that 81.82% of construction sites lack formal documentation specifying the quantities planned, and 72.73% have no documented record of the quantities ultimately used. In conclusion, an analysis of the discrepancies between forecasts and actual performance reveals significant operational failures. The example of bricks (with a loss of more than 4,500 units at one site visited) and cement illustrates the avoidable losses described by [17] as a result of mishandling and a lack of sorting at the source. The preponderance of expert opinion, as indicated by the 90.9% citation rate, corroborates the assertion that the crux of the issue lies in the absence of rigorous oversight. As suggested by [40], [41], in order to reduce additional costs in the building and public works sector in Bujumbura, it is necessary to formalise waste management plans and increase training for workers in sustainable construction techniques.

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As posited by [11], the concept of waste can be defined as any inefficiency that results in the utilisation of more resources than is necessary. The survey findings corroborate the pervasive nature of inefficiency in this domain. Indeed, all respondents (11/11) attest to the presence of waste on their construction sites and confirm that they have observed material losses. Furthermore, an analysis of the differences between the "planned quantities" and the "quantities used" reported by respondents clearly illustrates this definition of inefficiency, where surplus systematically becomes waste. This validates the hypothesis of structural inefficiency on the construction sites studied. The following examples illustrate the analysis of discrepancies between standard samples, with a focus on the comparison of quantities intended for use and those ultimately employed during the construction of buildings in Bujumbura.

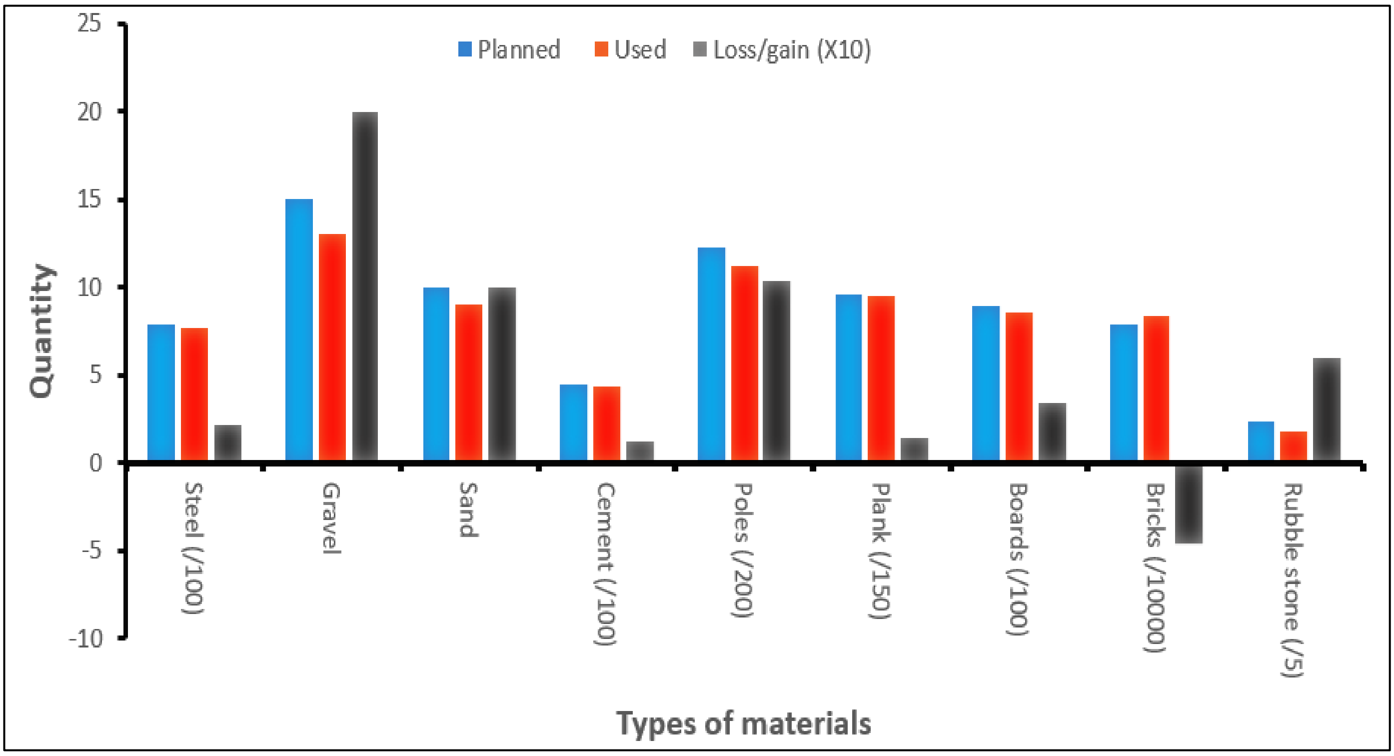


Fig 4 Typical Graph Comparing Planned Quantities and Quantities Used for Materials.

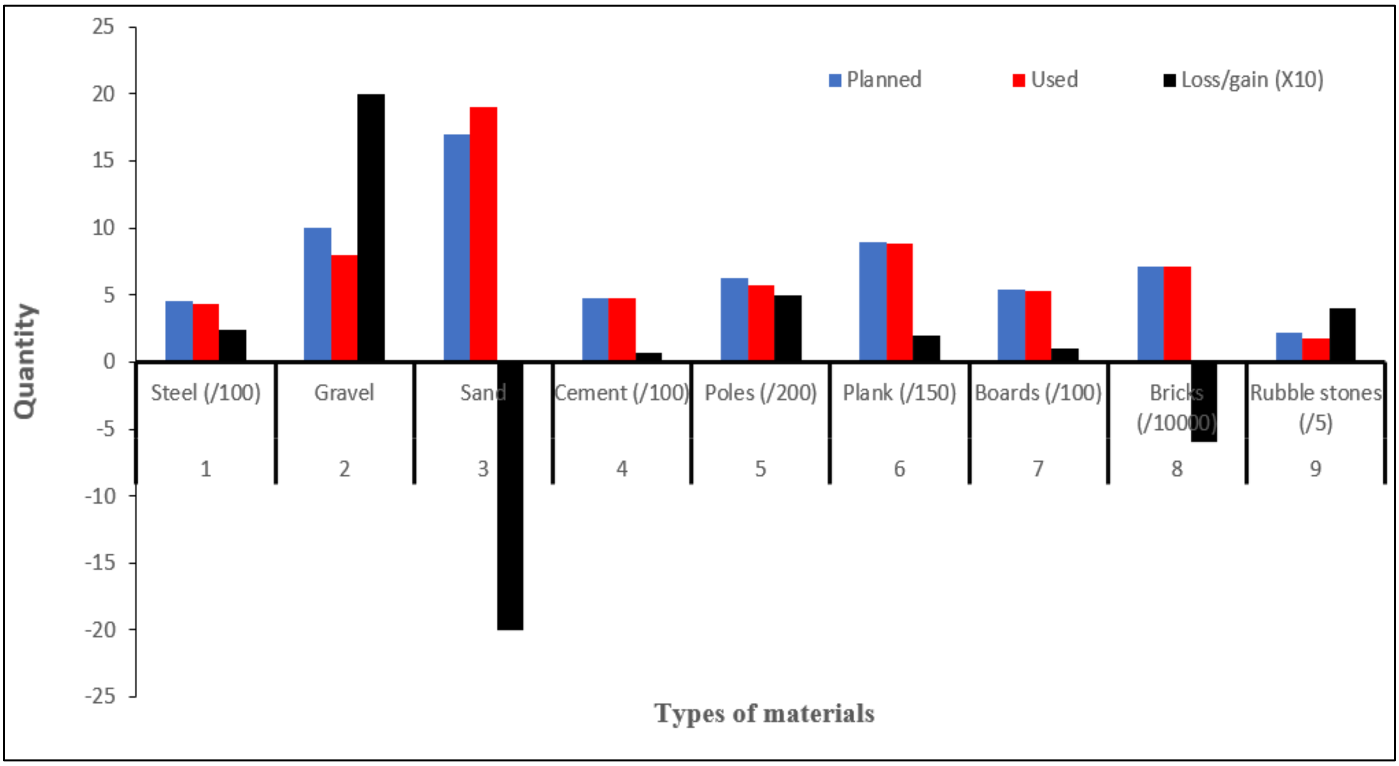


Fig 5 Typical Chart II Comparing Planned Quantities and Actual Quantities Used for Materials.

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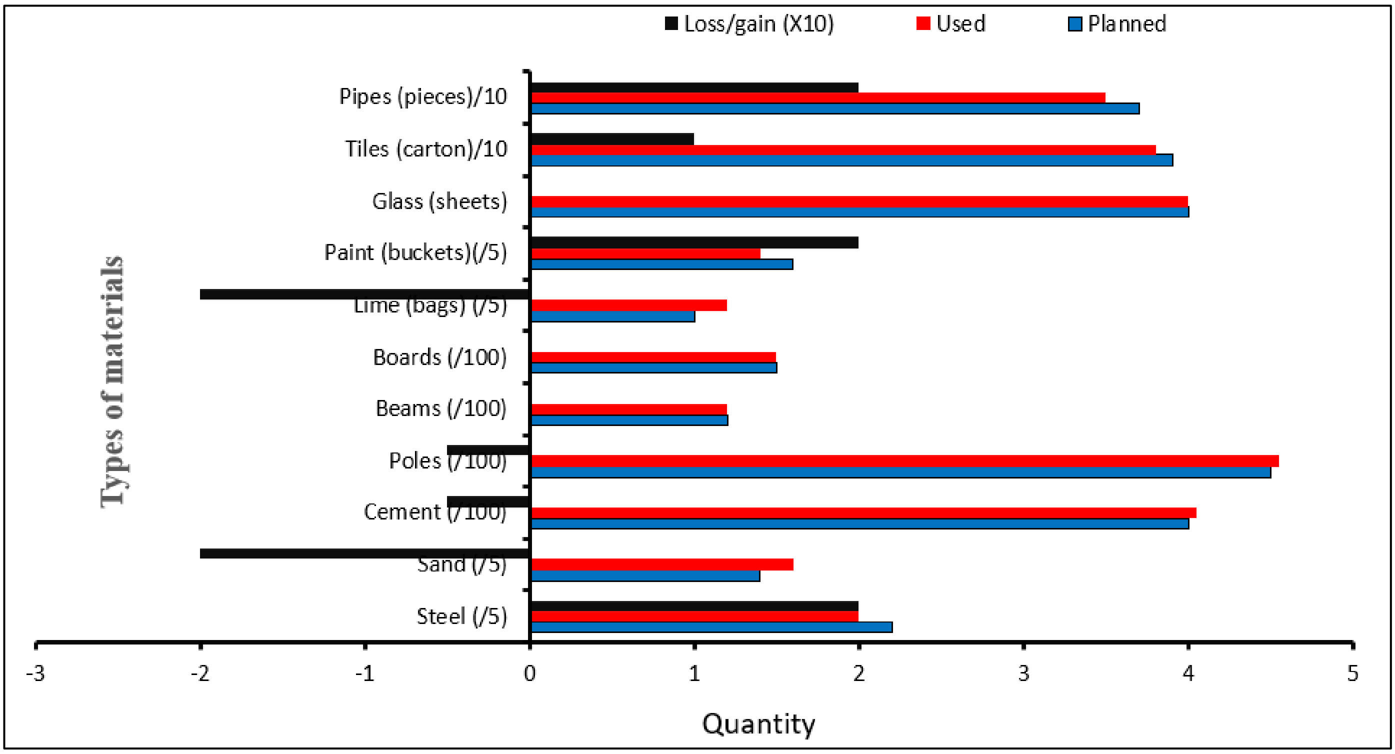


Fig 6 Typical Chart III Comparing Planned Quantities and Actual Quantities Used for Materials.

A thorough analysis of construction site data has been undertaken, revealing that discrepancies in material consumption are attributable to structural factors rather than to simple calculation errors. Material breakage, particularly for bricks and blocks, was identified as the primary source of waste for 72.7% of respondents, resulting in consumption volumes significantly exceeding initial estimates [42]. Conversely, discrepancies related to theft, moisture damage, or poor management of cutting waste have been observed in cement and steel. This issue is further compounded by inadequate monitoring, as evidenced by the fact that 72.7% of construction sites lack documentation to track the quantities of materials used. The absence of real-time monitoring results in the inability to implement corrective measures, thereby converting avoidable losses into systematic cost overruns [43].

In typological terms, this inefficiency is characterised by material diversity that aligns closely with established international classifications. In reference to the three-way division established by [17] and European standards [19],[23], our observations indicate a significant predominance of materials exhibiting high recovery potential. The initial category, encompassing inert and reusable materials in situ, exhibits a high degree of saturation within the study area. Unused stones and used formwork timber were identified in all sites (100%), while concrete and mortar residues were detected in 90.91% of cases.

The second category, consisting of recyclable materials requiring external treatment, is also significant, with more than 72% of sites reporting metals (concrete reinforcement bars), plastics, and wood from finishing work. Finally, although a minority, the third category of hazardous waste (solvents, adhesives) remains significant (27.27%), justifying the relevance of the risk management protocols mentioned by [21].

Nevertheless, the analysis reveals a critical dichotomy (distinction) between the nature of waste and its management. While the prevalence of categories 1 and 2 indicates a considerable potential for circularity, the operational reality appears to contradict the theoretical recommendations of [16] on sorting at the source. The absence of sorting on 72.73% of construction sites, in conjunction with the lack of formalised disposal systems in 90.91% of cases, constitutes a major disruption, effectively transforming theoretically recoverable resources into definitive losses.

Despite the high level of technical expertise (90% of engineers are experienced) involved from design to completion, construction sites suffer from significant overconsumption of materials. This "expert paradox" demonstrates that the generation of waste is not attributable to a paucity of knowledge; rather, it is a consequence of a failure of operational control and site governance. In summary, financial losses are the consequence of inadequate execution management rather than initial planning errors.

➤ *Financial Impacts of Construction Waste and Levers for Economic Performance.*

The survey, which was conducted among 47 professionals and involved site visits to 11 construction sites in Bujumbura, has confirmed that construction waste is not merely material residue, but rather a significant source of financial loss. For approximately 90% of respondents, this waste directly results in cost overruns and reduced net profits. This perception is in alignment with the findings of [39], which demonstrate that ineffective materials management constitutes a primary impediment to project budget performance in developing countries. The financial impact is exacerbated by increased disposal costs and the risk of regulatory fines, as cited by 74.47% of experts.

As emphasised in [44], the unseen loss associated with waste encompasses not only the purchase value of materials, but also the capitalised cost of their unnecessary management. The economic efficiency of projects is particularly compromised by additional labour costs, which 97.87% of participants identified as the main effect of waste. The time expended on cleaning, removing, and managing waste diverts labour from more productive activities, resulting in delivery delays for 91.49% of construction sites. This finding lends further support to the theory of [38]on the factors contributing to waste management, in which construction site logistics are presented as a critical lever for productivity. In the longer term, suboptimal management can have a detrimental effect on a company's reputation (85.11%) and the opportunities available for future contracts, thus demonstrating the interdependence between environmental sustainability and commercial viability.

Confronted with these challenges, Burundian professionals identify sorting, on-site recycling, and proper storage (97.87%) as the most effective practices for restoring profitability. The findings of this study indicate that material planning, as outlined in the recommendations [17], is a crucial aspect for the implementation of a preventive approach from the design phase onwards. This approach is endorsed by 91.49% of the respondents. The integration of contemporary technologies, specifically construction management software (93.62%) and real-time tracking systems, appears to be a pivotal technological solution for minimising human error. These digital tools facilitate accurate traceability, which, as asserted by [40], [45], is imperative for the transformation of informal construction practices into optimised industrial processes.

It is evident that the transition to more efficient construction in Bujumbura is contingent upon the establishment of a robust institutional framework. A substantial majority of experts, exceeding 91%, are in favour of the implementation of stringent regulations and the initiation of awareness programmes. The present study posits that encouragement through tax incentives (87.23%) and continuing education are policy levers capable of stabilising the economy of construction companies. By reducing waste, companies are not only aiming to increase their total profits (93.62%), but also seeking to improve work flow and reduce conflicts with the local community. This, in turn, will place the construction sector on a path of sustainable and socially responsible growth. As illustrated below, the reduction of waste can be regarded as a strategic investment in the enhancement of the company's financial performance.

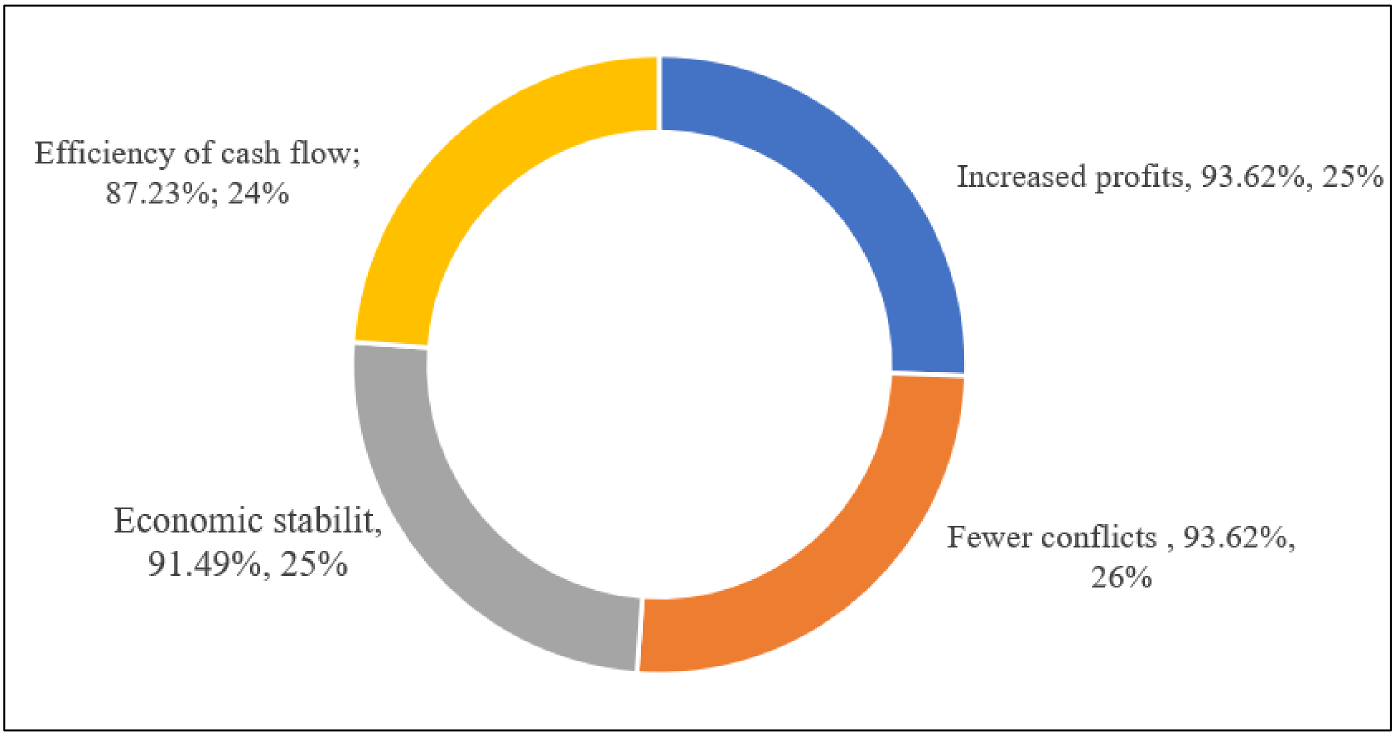


Fig 7 Economic Benefits

The results of the study demonstrate a high degree of consensus among construction professionals, with a broad consensus that the reduction of construction waste is a key factor in achieving both profitability and sustainability. The analysis demonstrates that for the majority of respondents, namely more than 93%, this approach results in a direct improvement in total profits. Indeed, it has been demonstrated that this approach enables cost optimisation (in particular with regard to raw materials and landfill costs) whilst concomitantly preserving the economic performance of the company. This approach has been demonstrated to be effective in the prevention of costly conflicts with the

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community. Moreover, the majority of stakeholders emphasise that this virtuous management system guarantees greater economic stability in the face of regulations and streamlines the organisation of work on construction sites.

In summary, the reduction of waste has transitioned from a constraint to a strategic advantage, which integrates operational efficiency, social acceptability, and financial performance.

## V. CONCLUSION

A cross-analysis of data collected from 47 industry professionals and direct observations made on 11 active construction sites in Bujumbura reveals a systemic reality : minimising construction waste is no longer simply an environmental issue, but rather represents the main factor eroding project profitability. Empirical analysis conducted in situ revealed that all construction sites produce significant amounts of waste, mainly attributable to structural work, such as stones, formwork timber, and reinforcing steel. This ubiquity lends support to the theory of [38], which posits that in developing countries, the absence of precise identification of waste flows from the design phase onwards constitutes the primary factor in economic inefficiency. In Bujumbura, analysis of construction materials reveals that almost all of them are identified as sources of waste. This phenomenon results in the transformation of waste into a structural, rather than incidental, component of construction costs. A notable finding of the survey was the profile of the subjects responsible for the content, with over 90% of the engineers interviewed having accumulated more than six years of experience. Nevertheless, this technical expertise does not necessarily translate into tangible managerial actions. The absence of monitoring documents in a significant proportion of cases, amounting to 81.8%, highlights what [17] refer to as the "implementation gap." This phenomenon highlights a significant disparity between the theoretical expertise of engineers and the persistent utilisation of fundamental practices on construction sites (in the field).

A recent study revealed that the absence of daily oversight was a determining factor in the transformation of qualified experts into mere spectators of management practices that were deemed unsatisfactory by a large majority of stakeholders. This apparent ambivalence regarding skills indicates that the issue is not a lack of academic qualifications, but rather a failure to implement on-site verification protocols.

This unfortunate minimization consequently engenders a substantial devaluation of the currency. In more than 54% of cases, dry losses exceed 1,000,000 FBu. A thorough analysis of consumption discrepancies has brought to light a number of significant deviations. These include the loss of more than 4,500 bricks on a single project and cement overdoses reported by 90.9% of experts. These results are consistent with those of [40],[45], which have demonstrated that material inefficiency in the construction sector in Africa can lead to a 10-15% increase in construction costs, which has repercussions on the economic stability of local businesses. The analysis of the collected data indicates that 72% of respondents estimate that material losses amount to between 5% and 10% of the total value of purchases. This estimate reaches 20% for one-third of the cases studied.

In addition to material losses, major organisational factors are responsible for these additional costs. An in-depth analysis revealed that 90.9% of the sites studied lack a system.Furthermore, it was observed that more than half of the sites are considered to be unsanitary or congested, emphasising the necessity for addressing issues related to management and hygiene. This spatial disorder, which is frequently examined in the literature as a significant impediment to productivity, is responsible for the delays to planning reported by 63.6% of respondents. As highlighted by [15], a poorly organised construction site is not only characterised by increased levels of waste, but also by a deterioration in safety measures and coordination between the various construction trades. This results in a detrimental cycle of hidden costs, which are associated with the processes of cleaning and other activities.

In conclusion, the reduction of waste in Bujumbura represents a hitherto unexploited potential for profitability. It is evident that professionals are cognisant of the potential advantages of such an approach, particularly with regard to enhanced total profits (93.6%) and augmented economic stability (91.5%). Nevertheless, they continue to be constrained by an absence of operational formalisation. In order to transform the current situation, which is characterised by a net loss, into optimal economic performance, it is imperative that the construction sector adopt an innovative approach. This approach necessitates the transfer of engineering expertise to the realm of rigorous document management. This transfer involves the creation of tracking sheets and plans for the management of construction sites and materials. Furthermore, it is imperative to ensure constant supervision of workers, thereby facilitating continuous improvement of processes and results. In the prevailing economic climate of Bujumbura, the reduction of waste has become imperative for the financial sustainability of projects.

## RECOMMENDATIONS

- Make it mandatory to develop a waste management plan before the start of each project.
- Accurately assess the volume of each type of waste during the design phase.
- Appoint a site manager responsible for ensuring that waste minimization procedures are followed.
- Order materials in “just enough” quantities to avoid unnecessary surplus.
- Install clearly identified sorting bins to separate inert waste, wood, and metals.
- Set up specific, secure storage areas to prevent materials from mixing.
- Organize short training sessions on site to optimize cutting and dosing techniques.
- Implement strict control of material inputs, outputs, and losses.

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- Increase the presence and supervision of engineers on the construction site.
- Compare actual consumption with forecasts on a weekly basis to quickly correct any discrepancies.
- Plan and validate waste recovery and disposal channels before work begins.

## AUTHORS' CONTRIBUTIONS

Seth Mbonimpa was responsible for the collection of data and the drafting of the initial version of the article. Legrand Cirimwami, Jean Claude Ngenzi, Daniel Hatungimana, and Samuel Rudahinyuka were instrumental in the provision of advice, revisions, and comments, and they also undertook the editing of the document to produce the current version.

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