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Construction and Demolition Waste Management in Libya: Current Situation and Future Prospects

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Abstract

As a result of increased urbanization, construction and demolition debris is expanding all over the world. Due to its direct effects on the environment as well as the efficiency of the construction industry, construction and demolition waste creation has been identified as one of the significant concerns in the sector. Construction and demolition waste management is a major concern for cities where fast urbanization, industrialization, and economic development generate so much waste. Construction and demolition trash is generated by the construction industry, which is one of Libya's largest and most active industries. New construction, refurbishment, and demolition of buildings and structures generate massive volumes of garbage known as construction and demolition waste. It is vital to take prompt environmental protection measures in Libya in order to maximize the possible good consequences while minimizing the negative repercussions of modernization and industrialization. The current state of building and demolition waste management in Libya is described in this paper, as well as the problems and prospects of building and demolition waste recycling. The goal is to provide building and demolition waste management and recycling techniques that are appropriate for these settings and have proven advantages for all stakeholders. It is critical to make efficient use of building and demolition trash, as well as sustainable environmental and economic management, in order to preserve the cleanliness of our environment.

Keywords

Construction, Demolition, Waste, Management, Recycling, Libya

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1. Introduction

Since a large percentage of waste is currently disposed of by open dumping [1, 2, 3], waste management and disposal are an urgent issue that the world faces today. In 2016 [4, 5], global urbanization grew at a rate of 54.3 percent. According to evidence, construction and demolition activities account for roughly 40% of all waste generated globally [6]. Construction and demolition waste account for 25-30% of total waste generated, according to the European Commission [7]. Construction and demolition waste is rapidly increasing in developing countries, such as Africa, as a result of rapid growth in development and urbanization [8]. In most developing countries, the final destination of construction and demolition waste is frequently unpredictable [9]. In contrast to most developing countries, developed countries such as the United States, China, Japan, and Western Europe have attempted to manage solid wastes in a more comprehensive manner. Libya, on the other hand, has yet to implement the integrated waste management hierarchy [10]. Then, for long-term waste management, estimating the amount of construction and demolition waste is critical [11]. Construction and demolition waste is defined as a mixture of materials that includes non-inert waste, inert waste, non-hazardous waste, and hazardous waste. Construction and demolition debris also includes items resulting from natural

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disasters such as floods, storms, earthquakes, and tsunamis [12].

There is a need to estimate construction and demolition waste in Libya because there are no laws requiring clients to record and publish the amount of waste they produce, and there is no clear statistical data about the amount of construction waste produced in Libya and its management. Civilization has advanced at a breakneck pace over the last few years all over the world. This report describes the current state of construction and demolition waste management in Libya, as well as the challenges and opportunities for sound waste management and recycling in this sector. The ultimate goal is to propose construction and demolition waste management and recycling strategies that are appropriate for these conditions, have proven benefits for all stakeholders, and provide data on the amount of construction waste in Libya.

2. Construction Waste Management in Libya

In Libya, the most common method of construction and demolition waste treatment is indiscriminate dumping, which involves dumping a mixed waste of concrete, bricks, and soil from construction and demolition sites in landfills at random. Most marketable materials, such as steel, metals, wood, and plastics, are, on the other hand, separated on site and sold to recyclers. Other than collected construction and demolition waste sent to landfills and marketable materials, other generated construction and demolition waste is at risk of being illegally dumped. The reduction of illegal dumping of construction and demolition waste is a big challenge to every stakeholder involved, and effective countermeasures to suppress the illegal dumping of construction and demolition waste in Libya are necessary. Construction and demolition waste have great value in reuse and recycling, but recycling of construction and demolition waste is not yet fully developed in Libya. Insufficient construction and demolition waste management has resulted in a number of issues. Illegal dumping, hazardous waste, and natural resource depletion are all major issues.

2.1. Illegal Dumping

Illegal dumping of construction and demolition waste can result in risks to human health and the environment, such as transportation obstructions (i.e., construction and demolition waste on roadsides and pavements), which can lead to accidents, as well as effects on the urban landscape, air pollution, soil and groundwater contamination, degraded infrastructure (i.e., blocking sewers and canals), and land waste. Illegal dumping of construction and demolition waste on streets, in particular, causes numerous accidents. Construction and demolition waste dumped in canals wreaks havoc on the urban drainage system, causing flooding during heavy rains.

(a) Construction and demolition waste was dumped on the side of the road.

(b) Construction and demolition waste was dumped on the beach.

Figure 1. Construction and demolition waste is being dumped illegally in Libya.

2.2. Dangerous Waste

Only marketable materials are sorted at most demolition sites. Hazardous materials are not separated at the source and are instead dumped illegally alongside other construction and demolition waste. The improper management of hazardous materials, coal tar waste, and mercury poses a greater risk to human health. The cost and lack of treatment facilities are the main reasons for illegal dumping of hazardous waste.

3. Depletion of Natural Resources

After proper treatment and management, major components of construction and demolition waste, such as soil, bricks, and concrete, can be recycled and reused for other construction sites. The use of recycled materials, such as natural soil for making clay bricks and natural gravels and aggregates for roadbed materials and concrete manufacturing, directly contributes to the conservation of natural resources. Furthermore, recycling construction and demolition waste helps to reduce landfill space at construction and demolition waste disposal sites.

4. Libyan Construction Waste Management Strategies

The Libyan government has failed to establish a sound legal framework for environmental protection that includes guidelines for the management and disposal of all waste in recent decades.

5. Challenges for Construction Waste Management in Libya

As previously stated, Libya, like other developing countries in Africa, is currently experiencing a lack of laws and enforcement in the area of construction and demolition waste management. Current solid waste management prioritizes expensive materials like copper and iron. The main issue with current research and development projects in Libya is their limited application. Because the input material and output were not sustainable, research and development manufacturing lines frequently came to a halt when the project was completed. Therefore, while establishing construction and demolition waste management plans, the reduction strategy takes precedence [13]. Other studies have focused on waste minimization measures during the purchase process [14, 15, 16]. Effective research and development activities that fully consider practical applications are highly needed to develop sustainable and environmentally sound construction and demolition waste in Libya, based on past lessons and experiences.

6. Conclusions

In Libya, there are numerous obstacles to recycling construction and demolition waste. Here are some of the issues that need to be addressed in order to better implement management plans in the field.

1. According to demolition contractors in Libya, there are no rules or regulations governing the use and management of construction and demolition waste.
2. Demolition contractors are unaware of the use of demolition and construction waste in concrete and other building materials. There is no accurate data available for the estimation of the generation of the construction and demolition waste in Libya.
3. According to the observations, illegal dumping is widespread in Libya, clogging roads, rivers, canals, and landfills.
4. Environmental degradation is a major concern as a result of illegal construction and demolition waste dumping.
5. There is no dedicated landfill for C&DW disposal in construction and demolition waste.
6. Construction and demolition waste disposal is simple and affordable.
7. The production of recycled construction and demolition waste lacks economic viability.
8. According to the demolition contractor, no permission is required in Libya to demolish any type of structure.
9. The age of the structure, the availability of resources, and the demolition process all influence the quality and nature of construction and demolition waste.
10. For demolition contractors, separating the constituents from the debris is a time-consuming and tedious task.

7. Recommendations

Following are some recommendations for the management and utilization of construction and demolition waste as a processed building material, i.e., recycled aggregates, based on the challenges identified in this study:

1. There is a lack of government oversight, resulting in illegal dumping and inefficient management.
2. As a result, a separate cell for the management of construction and demolition waste should be established.
3. Structure demolition and construction and demolition waste disposal should be governed by strict or concrete laws.
4. Construction and demolition waste recycling must be incentivized by government agencies in order to encourage its use.
5. Government agencies should conduct a public awareness campaign to promote better implementation of construction and demolition waste recycling through better advertising that emphasizes the quality for acceptance.
6. Separating the various constituents of construction and demolition waste at the source is the best way to improve the quality of recycled aggregates. For better utilization and management of construction and demolition waste, the synchronization of various processes, such as segregation, collection, reuse, and recycling, must begin.
7. Increase the use of processed construction and demolition waste in road construction; some countries recycle 90% of their construction and demolition waste into recycled aggregates.

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