

Demolished building waste management: a review. Gestión de residuos de edificios demolidos: una revisión

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ABSTRACT

Construction and demolition waste are the major issue as a direct consequence of increased global urbanization. It impacts the environmental efficiency of the construction industry, contributing to 35% of the global landfill. This research considers the two main fundamental factors affecting the demolished building waste management, which are the management hierarchy including the 3R strategies and the project life cycle and management tools. The inappropriate treatment and disposal of Construction and demolition waste give rise to the environmental pollution, land price, and natural resource consumption. This paper scrutinizes the concept of Construction and demolition waste management and review the extant studies in the managerial areas of Construction and demolition waste. These findings are aimed at clarifying the current and future practices of Construction and demolition waste management practices with an understanding for the sustainable governance.

Keywords: Construction and demolition waste, management, review.

RESUMEN

Los residuos de construcción y demolición son el principal problema como consecuencia directa del aumento de la urbanización mundial. Afecta la eficiencia ambiental de la industria de la construcción, contribuyendo al 35% del relleno sanitario global. Esta investigación considera los dos principales factores fundamentales que afectan la gestión de residuos de edificios demolidos, que son la jerarquía de gestión que incluye las estrategias 3R y el ciclo de vida del proyecto y las herramientas de gestión. El tratamiento y disposición inadecuados de los residuos de la construcción y demolición generan contaminación ambiental, precio de la tierra y consumo de recursos naturales. Este artículo analiza el concepto de gestión de residuos de construcción y demolición y revisa los estudios existentes en las áreas de gestión de residuos de construcción y demolición. Estos hallazgos tienen como objetivo aclarar las prácticas actuales y futuras de las prácticas de gestión de residuos de construcción y demolición con un entendimiento de la gobernanza sostenible.

Palabras clave: Residuos de construcción y demolición, gestión, revisión.

INTRODUCTION

Construction and demolition waste, is the heaviest waste that has been generated globally, usually arising from construction, renovation (Wu et al., 2017). Concrete being the major construction material, it is also the second most consumed commodity after water, the management practices are of prime importance. Construction and demolition waste include concrete, brick, dirt, stones, plaster (Gavilan, R. M. & Bernold, L. E. 1994) and other debris generated from buildings. The emergence of Construction and demolition waste has been increased since 2010 due to acceleration in construction. Various studies have been conducted on the management practices for Construction and demolition waste from different disciplines. Some studies include investigation on the practices, strategies and challenges, others focus on comparing the management practices in different countries and evaluation of the environmental and economic benefit of waste management practices, waste reduction potential of prefabrication.

However, the identification and characterization of the factors contributing to Construction and demolition waste management practices are difficult to manage efficiently without considering Construction and demolition waste management hierarchy. This paper reviews the various Construction and demolition waste management strategies, contributing factors.

CONSTRUCTION AND DEMOLITION WASTE MANAGEMENT STRATEGIES – HIERARCHY OF WASTE MANAGEMENT

1. REDUCE

This is among the 3R Construction and demolition waste management strategies which is rated as the highest priority (Huang et al., 2013). Once created it is essential to identify ways to either reuse them or recycle them, or dispose them. Reducing the Construction and demolition waste benefits in reducing the transportation cost to landfill, CO₂ emissions, reduces cost from material purchase, etc. Reducing the amount of Construction and demolition waste generated by maintaining strict size and quantity control, minimizing work errors and is the most cost-effective and economical solution to the management practices in construction industry.

2. REUSE

This action is considered as an effective means of Construction and demolition waste mitigation by using them to serve another function in addition to their original purpose. These include reusable aggregates, brick, wood, etc., that can be used either as new products, energy production or construction materials. There are potential options for processing the demolition waste to serve as raw materials for new roads, bridges and as urban landscape. Recovering these materials can help reduce costs generated from landfills and transportation.

3. RECYCLE

Recycling of Construction and demolition waste can be done either onsite or offsite which saves a huge amount of CO₂ emissions by reducing the demand for new raw materials, and the demand for landfill utilization. The various material characteristics should meet the quality requirements for the built structure or roads.

4. DISPOSAL

When either of the 3R strategies is not suitable for the category of Construction and demolition waste generated it must be disposed in a landfill. In such cases the disposal is to be monitored to eliminate any possible pollution to the surrounding.

CONSTRUCTION AND DEMOLITION WASTE MANAGEMENT CONTRIBUTING FACTORS

The various factors that contribute to effective Construction and demolition waste are regulatory framework for sustainable Construction and demolition waste management, stakeholder's attitude, Construction and demolition waste project lifecycle, and Construction and demolition waste management tools.

The various sustainable Construction and demolition waste management contributing factors include environmental, economic and social factors. The environmental factors including pollution and degradation, greenhouse gas and fossil fuel emission, depletion of raw materials, etc. (Shen L. & Tam V. W., 2002). The economic factors are various costs including that of materials, transportation, reuse and recycle costs and cost for landfill (Yahya K. & Boussabaine A. H., 2006.). The social contributing factors are associated with the long-term and short-term safety impacts of collection, sorting and disposal, etc. (Teo M. & Loosemore M., 2001).

The stakeholder's Attitude is considered as a crucial criterion to minimize and or eliminate all possible ways of waste generation. This can be achieved by liaising with the project team and setting rules for effective utilization of materials (Gavilan, R. M. & Bernold, L. E. 1994). Monitoring the workforce to maintain construction standards while giving attention to waste generation is an effective means to satisfy the client requirements whilst controlling the quantity of Construction and demolition waste generated.

Proper waste management strategies implemented at the planning phase of a project helps in reducing the generation of Construction and demolition waste (Ofori G., 2007). Various waste reduction strategies are to be implemented at the various phases of the project including planning and design phase, procurement phase, and in construction and demolition phase. These can be achieved by estimating the Construction and demolition waste generation before project initiation, clear designing and utilization of tools to make accurate design and anticipation of waste generation, maintaining accuracy in material quantity before procurement, and site supervision and appropriate material storage and handling (Gavilan R. M. & Bernold L. E., 1994).

CONCLUSION

There are persistent issues in association with Construction and demolition waste management with several efforts to tackle these problems. There are two important parameters that are to be incorporated together for effective Construction and demolition waste management. These are the reduce, reuse, recycle strategy and the Construction and demolition waste management contributing factors such as Construction and demolition waste from the perspective of. Construction and demolition waste management is vital to protect our resources from destruction and to prevent their further deterioration. This review provides a perception of effective management of Construction and demolition waste which helps to improve the Construction and demolition waste management by focusing on the contributing factors and strategies and thereby reducing the environmental impacts of Construction and demolition waste.

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