

A STUDY OF WASTE MATERIALS MANAGEMENT IN CONSTRUCTION

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ABSTRACT

Rapid growth in construction activities increases construction waste problems around the world. Construction waste gives a negative impact to the environment, costs, time, productivity of projects, and to reduce these negative impacts, it needs a comprehensive understanding of the construction waste generation and management. This research identifies ranking of causes that lead to generate waste materials in construction in two countries namely Sudan and Malaysia, causes of construction waste were identified from past researches. This research was carried out through structured questionnaire focusing on major parties involved in construction project. From the results it was indicated that inadequate planning and scheduling has high rank of occurrence, in contrast effect of weather is the lowest cause in both countries. Identifying the important and most frequently causes can play a major role to eliminate and reduce waste by considering more attention to them, and construction industry players can avoid and alert about how the waste was generated. In addition this research identifies ranking of implemented process used in construction industry to minimize waste materials, the ranking was also conducted in the two countries, Sudan and Malaysia. From the results it was indicated that IBS is the most preferable implemented process to reduce waste in Malaysia while it has the lowest process in Sudan. Through identifying the causes and reduction processes of the construction waste it gives better understanding to the construction community for future construction projects which will give a great benefit for any country in terms of economic, social and protection of the environment.

ABSTRAK

Pertumbuhan pesat dalam aktiviti pembinaan meningkatkan masalah sisa pembinaan di seluruh dunia. Sisa pembinaan memberi kesan negatif kepada alam sekitar, kos, masa, produktiviti projek. Maka untuk mengurangkan kesan negatif, ia memerlukan pemahaman yang menyeluruh daripada penjanaan sisa pembinaan dan pengurusan. Kajian ini mengenal pasti kedudukan sebab-sebab yang membawa kepada penjanaan bahan-bahan buangan dalam pembinaan di kedua-dua negara iaitu Sudan dan Malaysia serta punca sisa pembinaan telah dikenal pasti dari kajian yang lalu. Kajian ini dijalankan melalui soal selidik berstruktur yang memberi tumpuan kepada pihak-pihak utama yang terlibat dalam projek pembinaan. Kajian ini mendapati bahawa perancangan yang tidak sempurna dan penjadualan mempunyai kedudukan yang tinggi berlaku di kedua-dua negara manakala cuaca adalah punca yang paling rendah. Mengenal pasti sebab-sebab yang penting dan paling kerap, boleh memainkan peranan utama dalam menghapuskan dan mengurangkan sisa dengan memberi perhatian yang lebih kepada mereka, dan pemain dalam industri pembinaan boleh mengelak dan memberi amaran tentang bagaimana sisa itu dihasilkan. Dalam waktu yang sama kajian ini mengenal pasti kedudukan proses dilaksanakan yang digunakan dalam industri pembinaan untuk mengurangkan bahan buangan, serta kedudukan di kedua-dua negara iaitu Sudan dan Malaysia. Kajian ini juga mendapati IBS adalah proses yang paling digemari dilaksanakan untuk mengurangkan sisa di Malaysia manakala ia mempunyai proses yang paling rendah di Sudan. Dengan mengenal pasti punca-punca dan proses pengurangan sisa pembinaan ia memberikan pemahaman yang lebih baik kepada masyarakat pembinaan bagi projek-projek pembinaan masa depan yang akan memberi manfaat yang besar kepada sesebuah negara dari segi ekonomi, sosial dan alam sekitar.

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CHAPTER 1

INTRODUCTION

1.1 Introduction

Waste is one of the serious problems in construction industry. Many researchers and practitioners indicate that there are many wasteful activities during design and construction process. Wahab and Nawal (2011) described waste emanates during different stages of construction which are during planning, estimating and construction stage. Furthermore, Ekanayake and Ofori (2000) shows waste occur during design, operational, procurement and material handling. The majority of these consuming time and effort without adding value for the client thus resulting losses in material, delay times and execution of unnecessary work.

Waste has direct impact on the productivity, material loss and completion time of project which resulting in loss of a significant amount of revenue. The physical waste contributes a significant part of landfill, and studies show that 13-26% of landfill is construction waste which emphasis on the need of a systematic and efficient waste minimization method to control the generation of waste at different level. The construction industry produces large amount of waste, equal to four times produce in households and more than 50% deposited in landfill.

Therefore, to avoid the waste generation, need to find out the root cause of the waste. The causes that contribute to the generation of construction waste are various and conducting during different stages in construction meanwhile management processes to control waste becomes essential. Many developed countries have realized the need to modify tendering, contracting and construction site processes in order to ensure that waste prevention and management are prioritized on site.

1.2 Background of Study

In 21st century, researchers and practitioners around the world facing the challenges of construction waste. Various researches in develop countries indicate that contribution of construction waste in the urban area tend to increase .Researches in United States and Europe have revealed that considerable amount of waste lies in flow processes of construction as in. In addition, study conducted in Sri Lanka also reveals that the domestic construction industry workforce is ignorant of flow activities that create waste and their causes. Moreover, researchers from Nigeria described waste emanates during different stages of construction which can be during planning, estimating or construction stage.

Other problems according to the Singapore researchers, during design, operational, procurement and material handling attribute that leads to site waste. In addition, as in also indicated construction managers often fail to identify or address waste in the construction process. Thus, as a developing country.

Malaysia also has fallen into construction waste problems in line with the rapid development of construction sector. In tandem, with increasing demand of

infrastructure projects, residential development projects, large amounts of construction waste are being produced in Malaysia (Siti Nazziera, 2011). These conditions may give a huge impact on project costs and time due to physical and non-physical waste for Malaysian construction industry.

Also Sudan face the problem of waste materials from construction industry as a result of wide development on civil services that include many projects such as bridges, dams and streets also there was a huge migration towards capital of Khartoum during last two decades (Sharf Aldein Banga, 2008), related to that there was a large numbers of housing construction that produce many waste materials that may be rely on using un skilled labors or bad quality materials and other causes may be conducted.

There is essential need to control waste materials in central and around the capital of the Sudan, Khartoum city, due to rapid constructional growing that has been increasing over the last two decades. This has been mainly due to the increase in numbers of people who migrate from all other states to the capital city Khartoum consequently housing.

1.3 **Concept of waste**

Wastes defined as unwanted or discard materials. The wastes continually causing an environmental troubles and global warming problems to the world (Sakai, 2011).

According to the new production philosophy, waste should be understood as any inefficiency that results in the use of equipment, materials, labor, or capital in larger quantities than those considered as necessary in the production of a building. Waste includes both the incidence of material losses and the execution of unnecessary work, which generates additional costs but do not add value to the product (Koskela, 1992). Therefore, waste should be defined as any losses produced by activities that generate direct or indirect costs but do not add any value to the product from the point of view of the client.

1.4 Problem Statement

Construction waste becomes a global issue facing by practitioners and researchers around the world. Waste can affects success of construction project significantly. More specifically, it has major impact on construction cost, construction time, productivity, and sustainability aspects.

The construction industry has been found to be one of the most inefficient and wasteful sectors. (CIB/CSIR 2001) (International Council for Research and Innovation in Building and construction). Internationally, the construction and operation of the built environment has been estimated to account for:

- i. 12-16% of fresh water consumption;
- ii. 25% of wood harvested;
- iii. 40% of virgin materials extracted;
- iv. 20-30% of greenhouse emissions;
- v. 40% of the total waste stream of countries, 15-30% of which ends up in landfill sites;
- vi. Up to 15% of purchased materials at jobsite ending up as waste.

Construction site waste contributes to the large quantities of construction and demolition (C&D) wastes that are generated by the construction industry every year. The waste generated on construction sites has been found to result in two cost factors for the builders, i.e. the cost of transporting and disposing of site waste and the material procurement cost. This can have a negative impact on the profit margin of contractors. Reducing construction site waste can reduce both the cost of raw material purchase and the cost of disposing of the waste created on site. It can also reduce wastage due to inefficiency on site e.g. source separation can reduce the amount of waste resulting from commingled disposal. If planned, waste recovery for reuse and recycling can tremendously reduce the amount of waste that is destined for disposal by landfill. This can also open up secondary resource streams of building materials.

In recent years, the construction industry has realized not only the need to be environmentally responsible but also the benefits of green construction. There is an ongoing campaign to encourage life cycle assessment and costing. There is also a drive to quantify the environmental costs of construction in order to internalize the externalities of construction related activities. Many countries have embarked on programs that promote efficiency in construction in terms of labour, equipment and material use. There is growing advocacy for the purchase and use of recycled content building materials and products. Much effort has been dedicated to developing strategies that focus on construction site waste prevention, reduction, reuse and recycling. In addition, governments have increasingly introduced legislative and incentive instruments that make it more difficult to continue with wasteful jobsite practices. Of particular importance is the documentation of best practices that demonstrate the economic advantage of alternative waste management options for construction sites.

1.5 Aim and Objectives

The Aim of this research is assessing the concept of waste materials produce from construction industry and its effect to economic and environment beside that research concentrate on numbers of causes of waste and reduction processes implemented in construction to minimize waste. The related objectives are listed as follows:

- 1- To assess the concept of waste materials in construction industry and its effects for both economic and environmental perspectives from point of view of working people in construction field in Sudan and Malaysia.
- 2- Ranking numbers of selected causes lead to waste in construction in both countries which are Sudan and Malaysia ,and make comparison between them to see the major causes of waste materials in construction in both countries
- 3- Ranking of numbers of selected processes implemented in construction industry used to reduce waste materials, the ranking has been done for two countries Sudan and Malaysia in addition comparison will be made to see different between major processes implemented to reduce waste used in Sudan and Malaysia.

1.6 Research Scope

The scope of this study is limited to the following:-

- 1- This research only focuses on waste materials produced from construction industry.
- 2- This research only focuses on selected causes lead to waste materials in construction, also focuses on selected minimization process implemented in construction industry to reduce waste.
- 3- The selected causes and selected implemented process to reduce waste covers only two countries namely Sudan and Malaysia.

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