

Construction waste minimization for Contractors in Malaysia

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Abstract: - Construction is one of the industries that generate wealth to the country in Malaysia. Construction industry contribute a large of waste stream and facing a problem in poor construction waste minimization in order to reduce the negative impacts towards environment and dumping area. Thus, there are problems that are faced by Malaysia related to waste minimization such as the weaknesses of Malaysian contractor in minimizing construction waste and the weaknesses of government's policies pertaining to waste minimization and practices among contractor in construction projects. Hence, this paper outlines the structure of the research that is being conducted by the researcher. Qualitative methods have been adopted in this research for developing the framework of construction waste minimization for contractor in Malaysia.

Key-Words: - Framework, construction waste, waste minimization, Malaysia

1 Introduction

In construction industry, waste minimization is very important. Waste minimization is one of the waste management approaches that being applied in construction site to reduce the amount of waste generated. On the other hand, there are other authors have discussed and produced their own definition of waste minimization. According to [1] waste minimization is defined as the reduction of waste during process of products. In addition, it is also called as production material which is environmental friendly. Generally, there are three methods to minimize waste according to USA's Environmental Protection Agency's (EPA) which are reduction, recycling and treatment. Moreover, [2] have stated that there are three main practices in minimizing waste during construction activities which are; avoiding waste, reuse materials and recycling waste.

According to [3] waste minimization is often not to be considered in early stage of construction project. Nevertheless, in the hierarchy of waste management, waste minimization is one of the highest levels which are important to achieve the sustainable development. Importantly, it is a ways to reduce waste at source and in order to achieve the waste hierarchy towards 2020 at its objective. The hierarchy of waste in Malaysia is reduce, reuse, recycle, treatment and dispose to minimize the waste generated. Target of Malaysian for recycling is 22% out of waste generated by the year 2020 [4]. Current practices in minimizing construction waste among the contractor in Malaysia will be prioritized in this research in order to show the magnitude of

the problems encountered. Thus, the purpose of this paper is to represents the outlines of research conducted by the researcher.

2 Problem Statement

2.1 Weaknesses of Malaysian contractor in minimizing construction waste

In Malaysia over the last two decades, environmental issues are becoming more serious and should be curbed. Rapid development such as buildings and infrastructure projects have led to big waste generator and illegal disposal [5]. [6] mentioned that the problems occurred increasingly in Malaysia was illegal disposal waste. This statement is supported by an two authors who has stated that illegal dumping site occurred from construction waste in Johor District resulted 42% out of 46% [7]. [6] also also added that there are 933 tonnes of wastes generated in Klang Valley and the illegal dump sites occurred was exceeding 52 numbers of sites. It is causing a risk to environment such as greenhouse emission and leachate. These evidenced that waste minimization practices being applied by contractor unsuccessful. Furthermore, in reference to [7] the authors have found near along the road in Seberang Perai, Pulau Pinang there are more illegal dumping which cause a risk to human health and environment. Construction industry is not an environmentally friendly because it has also been linked to pollution and has a large negative impact

towards environment. [7] has regarded factors that contribute to an increase of illegal dumping issues is caused by financial and location of project. The data showed that rate of recycling in Malaysia is still low at 5% compared to other developed countries [8].

Not many contractors are willing to consider the sustainable environment and recycling the construction material because of working pressure and limited time to complete the project ([9]; [10]). Moreover, construction industry will always be linked to quality and quantity of waste [5]. Thus, in order to curb this problem, a strong enforcement policy in term of policy and legal instrument are needed otherwise these problem will not be addressed effectively. Construction industry is responsible to develop a sustainable environment in term of infrastructure. Essentially, construction industry is a major contributor to waste generator

[11] stated that construction industry the largest waste generators compared to other industry in Malaysia. However, construction waste will not only give negative impacts to the environment but it also can affect the contractor in managing waste disposal when the cost is increased. Development of building and infrastructure is growing rapidly. Consequently, the uses of natural resources will be increased. Additionally, there are various types of material can be seen used in construction site. According to [7] there are six types of waste material has been carried out on 30 construction site which are concrete (12.32%), metals (9.62%), bricks (6.54%), plastics (0.43%), woods (69.10%) and others waste (2%). In conclusion, the researcher found the largest waste generator is wood rather than other material. Lingard (2001) conducted a research on relationship between ways to prevent a waste and environmental sustainability. As a result, it shows a positive relationship. Thus, to ensure sustainable development is successful, the effective waste minimization is very important.

Additionally, Selayang Municipal Council has found an illegal dumping on an agricultural land in Sri Gombak and private land in Bukit Jalil. Thus, the primary questions need to be addressed are what are the problems of Malaysian contractor in minimizing construction waste and why illegal dumping still occurred? There is a need to identify the factors that contribute to waste minimization problem in construction projects. Furthermore, this research will recognize the main problem in minimizing construction waste in Malaysia in order to overcome this problem.

2.1.1 Weaknesses of existing policy and contractor's practices which is not standardized pertaining to construction waste minimization

It is reported that the result of construction waste goes into landfill. In accordance with the waste issues, many countries have chosen to start in recycling the construction material due to advantages (Bill Roth, 2012) in [12]. The current body of literature could be explored to identify the effective waste minimization practices formulated by the developed countries. Meaning we should learn, adopt and modify from more successful regimes. Furthermore, [12] has stated that many countries are also considered on the suitable site for waste location and equipment used; waste recycling operations; training for workers; and also environment and safety regulations. This statement is supported by a Ministry of Federal Territories and Urban Wellbeing under the purview of Entry Project Point (EPP) who has initiated EPP9 to Developing an Efficient Solid Waste Management Ecosystem. Practicing waste minimization by industries is not very common and just a few number of industries apply waste minimization [8]. The existing regulation and strategies in Malaysia more focus on household, municipal and hazardous industrial waste. Consequently, the other sectors decide to not follow the existing regulation because it is not fully enforced in their sector. Other than that, the existing policies seem not clear and the waste minimization practices do not mention directly.

The government has taken serious initiative about reducing waste on site because of waste issues, therefore the government enforced the usage of Industrialized Building System (IBS) used as construction method to reduce the waste problem and apply sustainable development through the Construction Industry Master Plan (CIMP) 2006-2015 (CIDB, 2011). In 2008, solid waste management in Malaysia had launched the Action plan for Clean and Beautiful Malaysia and national Solid Waste management policy.

However, empirical evidences confirmed by Alam Flora Sdn. Bhd that solid waste collection is only 76%, recycle process is 5% and 95% of waste collected being disposed at 112 landfills in Malaysia. Furthermore, 25,600 tonnes of waste generated from multiple sources including construction waste on daily basis in Malaysia [13]. There are some actions been taken by the Construction Industry Development Board (CIDB) and the Economic Planning Unit in 2010. Even so, the results have not been translated in the form of strong legal instruments and enforcement. Using of their own policies and guideline being applied by

industries in Malaysia. Hence, Malaysian contractor adopted their company initiatives for waste minimization during construction process which clearly does not reflect to current policies implemented by government [13]. The author also added that construction waste management remains poorly implemented in construction projects in Malaysia.

According to [14] Site Waste Management Plan (SWMP) by CIDB seem like not being enforced and still new in Malaysia. Lack of practices in minimizing waste is caused by lack of implementation by the government. Other than that, Malaysian contractor also adopted their company initiatives for waste minimization during construction process which clearly does not reflect to current policies implemented by government. In addition, the aspects in Malaysian policies seem quite general which not specified the important aspects such as construction waste. Thus, the questions need to be addressed are what are the gaps in the existing policies and current practices, why such gaps emerged and how to minimize these gaps? Hence, this research is to identify the gap in terms of existing policies and current practices; from there construction waste minimization framework for Malaysian contractor will be proposed. The proposed framework will be highlighting a new strategies and guidelines that can be used in practices for minimizing construction waste in order to applying good practices in construction industry among Malaysian contractor.

3 Research Aim, Objectives and Research Questions

The aim of this research is to highlight a new strategies and guidelines that can be used in practices for minimizing construction waste; from there construction waste minimization framework for Malaysian contractor will be proposed. Three objectives have been formulated underpinned by the stated aim:

1. To explore the current situation and main problems of Malaysian contractor in minimizing construction waste;
2. To identify the gap in terms of existing policies and current practices of Malaysian contractor pertaining to waste minimization;
3. To formulate a framework of waste minimization for Malaysian contractor.

The following research questions have been formulated as a result from the current scenario on

waste minimization in order to gauge the research endeavor:

1. Research Question for Objective 1
 RQ 1.1 : What are the current situations of construction waste in Malaysia?
 RQ 1.2 : What are the current problems of contractor in minimize construction waste?
 RQ 1.3 : What are the factors contribute to waste minimization problem in construction projects?
2. Research Question for Objective 2 & 3
 RQ 3.1 : What are the gaps in the existing policies and current practices, why such gaps emerged and how to minimize these gaps?
 RQ 3.2 : How to improve construction waste minimization practices among contractor in Malaysia?
 RQ 3.3 : What are the appropriate construction waste minimization practices implemented by other developed countries?
 RQ 3.4 : What are the appropriate waste minimization practices for Malaysian contractors?

4 Previous Studies Related to the Research

Various researches have been conducted on similar research pertaining to construction waste minimization. The number of similar research seems to show the sustainable and green environment are gaining worldwide concerns. Almost similar researches have been conducted but different in terms of area concerns. Hence, this research will carry out to fill in the gap between the previous researches. Table 1 shows the previous studies have been conducted on construction waste minimization in Malaysia.

Table 1: the previous studies on construction waste minimization in Malaysia

Citation	Previous studies	Gaps
[13]	Barriers to Practice of Non-Hazardous Solid Waste Minimization by Industries in Malaysia	This research was concerned on the barriers of waste minimization practices in Malaysian industries.
[2]	The Construction Solid Waste Minimization	The author only focusses on the type of construction solid

	Practices among Malaysian Contractors	waste produces and discussed the waste minimization practice by the contractors at construction sites
[15]	The Quantification of Local Construction Waste for the Current Construction Waste Management Practices: A Case Study in Klang Valley	This research only focuses on the classification of construction waste generated at sites.
[4]	Urban Solid Waste Minimization in Malaysia - The case of Shah Alam City Hall, Selangor.	Focusses on the awareness and level of involvement in waste minimization.
[16]	Initial Findings on Perspectives of Local Contractors on Waste Minimization Barriers and Incentives on Construction Sites	Concerns on factors influencing waste minimization barriers and incentives on construction site in Kuching, Sarawak.
[17]	Identifying Causes of Construction Waste - Case of Central Region of Peninsula Malaysia	This research focuses on factors causing construction waste in Malaysia.
[18]	Municipal Solid Waste Management in Malaysia: Current Practices, Challenges and Prospect	This research only concerns on current practice and challenges municipal solid waste management in Malaysia.
[6]	Waste Minimisation as Sustainable Waste	This research only review on waste minimization strategies and

	Management Strategy for Malaysian Industries	guidelines in UK and Thailand
[9]	Sustainable construction waste management in Malaysia: a contractor's perspective	This research focusses on the current status of waste management practices in the Malaysian construction sector

5 Research Methodology

Well planned research methodology is a guide to achieving the aim and objectives of research. Qualitative research design by way of naturalistic observation, interview question and supported by validation via quantitative instruments will be adopted. The methodology will be divided into four correlative stages which are theoretical framework, qualitative research, proposed framework and validation via qualitative research. For the first stage of data collection, a body of knowledge on current situation and problems of Malaysian contractors in minimizing construction waste will be explored. Theoretical framework on the factors contributes to waste minimization problem in construction projects will be investigated and identified. The purposes of this exercise are to addressing research question 1.1, 1.2, 1.3 and 2.3 underpinned by objective 1 and 2 as mentioned before. Comparative studies will be made between waste management policies being implemented in developed countries and Malaysia, identification of gaps in literature, previous research in the area, pattern in waste minimization related issues and components of the waste minimization will be identified at this juncture. Interview and Naturalistic Observation protocol will be prepared to ensure reliability and validity of qualitative data. Samples will be selected based on stakeholders and related agencies in waste minimization. Observation checklist will be prepared to observe the current status of waste minimization practices being made by the contractors. Selection of construction sites will be made within Klang Valley/Greater Kuala Lumpur and comparative study will be made based on the observation identified beforehand. For the third stage of data collection, draft Framework of Construction Waste Minimization for Contractors in Malaysia will be proposed. In stage 4, the validation is to ensure validity of the findings and the proposed

Framework of Construction Waste Minimization for Contractors in Malaysia. This should be the final stage of the research. The proposed Framework of Construction Waste Minimization for Contractors in Malaysia will be further validated via focus group session. The focus group in question will include experts in the area.

6 Scope and Limitation

The scope of research is one of the first sections which set out what, why, where, who and how the research is going on. This research will focus on current situation and practices of Malaysian contractor in minimizing construction waste. Next, the current problem in minimize construction waste would be identified. Another, the gaps in the existing policies and current practices among contractor in Malaysia will be carried out to investigate the reason of gaps emerged and ways to minimize these gaps. Since the research would be involved construction waste minimization practices among the contractor, the main target group will be the G7 contractors. This research will focus on the current status of waste minimization practices being made by the contractors in construction site. The target group comprises of registered contractors in the state of Selangor and Kuala Lumpur. Further, only selected sites within Klang Valley/Greater Kuala Lumpur were chosen to be observed due to a highest percentage of developments there and comparative study will be made based on the parameters identified beforehand. The research will be covered all types of construction sites. In other hence, the related agencies such as Construction Industry Development Board (CIDB), Solid Waste and Public Cleansing Management Corporation and Department of Environment (DOE) which are among the important agencies pertaining to waste minimization in Malaysia also chosen as target group to find out the details on this issues. The limitation of this study is limited to the main entities or individuals that play a significant role in the construction waste minimization in Malaysia.

7 Significance of Research

The significance of this research is to highlight the major issue of current practices on waste minimization among Malaysian contractor and to show the magnitude of the problems encountered; from there construction waste minimization framework for Malaysian contractor will be proposed. This research will be highlighting the gap

in terms of existing policies and current practices and the main problem in minimizing construction waste. This research will not only benefit to the government, but also to the others as follows:

1. Theory/knowledge
 - i. This research will add in to the existing body of knowledge on waste minimization issues and policies
 - ii. The findings are expected to be the cornerstone for more active development of sustainable construction towards sustainable development. The waste minimization issues are one of the primary concerns in sustainable construction, thus it is comprehend to sustainable development.
 - iii. There is a gap in terms of what has been planned and implementation actions in particular construction waste. Generally, waste minimization issues in construction industry have not been seriously addressed, thus more empirical evidence and research is required to provide information on the current scenario and actions should be taken.

It can be anticipated that this research will generate interests from sustainable development researchers and related agencies, as it will provide fundamental elements towards more rigor waste minimization.

1. Benefits in the future
 - i. This research provides stakeholders in construction industry with background information on waste minimization towards sustainable development. It is expected to provide preliminary findings for potential solution for waste minimization problems surrounding construction industry ever since.
 - ii. The findings should provide intangible, potential functional solutions for implementing effective minimization of waste in construction industry. Thus, in long term it should offer an economic advantage to the construction organizations by maximizing their resources and protecting the future of the company.
 - iii. The adoption of effective waste minimization will give raise to sustainable construction practices in which will offer environmental

protections as well economic advantages for consumers and communities offering substantial savings in construction costs.

This research is expected to emphasize the importance of implementation of efficient waste minimization towards sustainable development/construction in order to sustain ecological system and enhance the social well being of all Malaysian citizens and future generations.

8 Expected Findings

This research is attempts to propose a framework of waste minimization for Malaysian contractor since the practices among the contractor in Malaysia still low compared than others developed countries such as Hong Kong, Singapore and UK. Therefore, the proposed framework will be highlighting a new strategies and guidelines that can be used in practices for minimizing construction waste in order to capture good practices in terms of minimizing construction waste and improving practices among Malaysian contractor. The research output is expected to add in to the existing body of knowledge on the theoretical mechanism to reduce adverse environmental impacts by way of best practices by contractor in minimizing construction waste.

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References:

- [1] S. K. Mallak, M. B. Ishak, and A. F. Mohamed, "Waste Minimization Benefits and Obstacles for Solid Industrial Wastes in Malaysia," vol. 8, no. 2, pp. 43–52, 2014.
- [2] a. Che Ahmad, N. I. Husin, H. Zainol, a. H. Abdul Tharim, N. a. Ismail, and a. M. Ab Wahid, "The Construction Solid Waste Minimization Practices among Malaysian Contractors," *MATEC Web Conf.*, vol. 15, p. 01037, Aug. 2014.
- [3] A. R. J. Dainty and R. J. Brooke, "Towards improved construction waste minimisation: a need for improved supply chain integration?," *Struct. Surv.*, vol. 22, no. 1, pp. 20–29, 2004.
- [4] N. Eeda, H. Ali, and H. C. Siong, "Urban Solid Waste Minimisation in Malaysia - The case of Shah Alam City Hall , Selangor .," pp. 1–14.
- [5] R. A. Begum, C. Siwar, J. J. Pereira, and A. H. Jaafar, "Factors and values of willingness to pay for improved construction waste management--a perspective of Malaysian contractors.," *Waste Manag.*, vol. 27, no. 12, pp. 1902–9, Jan. 2007.
- [6] S. K. Mallak, M. B. Ishak, and F. A. Sekitar, "Waste Minimisation as Sustainable Waste Management Strategy for Malaysian Industries level," no. July, pp. 1245–1253, 2012.
- [7] H. Onn, P. Raja, and B. Pahat, "Construction Waste Management : Malaysian Perspective," vol. 2.
- [8] F. Report, "The Study On National Waste Minimisation In Malaysia Summary," no. July 2006.
- [9] E. Papargyropoulou, "Management and Innovation for a Sustainable Built Environment 20 – 23 June 2011, Amsterdam, The Netherlands ISBN: 9789052693958," no. June, 2011.
- [10] S. Nagapan, I. A. Rahman, A. Asmi, A. H. Memon, and I. Latif, "Issues on Construction Waste : The Need for Sustainable Waste Management," no. Chuser, pp. 329–334, 2012.
- [11] M. Nizam And B. I. N. Yusoff, "Waste Minimization By Recycling Of Construction Waste," No. November, 2010.
- [12] K. Anuar, M. Kamar, Z. A. Hamid, M. K. Ghani, C. Egbu, and M. Arif, "Collaboration Initiative on Green Construction and Sustainability through Industrialized Buildings Systems (IBS) in the Malaysian Construction Industry," pp. 119–127.

- [13] S. K. Mallak, M. B. Ishak, A. F. Mohamed, and S. Abdullah, "Barriers to Practice of Non-Hazardous Solid Waste Minimization by Industries in Malaysia," vol. 4, no. 1, pp. 154–162, 2014.
- [14] S. Nagapan, I. Abdul, A. Asmi, and N. Fadhilah, "Study of Site's Construction Waste in Batu Pahat, Johor," *Procedia Eng.*, vol. 53, pp. 99–103, 2013.
- [15] R. Nor, H. Raja, M. Noor, A. Ruslan, M. Ridzuan, I. R. Endut, B. Noordin, Z. Shehu, A. Halim, and A. Ghani, "The Quantification of Local Construction Waste for the Current Construction Waste Management Practices : A Case Study in Klang Valley," pp. 183–188, 2013.
- [16] R. Ikau, R. Tawie, and C. Joseph, "Initial Findings on Perspectives of Local Contractors on Waste Minimization Barriers and Incentives on Construction Sites," pp. 506–509, 2013.
- [17] S. Nagapan, I. A. Rahman, A. Asmi, A. Hameed, and R. M. Zin, "Identifying Causes of Construction Waste - Case of Central Region of Peninsula Malaysia," vol. 4, no. 2, pp. 22–28, 2012.
- [18] M. Dinie, M. Samsudin, and M. M. Don, "Jurnal Teknologi Full paper Municipal Solid Waste Management in Malaysia : Current Practices , Challenges and Prospect," vol. 1, pp. 95–101, 2013.