Construction waste generation in Malaysia construction industry: illegal dumping activities

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Abstract. Nowadays development of construction in Malaysia has been effect to the increasing of construction waste. Additionally, the production of construction waste from construction projects has given negative impact to the environment especially in illegal dumping activities. The increasing number of illegal dumping activities from construction projects in Malaysia gives a sign that Malaysian construction waste management needs to be concerned. To date, a comprehensive criterion for construction waste management, particularly for a construction project in developing countries is still not clearly defined. Therefore, construction waste management in Malaysia needs further research. The objectives of this paper are to explore illegal dumping activities, and discuss the contributory factors of illegal dumping activities. Hence, this research conducted an interview with expertise in the area of construction waste management in order to scrutinise illegal dumping activities in Malaysia. The data from semi-structured interviews were analysed by content analysis. Findings from this research will help to find out the strategies to reduce the illegal dumping activities. The final result also expected to increase the awareness and better solution for reducing illegal dumping activities in construction projects among construction players.

1. Introduction
Construction waste is wastes that unused from construction activities, such as pre construction, construction and post construction. All the construction waste was generated by human activities will contribute to the environmental problems [1]. Previous research has been defined that construction waste as construction fragments, ruins, disaster, construction materials and building construction and demolition, site clearance and any kind of waste from construction projects [2]. Additionally, previous research has been mentioned that construction waste as useful, unwanted or discarded materials that arise from the human activities and are not free flowing [3]. However, there is need an appropriate of waste which is to avoid, reduce and reuse the waste generated by the human activities [1,4,5].

From the previous study has been found that illegal dumping of construction waste becoming depressing in Malaysia [2,4,5]. Illegal dumping activities from construction projects have contributed bad impacts to the environment, social and economy. Additionally, the average total of construction waste was generated 28.6 tons daily in the year 2015 [5]. The data shows the increasing number of construction waste generated and potential contribution of illegal dumping activities. Furthermore, several studies have been conducted at Penang, Johor, Melaka, and Selangor from 2004 to 2013,
shows the increasing of illegal dumping activities from construction waste from year to year [5]. Thus, illegal dumping activities is an critical issue which 851 of illegal dumping area has been identified by SWCorp Malaysia and which has to be emphasized in order to reduce the construction waste generation in Malaysia [5].

2. Waste generation in construction industry

2.1. Construction waste generation and illegal dumping activities

Malaysian construction projects have been shown in the value of projected new construction works as reported by CIDB in the year of 2017. The value of construction projects for 2017 is forecast at RM138.0 billion compare to RM 131.0 Billion in the year 2016. This projection and development of construction project in Malaysian construction industry show a view of an implementation of megastructure projects and a good investment for Malaysia. From the discussion above, increasing demand in new development and refurbishment construction project are significant to increasing of generation construction waste [6]. The development of infrastructure especially in a construction project has contributed to the environmental issues especially in the production of construction waste [6,7]. Additionally, by increasing number of demand in infrastructure, it was directly increasing the development of construction in Malaysia.

Growing number of waste generation is due to several factors which economy, demand, living standard, population growth and industrial and urbanisation. Due to the factors of construction waste generation has been contributed to illegal dumping activities [1–4, 6-8]. Figure 1 shows the factors generation of construction waste from Solid Waste Corporation Malaysia (SWCorp Malaysia) perspective. Figure 1 shows the generation factors of construction waste which are the development of economy growth, increasing of infrastructure projects demands, commercial buildings and housing projects, increasing of living standard, increasing of urbanisation and industrial and finally increasing of population growth in Malaysia [8]. The increasing number of waste generation directly has been effect to the illegal dumping activities. Furthermore, the illegal dumping activities are due to several factors which serve to environment [8,9].

![Factors Generation of Construction Waste](image)

**Figure 1.** Factors Generation of Construction Waste [8,9].

SWCorp Malaysia has defined illegal dumping as a waste material dump into public and it can effect to the environmental issues [10]. In this case, waste materials from construction are not transported to the landfills can define as illegal dumping activities. Hence, the logistic factors are a major problem for developing countries. This is due to the development of the construction sector in the developing countries [11]. In Malaysia, normally construction waste dumped at municipal solid waste landfill. This is because this method is easy for responsible contractor and they do not need any
of technology to manage this construction waste. However, the disposal of waste contributed to the 
potion of waste dump, cost running during the logistic and the environment [12]. Mostly construction 
waste has been thrown at landfill, there are still reported that more of waste disposed at illegal 
dumpsites [13]. Illegal dumping is a major problem in many areas which raises concerns with regard 
to safety, property value, and quality of life in the community [5] [13]. In Malaysia, dumping of waste 
at illegal dumping sites is a common practice, particularly industrial and construction wastes.

2.2. Impact of illegal dumping activities

Generation of construction waste is one of the major factor by improper planning management during 
the construction phase [14]. Generally in every single phase of construction there are possibilities of 
construction waste generation if there are no concerns from construction parties [13]. Attention should 
be given emphasis to its environmental issues as the main impact is seen in public health over the last 
three decades [15]. The impacts of construction waste will stretch into the lives of the current and 
future generation. One of the major causes of construction waste is improper waste management. Lack 
of waste regulations and improper disposal facilities are the sources of unsuccessful waste 
management [16]. Construction waste management is important to avoid the negative impacts on the 
environment, social and economy [17]. It will become an issue if it is handled poorly. However, 
construction wastes which create issues such as illegal dumping require greater attention. According to 
the previous study the impacts of construction waste on the environment are unbalanced ecology, 
change of living environment, potential sewage, depletion of natural sources, energy consumption and 
generation waste [18].

Furthermore, a recent study of development squander impacts found that the ecological corruption, 
decimation of the biological system and dangers to general wellbeing are caused by poor 
administration of waste as far as transfer and waste taking care of handling waste management [18]. 
The previous research has found that the major factors contributed to an increasing of illegal dumping 
activities are the financial issues and logistic of the construction waste [19]. Additionally, the distance 
between the project location and landfill site is too far that has led the contractors to refuse disposing 
waste to the illegal dumping area. Continuity from that, it was reported that the contractors failed to 
pay for landfill charge and logistic cost in order to maximise their profit [19]. All parties in 
construction industry have together with the full commitment to ensure that construction waste can be 
organized and manage well. Thus, to archive the effort government should take an action by 
introducing new legislation and enforcement regime.

3. Methodology

This section explained the process of methodology adopted in this paper. Research methodology is a 
guide to achieve the aim and objectives of the research. Hence, this research will adapt qualitative 
approach as research approach because this approach is more suitable to capture information on 
construction waste management from respondents. Moreover, this approach allows researcher to go in-depth into the research topic. Apart from that, this research will use qualitative approach to gain an 
insight toward respondent perception and understanding toward on illegal dumping activities and 
construction waste management. The methodology divided into three phase which are literature 
review from the previous research, data collection by using qualitative method and data analysis by 
content analysis. Qualitative approach is an approach for examining respondent perceptions based on 
their work experiences [22]. For this paper, an illegal dumping activity has been explored by way of 
document review. Then semi-structured interview has been prepared to identify the contributory 
factors of illegal dumping activities. Interview protocol has been prepared to ensure the reliability and 
validity of qualitative data. Samples selected based on related and expert agencies in Malaysia 
construction waste management. Selection of SWCorp Malaysia from Cyberjaya, Kuala Lumpur, 
Johor, Melaka, Negeri Sembilan, Pahang, and Perlis and Perbadanan Pengurusan Sisa Pepejal 
Negara has been made based on the preliminary beforehand and there are only state have SWCorp Malaysia.
4. Result and discussion

4.1. Respondents background

Ten respondents have been interviewed in this research. However, part of the rest of the respondents will be discussed in future publications. Working experience of respondents is at least 5 years and more. Table 1 shows two of respondents that have been involved in construction waste management are highly experienced in Perbadanan Pengurusan Sisa Pepejal Negara. Additionally, eight of respondents from SWCorp Malaysia. Table 1 shows the background of respondents from the interviews.

| Respondents | Organisation | Position | Experience |
|--------------|--------------|----------|------------|
| R1           | Perbadanan Pengurusan Sisa Pepejal Negara | Timbalan Pengarah | 10 years |
| R2           | Perbadanan Pengurusan Sisa Pepejal Negara | Timbalan Pengarah | 6 years |
| R3           | SWCorp Malaysia Cyberjaya | Pengarah Bahagian Binaan dan Perniagaan | 20 years |
| R4           | SWCorp Malaysia Cyberjaya | Engineer | 5 years |
| R5           | SWCorp Malaysia Johor | Engineer | 6 years |
| R6           | SWCorp Malaysia Melaka | Engineer | 7 years |
| R7           | SWCorp Malaysia Negeri Sembilan | Engineer | 5 years |
| R8           | SWCorp Malaysia Kuala Lumpur | Engineer | 8 years |
| R9           | SWCorp Malaysia Pahang | Pengarah Bahagian | 18 years |
| R10          | SWCorp Malaysia Perlis | Engineer | 5 years |

4.2. Illegal dumping activities

Table 2 shows the percentages data of illegal dumping activities has been closed and reported in the year of 2015 by the several state in Malaysia.

| State        | Jan | Feb | Mac | Apr | May | June | Jul | Aug | Sep | Oct | Nov | Dec |
|--------------|-----|-----|-----|-----|-----|------|-----|-----|-----|-----|-----|-----|
| Johor        | 54% | 67% | 68% | 73% | 63% | 32%  | 93% | 96% | 96% | 98% | 98% | 98% |
| Kedah        | 90% | 93% | 100%| 100%| 100%| 100% | 100%| 100%| 100%| 100%| 100%| 100%|
| Melaka       | 94% | 100%| 100%| 97% | 100%| 100% | 100%| 97% | 100%| 100%| 100%| 100%|
| Negeri Sembilan | 61% | 70% | 85% | 90% | 90% | 90%  | 92% | 100%| 100%| 100%| 100%| 100%|
| Pahang       | 100%| 70% | 62% | 90% | 92% | 100% | 14% | 100%| 100%| 100%| 100%| 100%|
| Perlis       | 100%| 100%| 100%| 100%| 100%| 100% | 100%| 100%| 100%| 100%| 100%| 100%|
| Kuala Lumpur | 100%| 100%| 100%| 100%| 100%| 100% | 100%| 100%| 100%| 100%| 100%| 100%|

Table 2 shows the percentages of illegal dumping activities for the State of Johor, Kedah, Melaka, Negeri Sembilan, Pahang, Perlis and Kuala Lumpur. Data has been displayed in Table 3 are from January to December 2015. The percentage indicated is explained SWCorp Malaysia actions to implement the action plan and enforcement operations against illegal dumping areas for each state. SWCorp Malaysia aim to cover all the illegal dumping area (100%) for every month.

From the figure in Table 2 show that, every month illegal dumping activities exist and it will give negative impact to environment and public [15-18]. In overall of data, Johor are the only state are not
archive 100% for illegal dumping site which only 32% illegal dumping sites has been covered. It shows that population of illegal dumping site in Johor are the highest compare to other state. Furthermore, from the data shown that Perlis and Kuala Lumpur are the only state archive 100% illegal dumping site has been covered from January to December 2015.

Finally, from Table 2 shows illegal dumping activities in every state are still active and need more action to reduce the illegal dumping activities and participated by all parties concern. Consistent with government need which to be focus in issues solution and have impact to nation.

4.3. Contributory factors of illegal dumping activities

Table 3 shows the respondents overview of contributory factors of illegal dumping activities based on the semi structured interview.

| Respondents | Economy | Demand | Living Standard | Population Growth | Industrial and Urbanisation | Additional Factors |
|-------------|---------|--------|-----------------|-------------------|-----------------------------|-------------------|
| R1          | ✔️      | ✔️     | ✔️              | ✔️                | ✔️                          | Facilities; Educations |
| R2          | ✔️      | ✔️     | ✔️              | ✔️                | ✔️                          | Facilities; Attitude |
| R3          | ✔️      | ✔️     | ✔️              | ✔️                | ✔️                          | Facilities; Educations; Renovations; Attitudes |
| R4          | ✔️      | ✔️     | ✔️              | ✔️                | ✔️                          | Facilities; Educations; Renovations; Attitudes |
| R5          | ✔️      | ✔️     | ✔️              | ✔️                | ✔️                          | Facilities; Educations; Attitudes |
| R6          | ✔️      | ✗      | ✔️              | ✔️                | ✔️                          | Facilities; Renovations |
| R7          | ✔️      | ✗      | ✔️              | ✗                 | ✔️                          | Facilities; Renovations |
| R8          | ✔️      | ✔️     | ✔️              | ✔️                | ✔️                          | Facilities; Educations; Renovations; Attitudes |
| R9          | ✔️      | ✔️     | ✗               | ✔️                | ✔️                          | Facilities; Educations; Renovations; Attitudes |
| R10         | ✔️      | ✔️     | ✗               | ✔️                | ✔️                          | Facilities; Educations; Renovations; Attitudes |

Description:
✔️ : Respondents Agreed
✗ : Respondents Disagreed

The results of previous study (Table 3) identified that there are five factors has been contributed to the illegal dumping activities which are economy, demand, living standard, population growth, and industrial and urbanization. From the Table 3 it has shows that six out of ten respondents totally
agreed with all contributory factors has been contributed to illegal dumping activities. Based on the data, R1, R2, R3, R4, R5, and R8 agreed that economy, demand, living standard, population growth and industrial and urbanisation has contributed to illegal dumping activities in fact, another four respondents are not agree with several factors. Respondent R6 mentioned that demand does not give a big contribution to the illegal dumping activities.

Besides that Respondent R7 were not agreed with demand and population growth has contributed to the illegal dumping activities. In fact Respondent R7 mentioned the renovation work has given big contribution to the illegal dumping activities. Additionally, Respondents R7 said the renovation work contributed to 70% of construction waste production. In Addition respondents R9 and R10 are not agree with the living standard can contributed to the illegal dumping activities. Hence R10 mentioned that Major contribution factor of illegal dumping activities is lack of facilities providing for construction waste management. In conclusion, there are several additional factors has been defined from industry expertise which is facilities, educations, renovations and attitudes which can give big contribution if not been seriously managed in Malaysia construction industry.

5. Findings

Illegal dumping activities generated throughout the construction waste from construction site to landfill. The statistic data of illegal dumping activities in Table 2 shows that there is illegal dumping occurs on a monthly basis. This clearly defined that the existence of the problem of illegal dumping still needs to be more emphasized by all parties in order to reduce illegal dumping issues. In addition, figure in Table 2 shows the illegal dumping activities are still not yet fully covered by government. Government agencies are needed to do an action plan and operation exterminate of illegal dumping site. The increasing of illegal dumping activities because of increasing demand in construction and refurbishment projects as mentioned in CIDB report [6,7,20]. Additionally, others factors of illegal dumping activities are increasing of industrial and urbanisation development in Malaysia [8,21].

Therefore, there are various factors that have contributed to the illegal dumping activities. The results of previous study confirm that there are numerous factors causes of illegal dumping activities. Therefore, finding from data collection has been found additional factors contributed to the increasing of illegal dumping activities which shows in figure 2.

![Figure 2. Additional Factors of Illegal Dumping Activities](image)

Factors that contribute to illegal dumping activities are facilities, educations, renovation, and attitude. Other than that, respondents have mentioned that one of the major factors related to the environmental is the illegal dumping activities from construction and demolition projects. According
to respondent 1, in order to improve the current practices in the construction industry, SWCorp Malaysia have prepared the guidelines on construction waste management to assist the stakeholders in order to reduce the illegal dumping activities.

However, increasing number of illegal dumping has been reported shows the weaknesses of construction waste management in Malaysian construction industry and effect to environment [14,15]. The previous researcher also mentioned that the weaknesses of the guideline are not being enforced and translated in the form of the strong legal instrument [6]. Hence contractor in Malaysian construction industry can decide to adopt their own company initiatives for construction waste minimization during construction activities and it directly can contribute to the illegal dumping activities. As a result, respondents have found that new factors of illegal dumping activities and it were strongly proven the factors have increased the illegal dumping activities in Malaysia construction industry. Even though there are several programme handle by government to assist the construction parties to minimize an illegal dumping activities such as campaign, meeting and others programs. Then most of the respondents mentioned that illegal dumping activities are from the renovation works.

From the issues has been discussed the illegal dumping activities can effect to the unbalance ecology, environment pollution and others environment pollution [2,3,19]. Hence, the awareness among all parties especially in construction projects should be more concerned in order to reduce these issues. Other than that, the cooperation between all parties is needed to achieve successful construction waste management and reduce the illegal dumping activities. Several strategies for enhancing waste minimisation which are, all parties need to enhance the level of awareness on how to minimise the waste, then do an initiative to reduce, recycling and reused activities and strengthening the roles of government agencies to ensure the policies are effectively implemented [19,23].

6. Conclusion and recommendations
The overview of illegal dumping activities from construction and demolition projects reveals that construction waste in Malaysian construction industry are need to be more attention. From the studies has been prove that there is no proper construction waste management in Malaysia construction industry. This is evidenced by 21, 9000 tone daily or 8 million tone yearly estimated produced in Malaysia. Additionally, SWCorp Malaysia reported that in year of 2014/ 2015 there are 851 of illegal dumping (construction waste) has been detected. It shows that there are still lacks on construction waste management in Malaysia construction industry. Thus, a more holistic implementation is needed to ensure the illegal dumping activities can be reduced and protected. In conclusion, a strong support from the stakeholders, construction players, and government agencies are needed to more effective in managing construction waste in Malaysia. Otherwise, the sustainability and environmental problems will not be addressed effectively. Furthermore next stage will explore the requirement for controlling of illegal dumping activity from construction waste management in Malaysian construction industry.

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