

The importance of cleanliness in a proper construction site management in malaysia: a contractor's perspective

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Abstract. Construction site's cleanliness and tidiness is one of top main concerns of construction site management. A good site management with adequate planning in regards to housekeeping will ensure safety to both the site's working personnel and the neighbouring environment. This is especially of priority today due to the rapid growth of construction projects in Malaysia. Nevertheless, to date, statistics had shown that housekeeping related accidents happened repeatedly despite the awareness on site's cleanliness and tidiness. The objective of this study was to explore constructor's perspective on site cleanliness and tidiness. A set of questionnaire was distributed to thirty-four (34) Grade 7 CIDB contractors' firms in Petaling Jaya. Petaling Jaya was chosen since this area are developed area covered with residential area and cleaning management an importance issues. The goals of the survey study were to identify the following items from the perception of the contractors: (i) the hierarchy of importance of several purposes in ensuring construction site's cleanliness and tidiness, and (ii) the risk factors that influence a construction site's level of cleanliness and tidiness. It was found that from the contractor's perspective, ensuring a site cleanliness and tidiness is of importance mainly due to the need in protecting the environment, whilst, the least in cost saving. In addition, poor personnel's working attitude was found to be the main risk factor that will influences a construction site's level of cleanliness and tidiness. Conclusively, construction site's cleanliness and tidiness is highly vital. Even so, for nationwide awareness on the topic matter will requires full cooperation from all related parties.

1. Introduction

According to Gurmeet [5] has predicted that in the construction industry in Malaysia will experience a considerable growth in the year 2017. This forecasting is based on the expectation that construction will be a strong pipeline to the country in achieving the National Transformation 2050 (TN50). Indeed, the construction industry covers a wealth amount of scopes, yet, this study is emphasizing specifically on construction site's cleanliness and tidiness. Aside from the obvious dire effects to the environment, this study strongly stress that construction site's cleanliness and tidiness is of high importance due to the fact that insufficient housekeeping practices in construction site may lead to potential hazards to workers.

Statistics by DOSH [14] has shown that major cases of mortality are considerably attributed to the construction industry in comparison to other occupational industries. DOSH [14] has indicated that from January to October 2016 alone, there are 58 deaths have been reported in the construction sector due to accidents. It was noted by the Health and Safety Department that the highest numbers of



hazards in the construction sites are slipping and tripping – all related to housekeeping [17]. In addition, Datuk Lokman Hakim Sulaiman – the Health Deputy director-general (public health) noted on the increase of dengue cases in the construction sites as of late. This is also attributed to poor housekeeping [15] since stagnated rainwater in the construction sites has becomes the breeding ground for aedes. This is evidence when several construction sites were instructed to halt their operations until proven safe due to the infestation of aedes [15].

Table 1: Important of Site Cleanliness

Descriptions	Authors
1) Cost saving	Abdul Hamid and Singh [1]
2) Improve work productivity	Roth [10], Federated [17], Bates [2], Watson (2014) & S.W.Poon et.al [11]
3) Good company image	Bates [2]), Watson (2014) & Roth [10]
4) Neighborhood safety	Roth [10]
5) Protect the environment	Nagapan [7] & Bates [2]

The literature such as shown in Table 1.0 has noted that by keeping the construction site to be clean, the particular company could also save on cost, improve work productivity and illustrating good company image, whilst simultaneously ensuring the neighbourhood's safety and protecting the environment. For instances, a clean working environment will facilitate in keeping the working personnel's level of health. Therefore, cases of the degradation or the drop of working performance and absentee due to medical conditions could be reduced, thus, maintaining the overall productivity of the organization. Ahmadon [6] further added that proper construction site cleanliness can improve the image of Malaysian construction industry. This study highly agreed to the suggestions and ideas which were presented by these studies.

1.1. Importance of Site Cleanliness

The Social Security Organization (SOCISO) [18] has acknowledged that the fatality rate in the Malaysian construction industry is than three times higher in comparison to other industries. By reaching over than RM650 millions of compensation cost is a high number of value. Furthermore, this figures do not include the hidden cost of accidents which is usually thirty-three to eighty percent more than the direct cost, thus, summing into billions of ringgits [1] This compensation costs are indeed high, hence, actions need to be taken in overcoming the issue right from the root.

As mentioned by Roth [10], a construction project can be successful if housekeeping is made as one of their priorities in the construction site. Federated [17] commented that it is essential to have a good housekeeping program in the construction site to ensure a safe working environment. Bates [2] highlighted that when there are scraps or construction wastes being scattered at the construction sites un-attended, these items will create obstacles for the workers in being mobile. Suggestively, these obstacles may lead to case such as tripping and slipping as highlighted by Watson (2014). In timely clearing up construction site from trash and scraps, the overall working environment safety could be controlled. This notion is fully supported by Roth [10] and S.W. Poon [11]. The latter on their factor analysis on safety performance chapter 3.4 (d); which Tidy site: The tidiness and cleanliness of sites are important for safety. As mentioned by Nagapan [7], sorting out construction material to recycle and re-used certain material such as timber and metal will support on environmentally friendly construction works, which is good for sustainability. This can help promoting environmental friendliness scraps and supporting for the green building [10].

Moreover, [2] emphasized that a clean and tidy construction site will leave a good impression and protects the contractor's image. This is because, a clean working environment is a good tool for the company to illustrate their efficiency with the construction work to their potential customers (Watson, 2014). This is supported by Bates [2] upon pointing out that if the working tools and materials are not systematically kept, this will add to the need in relocating these items upon necessity. Therefore, as a whole, these unsystematic working environment will result in work deficiency and prolonging the overall time span for the project – which is of course, a negative setback.

Roth [10] also accentuated that contractors who keep their site clean will not only create a good working environment to their workers, but, also ensures that the community who lived close to construction site are not negatively affected by the construction works – physically, physiologically and psychologically.

1.2. Causes of Poor Site Cleanliness

There are various factors that contribute to the occurrence of poor construction site cleanliness and tidiness. Firstly, is poor material usage and storage system. According to Wyatt [13], ordering error such as overestimation, is a factor which affects the site condition. The material which are not immediately utilized for construction will have the need for storage or allocation space. If this is not provided, the materials are left scattered around in construction site and this is a case of poor material handling [12]. Phu [9] has stated that the frequency of material being used also affects the flow component that provides the material movement and placement during the construction process. Hence, the management must have a systematic approach in controlling the in-flux and out-flux of construction materials during the entire course of the project. Else, the construction site may face issues in relation to the inventory.

Secondly, is poor waste management system. Managing the construction site cleanliness need a good waste management system. However, this involves a cost to hire a waste management specialist. This is especially true for waste material involving soil and oil material. As noted by Permana [8], the lack of site inspection and technology is among the factors that lead to overall poor construction site waste management. The lack of encouragement from construction related agencies to give incentive for contractors to support waste management and keep the construction site clean [3] may lead to the contractors to proceed with the waste management themselves as they see fit. According to Bukhari [4] however, based on the previous survey there is little attention to cleanliness on the construction site from the organization senior management in Malaysia. If little to no amount of commitment from the organization in managing construction waste, this issue will never be resolved. can cause on poor site cleanliness. Due to the lack of programs, campaigns and poor waste management technology implemented, this resulted in the increasing number of hazard in construction industry in Malaysia.

According to S.W. Poon [11] there several more factors that affect construction site's cleanliness and tidiness. The other factors are: (i) time schedule of projects, (ii) inefficient communication due to multi-level subcontracting system, and (iii) linear penalty for not implementing safety regulation. All of these factors will in a way influence the overall achievement of construction site's cleanliness and tidiness either independent or cooperatively. For instances, a very tight times schedule will require the organization to be fully committed to completing the project, thus, hindering the company from having adequate time for housekeeping. Communication breakdown will definitely be a hindrance for housekeeping since the messages in ensuring construction site's cleanliness and tidiness might not be delivered to the responsible individuals. Furthermore, the penalty given to the contractor for not complying to the health and safety with respect to cleanliness and tidiness may just be too linear or minimal for the contractors to take immediate actions in contrasting to the penalty for delay or incompleteness of the project. Yet, this study strongly stressed that the main factor which contributed the most to construction site hazards in Malaysia is the overall poor working attitude of the construction site personnel. This particular factor will affect and infects the entire system of the organization's construction site management i.e. not only in regards to construction site cleanliness and tidiness. Poor working attitude could only be resolved via education/training and continuous monitoring.

2. Research Methodology

A survey study was conducted in gathering the data for this study. Questionnaire was distributed by emails to all the contractors whose name are listed in the CIDB Grade 7 contractor list. G7 was chosen since these contractors usually involve in big and high scale project. All of the contractor's main headquarters are also allocated in Petaling Jaya. A sampling size method had been used in order to determine the sample size for this research. As per listed in by CIDB, there are 159 contractor's registered in Petaling Jaya and based on random sampling size calculation, a number 60 respondent are needed in order to get 95% confident with 10% margin of error, however due to the time constraint, we only able to collect 34 samples out of 60. There questionnaire was divided to three (3) sections which were: (i) 'Part A - Background of Respondents'; (ii) 'Part B – The Important of Site Cleanliness and Causes of Poor Site Cleanliness', and (iii) 'Part C – Recommendation in Improving Cleanliness of Construction Site'. Likert Scale was used for all of the questions in Part B and C.

3. Results and Findings

3.1. Respondents' Background

A total of 34 respondents had responded in this research. Site Quantity Surveyor at 70% has the highest percentage of this survey participation. This is followed by Project Manager and Site Manager at 15% and 9% respectively, and finally by safety officer at 3%. In regards to working experience, only 3% out of the respondents are having more than 15 years of working experience, 26% having 10 to 15 years of working experience, 15% having 5 to 10 years working experience, whilst, mostly at 56% having less than 5 years of working experience. It was also noted that at 76%, most of the respondent knows about site housekeeping.

3.2. The Importance of Site Cleanliness in Construction Site

The result of the importance of site cleanliness in construction site rated by the respondents are shown in figure 1. It was apparent that the respondents strongly agreed that site cleanliness is important at the utmost level in order to protect the environment, as our construction industry had been highlighted to adopted green building as stated in Malaysian Construction Industry master plan (2005-2015) [16]. Only then it is followed by neighbourhood safety, good company image, improve work productivity. However, the means are slightly lower in terms of keeping the site clean can help in cost saving. In short, for the respondents, maintaining the environment as the current state that it is, is more important than housekeeping cost and compensation cost that need to bear by the contractor due the injuries. This finding is such a great welcome.

In general, try to avoid extremely fine lines (often called 'hairline' thickness) because such lines often do not reproduce well when printed out—your diagrams may lose vital information when downloaded and printed by other researchers. Try to ensure that lines are no thinner than 0.25 pt. Note that some illustrations may reduce line thickness when the graphic is imported and reduced in size (scaled down) inside Microsoft Word.

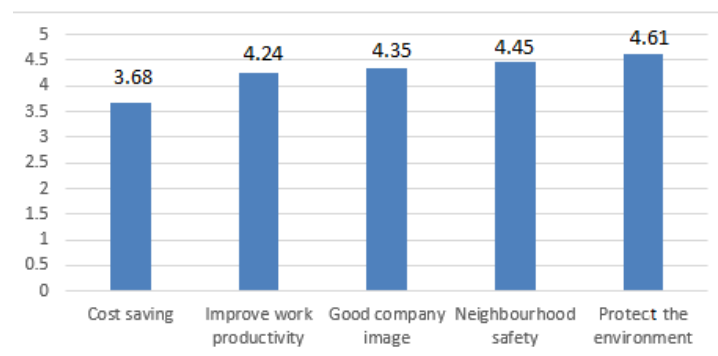


Figure 1: Important of Site Cleanliness

3.3. Factors Affecting the Site Cleanliness Issues that Leads to Poor Site Cleanliness

The result and analysis on the factors affecting the site cleanliness issues in Malaysian construction site can be referred to figure 2. From the respondents' feedback, top five highest mean responses of factors that caused poor site cleanliness are: (i) poor attitude of workers, (ii) poor supervision, (iii) no commitment from the organization, (iv) lack of construction waste management technology, and (v) lack of inspection on site. The rest of the factors which are ranked lower, yet, still agreed upon are: (i) ordering error, (ii) lack of experienced worker, (iii) language barrier between supervisor & workers, (iv) cost of managing construction waste, and (v) lack of staff for site cleanliness. Based on the five highest factors, most of the poor cleanliness affected by the individual factors due to the non-encouragement and guidance related to cleanliness on site. Therefore, by having adequate information on the causational factors that will influence construction site's cleanliness and tidiness, preventive measures could be taken by the contractors in overcoming the issue.

Captions should be below the figure and separated from it by a distance of 6 points—although to save space it is acceptable to put the caption next to the figure. Figures should be numbered sequentially through the text—'

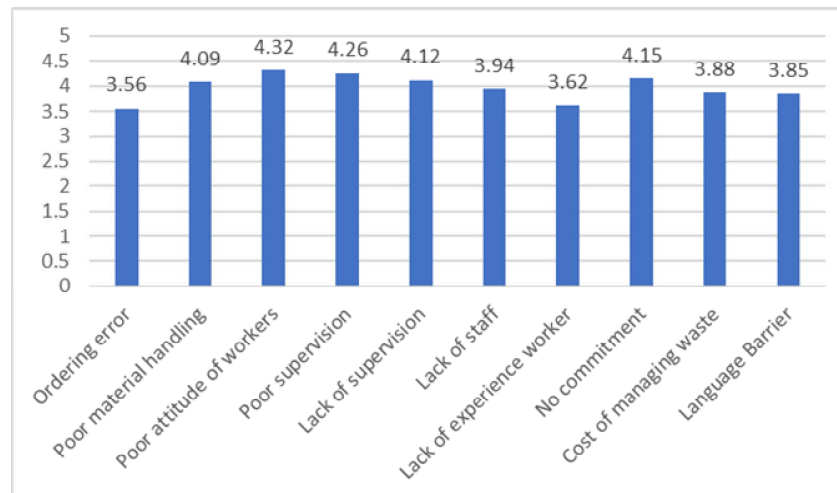


Figure 2: Factors that lead to poor site cleanliness in construction site.

3.4. Suggestions and comments on how to reduce site cleanliness issues.

Tables should be centred unless they occupy the full width of the text.

3.5. Tables in parts

The suggestions and comments were filtered and ranked accordingly by the frequencies of the responses. The strategies to reduce the site cleanliness problem at construction site were noted as follow:

- 1) Awareness campaign on site cleanliness
- 2) Enhance and incentive to contractor firms who keep site clean
- 3) Enhance and enforce 5S to site
- 4) Government enforces laws emphasizes on housekeeping
- 5) Housekeeping team should clear up the place after work
- 6) Proper waste disposal and effective recycling policy
- 7) Provide training course to worker
- 8) Regular inspection on site cleanliness
- 9) Worker should be briefed about site keeping before work
- 10) Impose penalty to contractors who offend the cleanliness policy

- 11) Language barrier between supervisors and workers
- 12) Assign person to in-charge site housekeeping

Overall, there were 12 listed suggestions given by the contractors in ensuring construction site's cleanliness and tidiness. Nonetheless, as good as these suggestions are, this study emphasize that full-on cooperation at every level of the organization is vital in making sure that the suggestions could actually be fruitful. Without cooperation and support from every level of the organization, the suggestions will only be mere ideas without actual impact.

4. Conclusion

Conclusively, construction site's cleanliness and tidiness is highly vital. From the result, it is concluded that most of the contractors will maintain their construction site cleanliness in order to ensure that they do not harm the environment – both in term of residents and nature. Nevertheless, the factors that are most affecting the site cleanliness problems on site are because of poor attitude exhibited by the construction working personnel, poor supervision, the lack of commitment from every level of the organization, the shortage of construction waste management technology, and finally is the deficiency of inspection. There are several of proper ways that were suggested to help reduce the site cleanliness problems in Malaysian construction site. Nevertheless, for nationwide awareness and implementation of construction site cleanliness and tidiness will requires full cooperation from all related parties.

5. Reference

- [1] Hamid A R A and Singh B 2003 *Hazard of Construction Site* Retrieved on January 26, 2017 from https://www.researchgate.net/publication/264622908_HAZARDS_AT_CONSTRUCTION_SITES
- [2] Bates L R 2015 *Construction site housekeeping: Why you want a clean workplace* Retrieved on January 26, 2017 from <http://www.commonwealthtourism.com/construction-site-housekeeping-want-clean-workplace/> (Accessed: 26 January 2017).
- [3] Begum R A, Siwar C, Pereir JJ and Jaafar A H 2006 Factors and Values of Willingness to Pay for Improved Construction Waste Management – A Perspective of Malaysian Contractors, *Journal of Waste Management* **27** 1902-1906.
- [4] Bukhari A, Hassan S H, Ridzuan A R 2009 *The Effectiveness of Industrialised Building System (IBS) with Respect to Waste Minimisation Compare to Conventional Method* Final Year Thesis (UiTM Malaysia)
- [5] Kaur G 2015 *Construction sector to be busy in 2016 with projects worth RM83bil.* Retrieved on January 20, 2017 from <http://www.thestar.com.my/business/businessnews/2015/12/29/jobs-flow-to-drive-construction-sector/>
- [6] Bakri A, Zin R M, Misnan M S and Mohammed A H 2006 *Occupational Safety And Health (Osh) Management Systems: Towards Development Of Safety And Health Culture* Thesis (Universiti Teknologi Malaysia)
- [7] Nagapan S 2013 *Study of Site's Construction Waste in Batu Pahat, Johor* Research Management and Innovation Centre (Perlis:University Malaysia)
- [8] Permana 2007 *Construction Safety Practices in Batam, Indonesia.* Master Thesis of Science Construction Management (University Teknologi Malaysia)
- [9] Phu N L and Cho A M 2014 *Factors Affecting Material Management in Building Construction Projects*
- [10] Roth S 2005 *Clean Work Sites Help Keep Projects' Reputations Sparkling* (Kansas City Business Journal)
- [11] Poon S W, Tang S L and Francis K W W 2008 *Management and Economics of Construction Safety in Hong Kong*, Construction and Real Estate Series (Hong Kong University Press).
- [12] Tan C K and Razak N A 2014 *Case Studies on The Safety Management at Construction Site* pp 90–108.

- [13] Wyatt D P 1978. *Material Management, Part I. Occasional Paper* (England: The Chartered Institute of Building, Berkshire)
- [14] Department of Occupational Safety and Health Ministry of Human Resources 2016 *Guidelines on Occupational Safety and Health in Construction Industry (Management)*
- [15] Rajendra E 2016 “*Youngsters at high risk of dengue*” 26 august 2016 Retrieved on April 1, 2017 from <https://goo.gl/U5XQoN>
- [16] Kamar K and Hamid Z 2012. *Sustainable construction and green building: the case of Malaysia* Sustainability Today 167 15
- [17] Federated 2007 *Housekeeping during Construction Operations* (Malaysia: ISO Services Properties, Inc. SOCSO Annual Report Social Security Organization 2000)

Acknowledgments

The authors acknowledge INTI INTERNATIONAL UNIVERSITY in giving full support.