

# INDUSTRY PERCEPTION ON THE BENEFITS OF CONSTRUCTION WASTE MANAGEMENT STRATEGIES IN THE PHILIPPINES

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## ABSTRACT

*The surge of construction projects in the Philippines has influenced construction industry attitudes towards construction waste management and environmental protection. As construction waste management is becoming an important factor in modern construction management, the Philippine construction industry has begun to do its part in promoting and implementing means of managing wastes produced from construction activities. This paper discusses the result of conducted survey among Philippine construction industry stakeholders, aiming to determine their perception on the benefits of waste management planning, the willingness of stakeholders to minimize wastes, and the importance of environment as a construction factor. By identifying their perception, areas that require special attention can be identified leading to the development of better waste management plan. Results indicated that the majority of the stakeholders recognize that construction waste management has its benefits, which includes cost savings, increase in profit, reduced dumpsite disposal, improved company reputation and acquisition of new projects.*

**Keywords:** construction waste, industry perception, management strategies, sustainable construction, benefits

## 1. INTRODUCTION

The construction industry is a significant contributor to the development of society. However, despite its numerous benefits, the construction industry has also been identified as a major contributor to environmental degradation (Lu and Yuan 2011), which includes exploitation of natural resources for the development and generation of waste (Tam *et al*, 2005, 2006). The quantities of waste generated from construction industry vary from country to country (Poon *et al*, 2013). According to Fishbein (2008; cited in Begum, 2009), construction and demolition waste or C&D is estimated to be 10-30% of waste received at many landfills around the world. Several methods have been developed to respond to the issue on construction waste, which has been referred to as construction waste management methods. Methods are still being studied on its efficiency in accomplishing its purpose. Many countries are putting much effort into establishing environmentally sustainable building production systems (Cha *et. al*, 2009).

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In the Philippines, there is a surge of construction projects. According to government statistics, the number of construction projects increased by 1.6% in the third quarter of 2014 as compared to the same quarter in 2013. This represents a total of 29,616 construction projects based on approved building permits (National Statistics Office, 2014). While there is an increasing trend in the number of construction projects in the Philippines, current practices in waste management are resulting in major environmental pollution and little is being done to rectify poor practices or carry out remedial works on existing environmental hazards (Asian Development Bank, 2003).

As proper waste management can generate various benefits (Hwang and Yeo, 2011), various efforts have been exercised internationally, including the development of methods that would decrease the amount of waste produced during construction. The implementation of a construction waste management plan in construction projects may arise from the need to control the amount of construction waste generated and produced, in order to countermeasure the rising disposal costs, burdening contractors and clients, and reduction of landfill sites for disposal. However, one will realize that there are other benefits that must be considered and expected when implementing a construction waste management plan. To wit, benefits include cost saving and profit maximization, reduced demand for landfill spaces, improved resource management, image improvement, and productivity and quality improvement as discussed in the study of Hwang and Yeo (2011).

However, several difficulties have been encountered in the proper implementation of these waste management methods. Teo and Loosemore (2001) found that attitudes towards waste reduction have become one of the reasons behind the difficulties of the management of waste in the construction industry. Therefore, this paper aims to gather respondent's view particularly the construction industry personnel on the key benefits of implementing waste management strategies on site. By identifying their perception, areas that require special attention can be determined leading to the identification of better waste management plan (Kulatunga, *et al* 2006).

## 2. PHILIPPINE POLICIES RELATED TO CONSTRUCTION WASTE

In the Philippines, three legislations directly discuss the proper regulation of wastes on a national level namely: for solid wastes, Republic Act No. 9003, also known as the "Ecological Solid Waste Management Act of 2000"; for toxic, hazardous, and nuclear wastes, Republic Act No. 6969, also known as "Toxic Substances and Hazardous and Nuclear Waste Control Act of 1990"; and for air pollution, Republic Act No. 8749, also known as "Philippine Clean Air Act of 1999".

### 2.1. *Ecological Solid Waste Management Act of 2000*

This Republic Act may be considered as directly involved with construction waste generation and management. Majority of the wastes produced in the construction site are solids, thus are within the scope of this Act. Construction wastes may fall under the Act's classification of waste as municipal wastes, special wastes, and yard wastes. While this Act covers the regulations of handling wastes on a national level, it does not address the proper handling of industry specific generated wastes. Although it aims to encourage greater private sector participation in solid waste management, it does not have any discussion, or requirements, on the topic of construction waste management. General building, or engineering contractors considering disposal of construction waste to public waste facilities must review this document, and adhere to its policies.

### *2.2. Toxic Substances and Hazardous and Nuclear Waste Control Act of 1990*

This Act mandates that hazardous wastes be handled properly due to its short and long term hazards both to the human populace and environment. Hazardous construction wastes may include paints and its container, resins, solvents, oils, and batteries. Heavy metals such as lead, found in batteries and paints, mercury, in lightings, cadmium, and arsenic, in treated wood, are some of the ingredients of building components that may be disposed to dumpsites or landfills. These hazardous wastes must be managed as not to cause or potentially cause pollution, state of danger to public health, welfare, and safety, harm to animals, birds, wildlife, fish or aquatic life, harm to plants and vegetation, or limitation in the beneficial use of a segment of the environment.

### *2.3. Clean Air Act of 1999*

Construction companies must comply with the requirements of this Republic Act. If these are violated, construction operation may be ordered for discontinuation if current operation results to emission or discharge of pollutants constitutes imminent threat to human, animal, or plant life, public health, or public safety. Technologies or management strategies preventing the dust emissions from construction activities must be implemented.

### *2.4. Environmental Assessment Tools Related to Construction Waste Management*

Environmental assessment tools have been arising in the construction industry worldwide. They are used to set specific, measurable goals and objectives to the stages of environmental planning and management process. It has specific guidelines, requirements, and procedures for processes such as planning, implementation, monitoring, measurement, and management. These environmental assessment tools are being used to promote and strengthen awareness on the need to begin the era of sustainable construction, and preference over green structures. Among the environmental assessment tools used in the Philippines are the Leaders in Energy and Environmental Design (LEED) certification system, Building for Ecologically Responsive Design Excellence or BERDE rating system and the Quezon City Green Building Rating System (QCGBRS) under the Quezon City Government Green Building Ordinance of 2009.

## **3. METHODOLOGY**

### *3.1. Development of Survey Tool*

A survey tool was developed in order to gather respondent perception on the possible benefits of implementing a construction waste management plan in construction projects, the willingness of stakeholders to minimize waste production and disposal, and the importance of construction project factors.

#### **a) Waste Management Planning Benefits**

Five questions, answerable with “yes” or “no”, were asked to the respondents regarding the possible benefits of implementing a waste management plan in their construction projects. These benefits are the reduction of the amount of waste disposed to public dump sites or landfills, reduction of project costs, increase of profits, improvement of company reputation, and acquisition of more projects for their company. The objective of asking these questions is

to determine the perception of the respondents on how beneficial waste management strategies implemented at their sites are.

b) Stakeholder's Willingness to Minimize Construction Waste

Four questions, answerable with "yes", "neutral" or "no", were asked to the respondents regarding the willingness of stakeholders directly involved with construction projects to minimize the production of construction waste. Stakeholders are personnel with 'stake' on the project such as the contractors, clients, designers, and government. Results from this part of the survey should reflect how respondents perceive attitudes of these stakeholders when it comes to construction waste minimization.

c) Importance of Project or Construction Factors

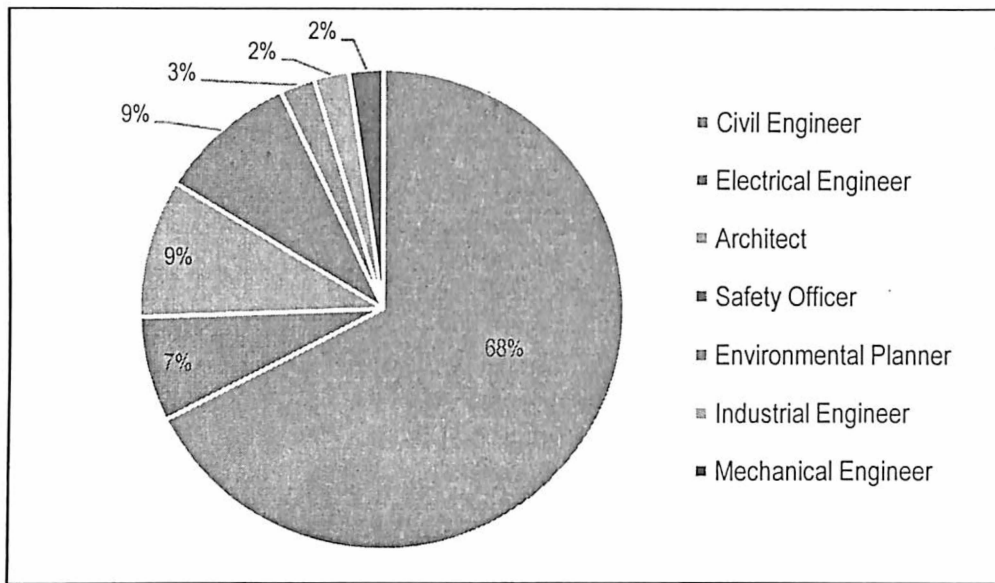
Finally, respondents were asked to choose which among the cost, quality, time, environment, and safety is the most and least important and prioritized project or construction factor in their practice. Responses were tallied to determine which project or construction factor was perceived as most or least important and prioritized among the respondents. Results should indicate the trend and attitude of respondents in their decision-making during construction work.

### *3.2. Selection of Survey Respondents*

There are 222 registered Class AAA contractors in the Philippines. This study limited its respondents to Class AAA contractors, involved with General Engineering works. One hundred twenty (120) out of the 222 Class AAA contractors are registered within Metro Manila. In this study, there were 43 individual respondents, coming from 1 Class B contractor, 1 Construction Management Company, and 30 Class AAA General Engineering Contractor. Some company insisted on providing two or more respondents, while others provided just one key personnel. These respondents were greatly involved with their company's construction waste management system. Familiarity with the company construction waste management planning was a requirement, and was specified in the letter of intent sent to the companies. Aside from the structured survey, respondents were also interviewed face-to-face. In the interview, respondents were asked to elaborate their answer on the survey.

## **4. RESULTS AND DISCUSSION**

The distribution of the profession of respondents is presented in Figure 1. Majority of the respondents were civil engineers, followed by electrical engineers, architects, and safety officers. Majority of the respondents hold managerial positions in their respective companies, such as project managers, division heads, and administration positions. Some companies were represented by safety officers. These personnels are responsible with the task of implementing the company's construction waste management plan aside from ensuring the safety operation of their construction activity. With the exception of some companies, not all have an appointed environmental planner, waste management officer, or any equivalent position, solely responsible with the environmental aspect of construction activity and operations.



**Figure 1.** Distribution of Respondent Profession

*4.1. Waste Management Planning Benefits*

Eighty two (82) to ninety (90) per cent or majority of the respondents agree, and are aware, that waste management planning in construction projects has its benefits as shown in Table 1. Respondents expressed that the identified benefits are good motivators for implementing a waste management plan in their projects.

**Table 1.** Stakeholder’s perception on different identified benefits of construction waste management

Benefit	Yes (%)	No (%)	Abstain (%)
Profit Increase	88	12	
Reduced Project Cost	84	16	
Reduced Dumpsite Disposal	98	2	
Improved Company Reputation	93	7	
Acquisition of new opportunities or new projects	82	16	2

a) Profit Increase

Eighty-eight percent (88%) of the respondents agree that implementing a construction waste management plan in their construction projects will result to an increase of their profit. They attribute this benefit mostly on the income they acquire from selling recyclable construction waste materials to materials recovery facilities, or to junk shops. Excessive wastes

are prevented in order to reduce the need to purchase additional materials, which would decrease profits in the long run. Through cost savings, profit is also perceived to be generated in decreasing the expenditures due to transportation and disposal fees needed to dispose construction waste to disposal facilities.

b) Reduced Project Costs

The reduction of project costs is also directly perceived as a waste management planning benefit according to 84% of the respondents as shown in Table 1. Through waste management, companies effectively reduce the amount of construction waste they need to dispose or manage, reducing disposal costs, and cancelling the need to hire additional laborers or subcontractors responsible for construction waste management. The need to purchase additional new materials is also avoided, since reuse and recycling is promoted, therefore enforcing cost saving methods in the construction site. With reduced project cost, respondents also stated that profit can be maximized.

c) Reduced Dump Site Disposal

Construction waste management methods implemented locally aim to reduce the amount of waste produced. In addition, as companies see the benefit of retrieving resalable materials from waste, the waste volume for disposal is reduced. Because of this, majority or 98% of the respondents agree that construction waste management is definitely reducing the volume of construction wastes disposed to local waste facilities. According to interview conducted, respondents believe that because of this reduction, they are effectively reducing the impact of construction activity to the environment. Reducing dumpsite disposal volumes is also perceived as a way to decrease the burden of transportation and disposal costs for the company.

d) Improved Company Reputation

Ninety three (93) percent of the respondents believe that waste management will greatly contribute to an improved company reputation. Respondents believe that implementing a waste management plan develops a company's reputation as an environmentally friendly company, enhancing their image on the public and possible clients. Awareness in sustainable building, through construction waste management planning, and the use of green building technologies, is currently emerging in the local industry. In addition, companies advertise green projects they have completed in order to enhance, strengthen, and promote this public image.

e) More Projects

In relation to the benefit of improving company reputation, showcasing a company's ability to implement waste management in their construction projects, as well as oversee the construction and installation of green building technologies, is one of the ways to attract more clients and projects according to 82% of the respondents. Client preference for green building construction has led companies to implement construction waste management in their projects. Ability to implement construction waste management attracts clients to hire capable contractors.

4.2. Stakeholder Willingness to Minimize Construction Waste

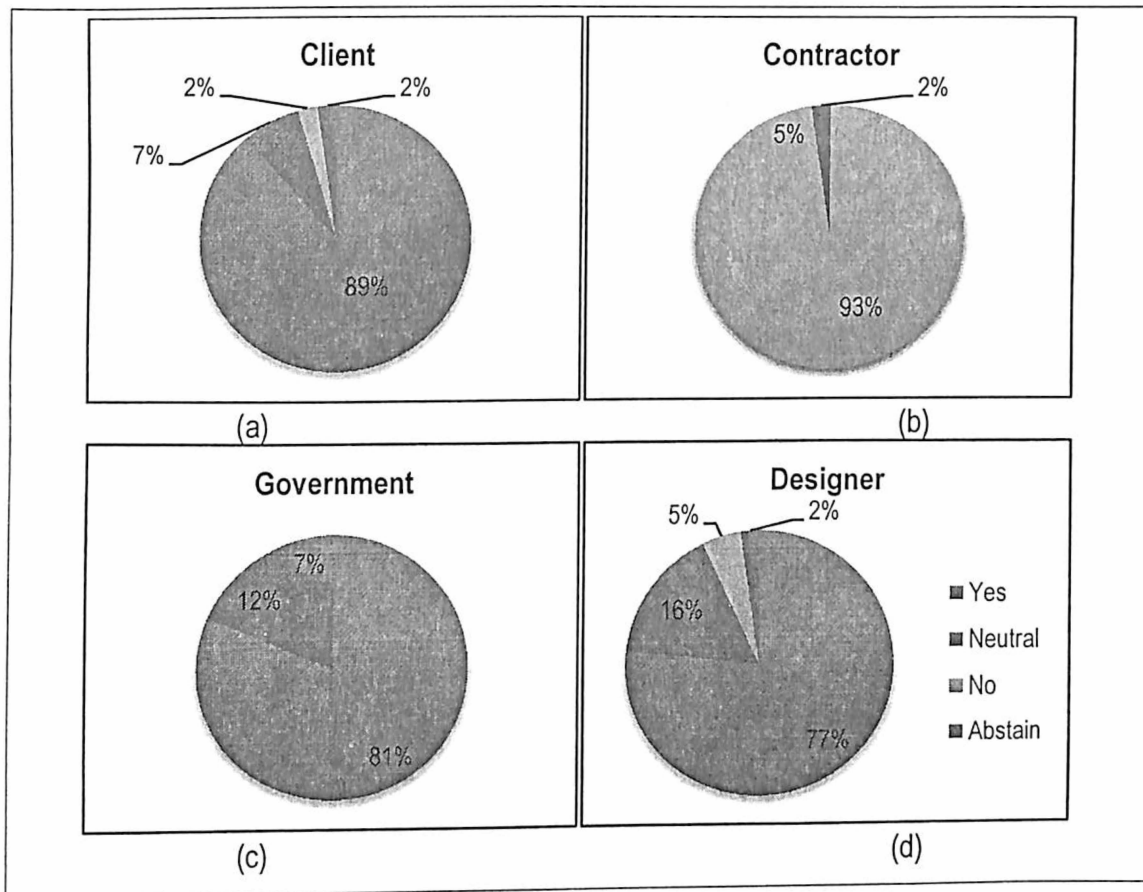
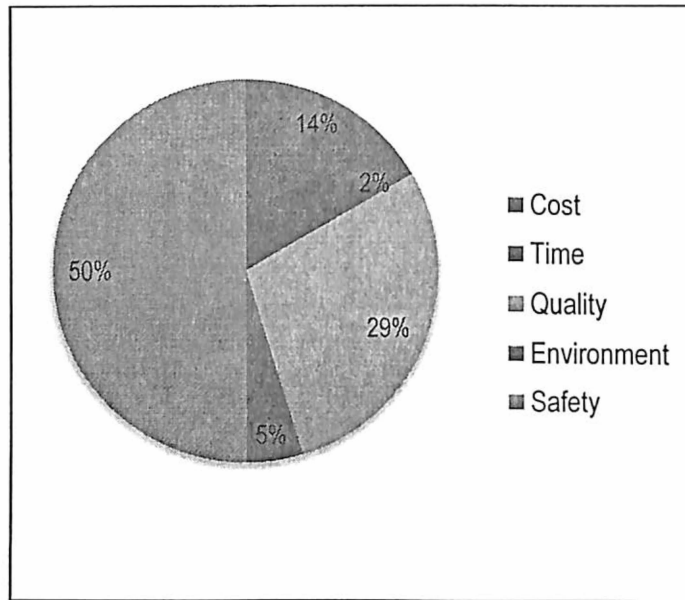


Figure 2. Stakeholders' Willingness to Minimize Waste as Perceived by the Respondents: (a) Client; (b) Contractor; (c) Government; and (d) Designer

Respondents were asked on how willing certain industry stakeholders are in minimizing the construction waste produced during construction activity in construction sites. Many agree that the specified stakeholders are generally willing to do so, as shown by the responses in the Figure 2. These responses reflect the awareness of construction waste management involvement amongst stakeholders.

'Contractor' is perceived to be the most willing to minimize waste through waste management, as it directly experiences its benefits. From the point of view of the respondents, it can be seen that the 'Designer' stakeholder was the least willing in minimizing construction waste. It is perceived that currently, designers are not really inclined, or focused, with waste minimization, as their involvement with projects is on ensuring the integrity of the structure and that it meets client requirements. 'Client' and 'Government' stakeholders were perceived to prefer it as well, based on requirements of the former, and in enforcing environmental laws for the latter.

#### 4.3. Importance of Project or Construction Factors



**Figure 3.** Most Prioritized Construction Factors

Respondents indicated that in their practice, 'Safety' in the construction site was the most prioritized (50%) and important factor considered when it comes to decision making as shown in Figure 3. This may be due to government policies, requiring contractors to implement operational safety and health programs in contractors. Companies have invested in the training of their safety personnel, and implementation of safety regulations during its operations, as compliance to government requirements. In conducting interviews, it has been observed that environmental planning, and construction waste management is within the responsibility of the project safety team, indicating a lack of priority for environmental concerns and impact prevention amongst local contractors.

For respondents, 'Time' was considered as the least important and prioritized factor in their operation. In the interview, it was explained that delays are normally expected, and that, allowances for delays are always made, in anticipation of its effects. Company owned projects tend to be lenient over delays, showing that 'Time' may not be an important factor in the local construction industry, for as long as 'Quality' is maintained, as explained by some respondents. For some of the respondents, issues with 'Cost' are also adjustable, especially if the project is company – owned; certain components can be made with low cost materials to compensate for financial requirements of materials that are expensive.

'Environment' is also not prioritized for some companies as it only ranked fourth as shown in Figure 3. The main argument for disregarding 'Environment' in the decision making process, or during construction activity, is the weak implementation of government legislation. 'Environment' factor becomes important to a contractor only when it is required by clients, or by a green building rating system used for their project.



## 5. CONCLUSIONS AND RECOMMENDATIONS

This study was conducted to determine the perception of the Philippine construction industry on the benefits of waste management implemented on site through survey conducted amongst Philippine contractors. The result the study showed that benefits of construction waste management are recognized, and are motivations for the contractors to implement it. Aside from cost savings, other benefits identified were increase in profit, reduced dumpsite disposal, improved company reputation and acquisition of new projects. However, the purpose of implementing a waste management for environmental reasons comes secondary; or is motivated only by requirement to comply with the governing green building rating scheme, implemented in the project. Because of weak implementation of the law, contractors are not compelled to implement waste management to promote accountability and responsibility over the Philippine environment.

As recommendations for further study, the amount of construction waste generated on site must be characterized quantified. With available data on waste type and volumes, it would be possible to measure the effectiveness of waste management strategies implemented. For the development of a better waste management plan, it is also recommended to conduct a study on the attitude and perception of the construction workforce on the benefits of waste management on site.

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