

Challenges Faced and Potential Benefits of Recycling Activities in the Rawang Industrial Area, Malaysia

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Abstract

In Malaysia, industrial wastes comprise about 30% of the total solid waste generated. At present, most of the industrial wastes are disposed of either at open dumpsites or sanitary landfills. Under the Solid Waste Act 2007, the Malaysian government is encouraging the private sector to participate in voluntary waste minimisation plan. So, it will be just a matter of time before the government make it mandatory to practice waste minimisation in the private sector. Therefore, the main objectives of this study are to identify the challenges faced and the potential benefits of recycling activities at the Industrial area. Among the challenges faced by the industries are a lack of dedicated staff appointed to oversee the solid waste management, the availability of storage area and bins for recycling activities, while most of the industries have no knowledge on where to send their recyclable items. There are many benefits of practising waste minimisation such as the reduction in waste collection and tipping fee, reduction of dependency on natural resources as well as reduction of risks of polluting the environment.

***Keywords:* industrial wastes, recycling challenges, benefits of recycling**

I. INTRODUCTION

The amount of municipal solid waste generated in Malaysia is increasing each year due to population growth, economic advancement, industrialization, urban migration and a high influx of foreign workers and students [1]. The problem is worsened by the unsustainable practice of disposing municipal solid waste in landfills as well as illegal dumping of waste. Besides this, there are a lot of environmental burdens associated with a high amount of solid waste generated such as air pollution, water pollution, poor aesthetic view and threat to environmental sustainability.

Even though the Malaysia government had started to enforce the Solid Waste Management Act (Act 2007), it is still at an early stage where the main focus is on household and commercial waste [2]. In addition, collection and transportation services of household and commercial waste in Peninsular Malaysia have been fully privatised and closely monitored. However, industrial waste collection services are not regulated and industries are free to appoint their own contractors for waste collection services.

Although the 2007 Act encourages businesses and the participation of the public in waste minimisation practice, compliance seems to be limited due to lack of enforcement mechanisms [2,3,4]. A lack of publication on cost estimation and solid waste management planning also indicates that much attention is needed on the importance of cost planning for solid waste management in regions focusing on industrialization [5].

Malaysia is reported to be among one of the largest waste generating industrial countries in the Southeast Asian region [6]. Industrial waste in Malaysia comprised of 30% of total municipal solid waste collected and it is projected to increase by 4% per year [7,8]. Since raw materials are used in manufacturing new products, there might be excess or rejected parts that can be used for recycling purposes. Excessive use of raw materials will definitely cause extra burden on the environment.

In order to achieve a sustainable level of industrial activity, industrial players should be efficient in the usage of resources by replacing non-renewable materials with renewable materials and modify goods production and services with those which have fewer negative effects on the environment [9]. In addition, sustainable solid waste management requires the cooperation of all waste management practitioners to identify and propose suitable methods to key industrial players [10]. The key strategies for production and recycling networks are optimal use of resource and energy efficiency [11].

The large and medium industries located in identified (conforming) industrial areas have already made some arrangements to dispose solid waste. However, the problem persists with small scale industries. In the cities and towns, small scale industries find it easy to dispose waste as they please without proper regulation making it difficult for local bodies to collect such waste even though it is not their responsibility [12]. For some industries, they dispose the wastes by burning them in their factory compound or dumping into bushes, plantations or store them in warehouses [8].

The aim of this research is to study the challenges faced by the industries in solid waste management at the Rawang industrial area with the following objectives:

- i. To identify the challenges faced by the industries in undertaking recycling activities.
- ii. To identify the potential benefits of undertaking recycling activities.

It must be noted that not all the information collected is accurate because some of the data is on the basis of estimation. The number of employees is also based on approximation and does not reflect the actual number of employees. Majority of industries surveyed were able to identify the main types of waste generated through their respective production processes; however other types of wastes, which are generated in smaller quantities, were not mentioned.

II. METHODOLOGY

Survey, on-site observation and semi-structured interview were the methods employed in carrying out this research. A total of 100 copies of questionnaires were distributed by fax, email and by hand. However, only 29 companies responded to the instruments provided. The respondents held different positions in their respective organizations such as project managers, supervisors, engineers, safety and health managers and administrative managers.

In this study, a combination of structured and open-ended questions was used in the questionnaire due to the fact that some questions allowed the respondents to answer in the format preferred by them. The answering technique designed for the structured questions were “selective based” as this technique is more convenient for the respondents to answer in the shortest time. Respondents just had to tick in the appropriate box.

The questionnaire contained 11 structured questions and 2 open-ended questions, divided into two parts. The first part consists of two open-ended questions which aim to get information on the total amount of waste generated in their company while the second part contained questions which gathered information on how the companies managed their solid waste presently.

III. CHALLENGES FACED BY THE INDUSTRIES TO PRACTICE RECYCLING

One of the challenges faced is to have dedicated personnel for overseeing the solid waste management in the industry. Only 34% of the respondents indicated that there was a specific person responsible to oversee the waste management practice in their industry. The position of the person-in-charge varies between companies, i.e. from Managing Director to Production Manager. This shows that commitment from top management is very important in implementing a waste recovery plan.

From the study, it was also found out that industries with dedicated employees for solid waste management tend to have dedicated recycling programs while those without, tend not to have any sort of recycling program. So, it is very difficult to carry out waste recovery

plans if the company does not have experienced and dedicated personnel to carry out the tasks. It is also very important for the personnel, appointed to monitor the solid waste management practice, to be well trained on the issues related to solid waste management practices.

The second challenge faced is the availability of storage for recycling activities. Most of the waste recycling companies required a certain minimum amount of waste in order for them to go to the customer's place to collect the recyclable items. Recyclable materials generated in large quantities, such as mixed papers and cartons boxes, are generally disposed on a daily basis. However, for those industries that produce very little amount of recyclable materials, they require a longer time to accumulate the solid waste until the volume is large enough for recycling companies to do the collection. However, not many industries are willing to invest a lot to procure storage bins whilst the storage area for the recyclable items within the compound of the industries is also limited. **Table 1** shows the collection frequency for different types of waste.

TABLE 1 Main Waste and Collection Frequency

Waste Types	Typical Collection Frequency
Mixed waste	Daily, 2-3 times per week
Waste paper	Daily
Wood Pieces, sawdust (from Furniture Industry)	Daily
Scrap metal (from Metal Industry and Machinery)	Weekly
Waste Plastics (from Plastic Industry)	Monthly
Recyclables	Weekly/ Monthly (depending on production)

The third challenge faced by the industries is that they do not know where to send their recyclable items such as broken wooden pallets and expired food waste. Most of the industries dumped their broken wooden pallets in their compound while for the expired food wastes, they were disposed at landfills. **Figure 1** shows the amount of wooden pallets generated by industries while **Figure 2** shows the amount of expired food generated by the food and beverage industries.

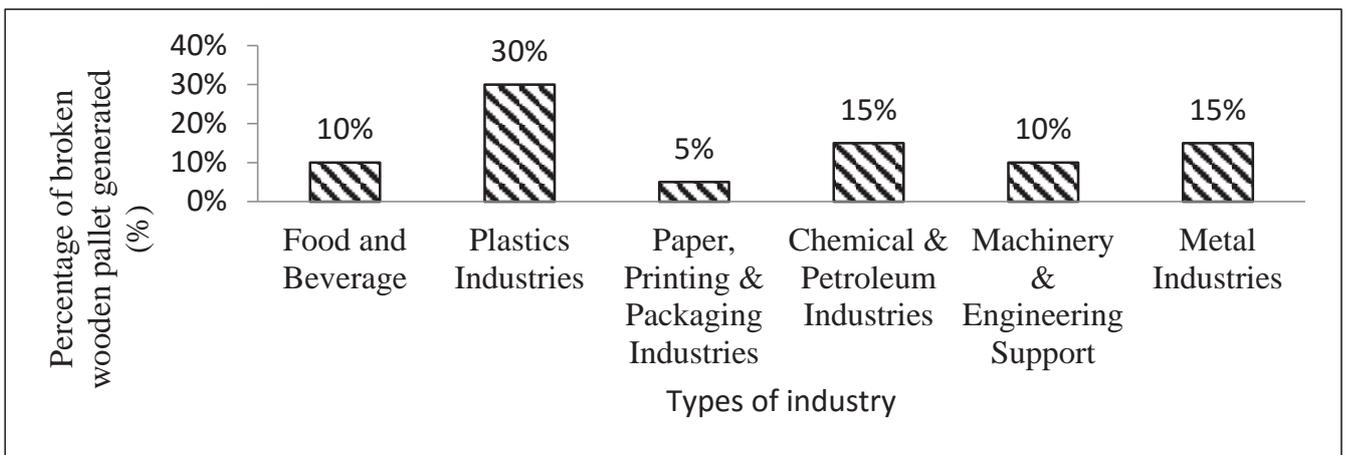


Fig. 1 Percentage of broken wooden pallets generated by different industries.

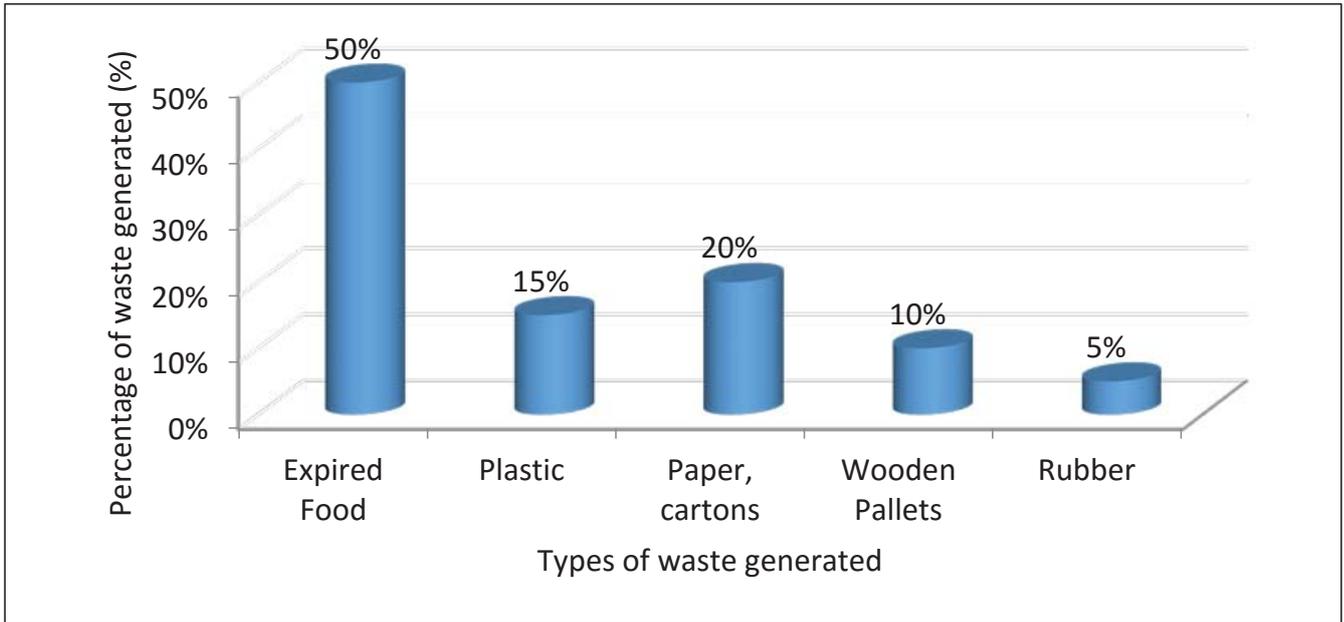


Fig. 2 Different Types of Waste Generated by the food and beverage industries.

IV. ESTIMATED COST SAVING FROM RECYCLING ACTIVITIES BY DIFFERENT INDUSTRY

Table 2 below shows the estimate incentives that the industries can get if they segregate their recyclable items and sell them to the waste recyclers.

TABLE 2 Estimated incentive generated per month for different types of industries

Types of industry	Plastic	Paper	Shredded paper	Carton boxes	Metal	Tin/Can	Incentives per month (RM/month)
Food and beverage	15%	10%	0	10%	0	0	912.00
Plastics	5% - 20%	10% - 20%	0	10% - 60%	0	0	658.29 - 2112.00
Paper, printing and packaging	5%	45% - 55%	0	30% - 40%	0	0	1440.00 - 2064.00
Petrochemical	10% - 20%	25% - 40%	0	20% - 30%	0	0	576.00 - 2208.00
Machinery and Engineering Support	10% - 20%	10% - 70%	15% - 30%	10% - 20%	10% - 40%	5%	1267.20 - 3801.60
Metal	0	20% - 30%	0	15% - 20%	35% - 40%	0	1920.00 - 2928.00

The above calculation is based on the following assumptions:

Incentive given for

- i. Plastics is RM0.30 per kg
- ii. Paper and shredded papers is RM0.20 per kg
- iii. Carton boxes is RM0.30 per kg
- iv. Metal is RM0.50 per kg
- v. Tin/Can is RM2.00 per kg

These incentives can help the industries to reduce their solid waste collection fee as well as tipping fee.

V. OTHER BENEFITS OF RECYCLING

Waste collection frequency can be reduced if the companies can retrieve more recyclable items from the waste stream. Reduction in waste collection frequency will result in less money spent to dispose the wastes as the waste collection fees are based on per collection trip (ranging from RM150 – RM220 per trip). Therefore, it is very crucial for the industry to know the types of waste that they are generating so that it can be sent for recycling.

More landfill space can be saved and the landfill lifespan can be prolonged if the majority of the wastes are diverted for recycling and waste transformation purposes. In addition, recycling activities also help to reduce dependency on the diminishing natural resources as well as reduce the pollution to the environment.

VI. CONCLUSION

The Malaysian government is yet to regulate the separation of the waste collection system for industrial waste and therefore due to lack of enforcement, very few are practising recycling activities at their premises. Only 34% of the respondents have dedicated personnel to monitor their waste management activities. Without dedicated personnel, it is quite difficult to conduct efficient waste minimization activities. Other challenges faced are the lack of storage area and storage bins for temporary storage of recyclable items and most of the industries do not know where to send their broken wooden pallets and expired food wastes.

As for the benefits of practising recycling, the industries can reduce their waste disposal cost and tipping fee by diverting their wastes for recycling purposes and receive incentives as return in the process. Recycling activities will also help to save landfill space and further prolong the lifespan of landfills.

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