SOLID WASTE MANAGEMENT SYSTEM AT PSTU CAMPUS

Protiva Adhikary[1], Md. Hamidul Islam[2], Susmita Howlader Muna [3], Milton Saha[3] and Musrat Emon[3]

[1]Undergraduate Student, Faculty of Disaster Management, Patuakhali Science and Technology University, Dumki, Patuakhali-8602, Bangladesh, E-mail: protiva999@yahoo.com
[2]Lecturer, Department of Building Engineering & Construction Management, KUET, Khulna-9203, Bangladesh, E-mail: hamidcekuet@gmail.com
[3]Undergraduate Student, Faculty of Disaster Management, Patuakhali Science and Technology University, Dumki, Patuakhali-8602, Bangladesh.

ABSTRACT

Waste management is a set of activities that include collection, transport, treatment, and disposal of waste; control, monitoring and regulation of the production, collection and prevention of waste production through the process of reuse and recycling. The study area is Patuakhali Science and Technology University (PSTU). It is a government financial public university at Dumki Upazila about 15 kilometers north from patuakhali district which was established in 08th July 2000. The study aims at to expose the present status of the waste management system, to identify the amount of waste and to show an appropriate waste dumping site for the management of the solid waste in PSTU. The data has been collected through measurement, informal discussion and key informants interview. The waste management system in PSTU is not well- established. The study finds out that the generation of waste is about 0.84 ton per day which mostly the solid waste. The wastes collected from the different Halls are dumped beside the respective halls. Wastes collected from the Academic building, Teachers Quarters, Dormitory are dumped behind the Gymnasium. The random waste dumping in an open environment can cause severe environmental pollutions, health disorders, chronic respiratory diseases etc. The authors are representing the simple route for waste transportation and environment friendly dumping sites which are more easily accessed and cost-effective.

Keyword: *Waste, Management, PSTU Campus, Dumping.*

1. INTRODUCTION

Solid waste is a very important and emphasized concern of waste management in the present world, especially for the country like Bangladesh (Ahmed, et al., 2010). Inefficient and non-systematic management of solid waste is a serious cause of degradation of the environment and non-scientific disposal of solid waste creates serious impacts on health of living beings in recent times (Tania, 2014). PSTU is well known for its beautiful green campus. It consists of four student's residential halls, academic building, administrative building, teachers' quarters and dormitory, health care centre with almost 4000 students and 400 teachers in the campus. Due to lack of waste management system, wastes are found to be scattered in the open environment. The collection and dumping station is not well developed. The non-scientific methods for dumping are degradation of aesthetic and environmental quality of the campus and also liable for climate change (Mondol, et. al., 2013). Unscientific solid waste management and disposal is contributing global warming (Alamgir, et. al., 2007). A healthy environment is a vital condition for a happy life. In order to gain healthy environment management of waste is very essential. Sustainable waste management method is reducing the air, water and land pollution and also reducing the greenhouse gas emission, which is the most contributing factor to global warming (Rahman, et. al., 2013). So, it has become necessary to manage the solid waste in the campus in a scientific way. The present paper is discussed the solid waste management system and probable layout design in the recommend disposal site.

2. METHODOLOGY

The study area comprises of academic building, administrative building, dormitory, teachers quarter Hall etc. The study conducted from July to November 2015. The study focuses on surveying information relating to existing waste management in PSTU. It also focuses on the present condition of solid waste and its present management practice. The study highlights the present status of the waste management system; identifies the amount of waste and in addition it shows an appropriate waste dumping site for the management of the solid waste in PSTU. These studies identify the lacking of waste management and the future management plan with the proper consciousness of related authority for waste management. Primary data was collected by field

observation from the study area, informal discussion and key informant interview with the stakeholders. Secondary information was collected from the proper documentation like research articles, books, and online database.

2.1 Primary Data Collection

To find out the composition and amount of solid waste and the present management practice in the study area, primary data was collected from the people of the University who are responsible for waste collection, dumping and processing. Primary data was also collected by means of visiting the waste collection sites and different stakeholders related directly to the waste management. The selected ward as well as the dustbin of the road site and its situation was also monitored.

2.2 Secondary Data Collection

Secondary data is about solid waste, waste management and about the study area. For assessing expert opinion, the key informant interview was conducted with the various stakeholders who were expert and associated with solid waste management practice in the selected area. Solid waste minimization and management were searched for through online journal databases. Research was also extended to include literatures relating to dumping, recycling, and composting.

3. ILLUSTRATIONS

3.1 Waste Types

The study mainly based on solid waste generation and the solid waste can be different types such as paper, plastic, polythene, vegetable waste, metal, sanitary waste etc. These components are mostly available in the study area. Figure-1 shows that the percentage of paper, plastic, polythene, vegetable and sanitary wastes are respectively 35, 5, 45, 10 and 5 %.

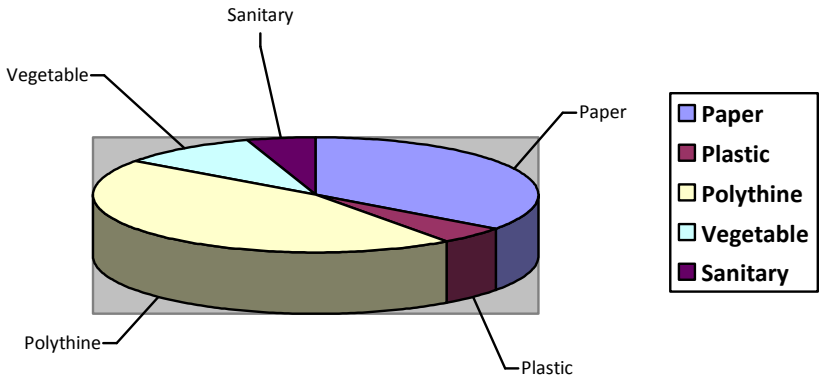

Figure 1: Composition and percentages of them

3.2 Amount of the Waste

It is found from the study that every day around 1015kg solid waste generated in different halls, academic buildings, teacher's residential area, dormitory, health centre and all wastes are dumped to the open environment. Maximum wastes are generated from residential area of the teachers and the residential hall of the students. The amount of waste and the place from where the waste is collected as shown in Table 1.

Table 1: Amount of waste and waste collection area

Waste collection area	Amount of waste per day (kg)
Sher-E-Bangla hall	10
Kabi Begum Sufia Kamal Hall	80
Sheikh Fajilatunesha Mujib hall	60
Academic building	8
Teachers Residence area	800
Dormitory	15
M. K. Ali hall	40
Health centre and others	2

3.3 Present Status of Solid Waste Management System

In the PSTU campus no systematic waste management strategy is followed at present. PSTU operates the collection and transportation system of its own. Every hall is collected wastes in its own authorized way in every morning and stored it in an initial dumping site inside the hall as shown in Figure 2.

Figure 2: Initial dumping site

Figure 3: Permanent waste disposal site (present)

Then those wastes are collected from the temporary dumping site of each hall within a week and are thrown away to the outside of its boundary wall. Academic building, Teachers Residential area and dormitory wastes are collected in every morning and directly dumping it behind the gymnasium and beside the Kabi Begum Sufia Kamal Hall as shown in Figure 3. In M K Ali Hall waste is also collected in everyday morning and dumped those in the south side of the hall in a regular basis.

No segregation is done when collectors store the waste in the primary disposal site except sanitary waste in two ladies hall and teachers residential area. In fact all types of waste are collected, stored and primarily disposed together in the halls as well as wastes from other sources are also dumped together. Among all waste some food waste is thrown in the pond as foods for fish. Again garden wastes are sometimes used as a fodder for cattle. Only one vehicle (trolley) is not enough to collect and transport the waste at PSTU Campus. Trolley is used to carry the waste from primary dumping site to permanent site which is shown in figure 4.

Figure 4: Trolley used for waste management

The people responsible for the collection and transport are paid directly from the university. Two people are responsible for the collection of waste from any temporary disposal site at any day of a week. The maximum wastes of PSTU are dumped in the hall side in an open environment which is indicated in figure 5. These situation creates huge environmental pollution mainly air and odour pollution.

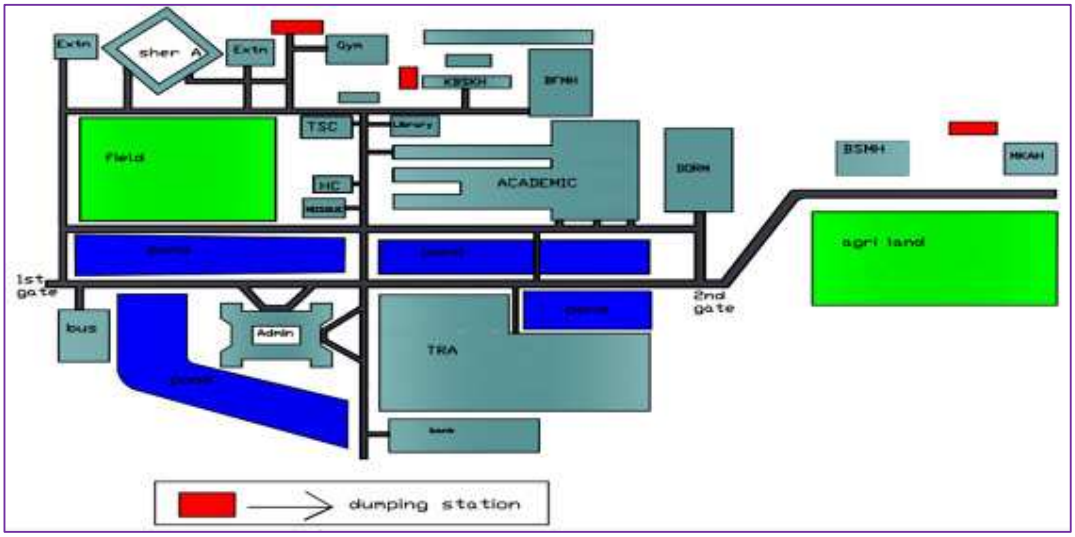

Figure 5: Layout of present disposal site

3.4 Cost of Present Waste Disposal System

As PSTU have no concrete infrastructure for the management of waste so it has no cost for the construction of waste disposal site. At present it only bears the cost of payment as a salary for the workers who involved with waste management. The amount of money for employee is about 226000 Tk. that is fixed for per month at waste management purpose. The people who deal with waste collection and waste disposal are paid for their work and

it is consider as waste handling cost. The number of people who work directly with waste collection, store, transport and disposal and their working place and of course salary is shown in Table 2.

Table 2: Existing working conditions

Working place	Work type	Number of employee		Salary/month(tk.)	
		permanent	Temporary	Monthly	Daily Basis
Inside the halls	Collection and store	8	10	8700	230-290
Whole campus	Transport and disposal	2		12000	
Dormitory	Collection, transport and disposal	1		8700	
Administrative building	Collection	2		8700	
Academic building	Collection, transport and disposal	4	1	8700	230-290

3.5 Recommend layout of waste management

For better implementation a permanent dumping station nearby M. K. Ali Hall which is treated now as agriculture land can be constructed. The position of the disposal site will be out of the academic premises. We follow stationary container system for waste management that would be more effective than existing one.

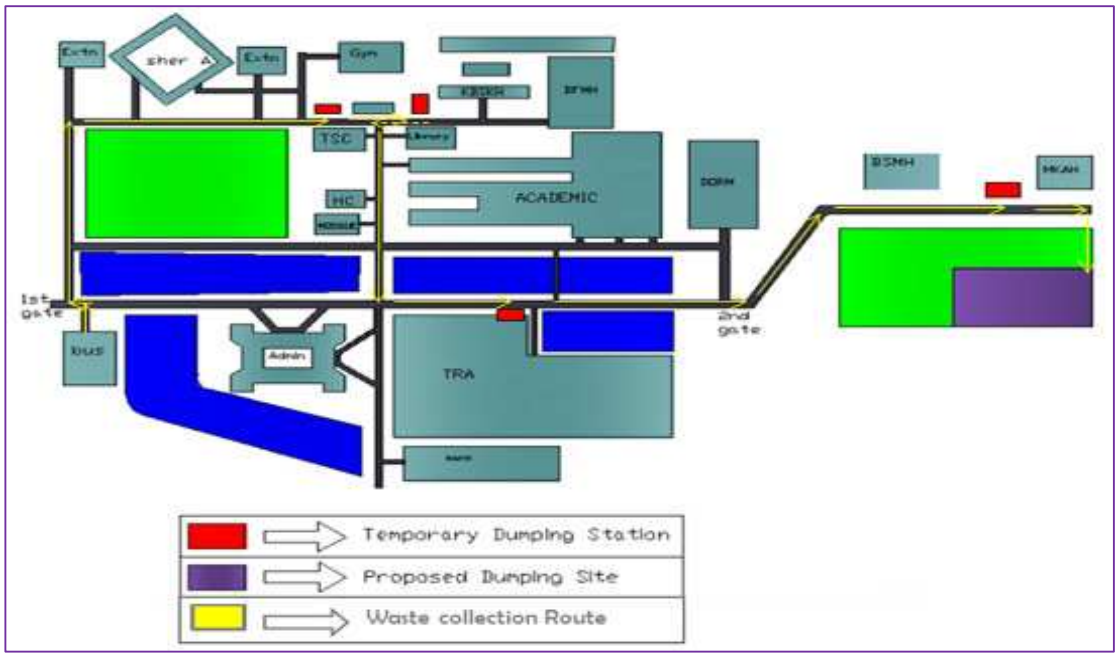

Figure 6: Recommended Layout of waste management system

For the betterment of the waste management system especially waste transportation firstly need a van that would be motor base or paddle base. The van would be 4' by 3.5' with 3' height which carrying capacity is about 600 kg. It takes to cover the entire transportation task in 2 trips. Two people would be needed to complete the whole task that means driving, loading and unloading the waste. Because of the following reasons the system would be benefited for PSTU.

- Prevent odour pollution as it would build in safe distance from residential area
- Restricted for the entrance of animals and other unauthorized persons as the proposed site is surrounded by the boundary wall
- Time saving and easy to manage

3.6 Cost of Recommend Layout System

There is no additional cost is required to execute the improved waste management system in PSTU that discuss in the study accept purchasing cost of van. The van can be run manually or by engine. But a motor van would be the best for the proposed system because it is easy to run and it is less time consuming. The motor van can be purchased in two ways either as assembled or part by part. The cost of a motor van is about 40,000 Tk. while it takes 10,000 Tk. to purchase different parts (engine, wheel, body etc.). It would be the best to purchase an assembled motor van because purchased in part by part needs technician to accumulate the parts and it increases the amount of cost. Moreover that it has no extra labour cost because the person appointed for transportation and disposal of waste from whole campus would be responsible for the work.

4. CONCLUSIONS

Waste is said to be a mirror of the society since waste generation and disposal reflect a range of aspects of the society such as its economic, historical, cultural and environmental components. From the survey it is found that in PSTU about 1015 kg wastes are collected from different sites per day. The amount of wastes is increasing day by day. With the increasing amount of waste a considerable pressure put on to the environment as a whole such as air and land. It is found that PSTU have the lacking of skilled waste management system and proper selection of dumping area which creates several health problems directly or indirectly. To keep consideration with the existing worse condition a feasible layout of waste management system would be implemented to improve the situation. The layout indicates the waste transportation routes, temporary dumping stations as well as the final dumping site. To make the activities in systematic as well as simple way a stationary container system would be followed for the waste collection. In the study authors show the necessity of a motor van for waste transportation with its proper size and actual cost. All things are planned to consider its cost effectiveness, easy accessibility and manageability as well as its overall sustainability. Moreover, regular audit by concerned authority, sincerity of labour is essential to fruitful the solid waste management system in PSTU. If PSTU concerned authority approved the plan and implement the waste management system the whole PSTU would be more clean and hygienic to create the situation of education and live in.

ACKNOWLEDGEMENTS

Author first would like to express greatest appreciation to Almighty God. They would like to express deepest gratitude and sincerest appreciation to officials, workers, labours for sharing their experience and cooperation in completing the paper.

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