New approach for municipal solid waste governance aim to become green city base on a sound material – cycle society initiative in Hanoi, Vietnam

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ABSTRACT

This study aims to analyze the Japanese Sound material-cycle society (SMCS) model in compatible condition with current waste in Hanoi, Vietnam at the first step: waste classification base on SMCS initiative and Japanese waste classification standards. About household waste, author co-operated with some officers and experts in Urban Environment Company (URENCO) in 3Rs (Reduce-Reuse-Recyle) project in 4 main wards of Hanoi: Phan Chu Trinh, Lang Ha, Nguyen Du and Thanh Cong. This project supplies collection containers for households and public places for separate waste at source with 3 categories: Organic waste, Inorganic waste and Recyclables. In comparison with old state, household waste at these places is classified properly with higher value for recyclable and organic waste.

About waste from commercial centers and restaurants, author conducted a fieldwork in 2 big-size super markets, 5 media-size super markets and 5 free markets about waste classification at source. Author interviewed collectors and directly classified and measured the composition of waste in 2 weeks with collectors. The author also went to Nam Son Landfill Site to survey the real situation of waste composition when it is buried. The capacity and environmental impacts from landfill activities are also quantified. The output of this study is to identify MSW composition and material cycle aim to increase composting and recyclable material amount, quantify the reduction in landfill load and propose some policies to improve local people awareness for better MSW governance. Basing on new data from classification activities, author expects to propose a new scenario for municipal solid waste treatment by using Integrated Waste Management Model (IWM-2) to improve the current situation aiming to sustainable society.

1. **Introduction**

Hanoi is capital of Vietnam, located in the Northern at Hong River delta. Hanoi was expanded from 1 August 2009 with total area of 3,344.7 km2 (old Hanoi is about 927.39 km2) and consists of 10 urban districts and 18 suburban districts and 1 town. Currently Hanoi's population is about 6,232,940 people excluding thousands of visitors from another provinces living and working temporarily. Population density is approx 3,565 person per square kilometer. Recent years, urban districts areas have been experiencing a fast urbanization. According to official statistics in 2009 Hanoi

has 6,500 factories and enterprises, over 90 hospitals and big medical centers, 70 markets and hundreds of restaurants and commercial centers. Current Hanoi with large rural areas, few people have sufficient awareness about waste classification while landfill area is not widen. More and more industrial zones are developing, people life style also change so much, infrastructure, legal framework is not caught up with urbanization speed therefore the amount of waste is increasing and causing many environmental burdens for inhabitants and local government.

The problem with lacking of landfill area for municipal solid waste doesn't happen in Hanoi only. Many countries/ areas all over the world have been facing with this situation and most of them, especially in developed countries choose method of improve people awareness about waste classification to reduce landfill area instead of widening it. For example, Germany is leading country in the world for amount of recyclable waste. The issue of waste classification was taken seriously in this country from 1991. They separate waste in different color bins. Yellow bin is for food/ milk container, carton, plastic or metal, navy blue bin for paper, green bin for organic waste and black bin for glass. They also apply many advanced technologies in separating waste at waste treatment facilities to have the highest value of recyclables. Waste classification wareness is also improved and educated for children. Waste from non-value disposal became worthy goods and help improve living conditions.

In Singapore, an efficient collection mechanism has been applied for several years. Waste collection became an attractive business and is handled for good contractors. One contractor is responsible for collecting waste in one defined area in 7 years. Contractor collects waste door-to-door, then gathers in big collecting site. Waste is treated under "national recyclable program". Environmental Law is considered strictly in Singapore with high level of awareness. Thus, Singapore is always considered as one of the cleanest countries all over the world.

In developing countries, municipal solid waste collection still has many problems. They are facing with some difficulties such as collection network, weak transportation, inefficient machines and technology etc. that lead to increasing cost but low efficiency. Moreover, private sector participation in this field has many restrictions and residents' awareness is still very weak. Therefore, in comparison with developed countries, waste collection and classification in Vietnam and other developing countries are still at low level.

In Vietnam, household solid waste is the main discharge source of MSW (World Bank et al., 2004). 3Rs project with Japanese initiative about a sound material – cycle society is a reliable information source to select a suitable technology for waste treatment in the future.

2. Methodology

Because of complicated changes from old Hanoi to new Hanoi so the fieldwork was just conducted at 4 main wards in Hanoi (Nguyen Du, Lang Ha, Dong Da and Phan Chu Trinh) and some main markets in urban areas. These areas have dense population habitation, traffic system with many small alleys. Waste generation per capital in these areas is also higher than other urban areas.

2.1 Selection and analysis secondary data
2.2 Research are and target areas (household, markets, restaurants)
2.3 Questionnaire survey and quick interview
2.4 Expert interview
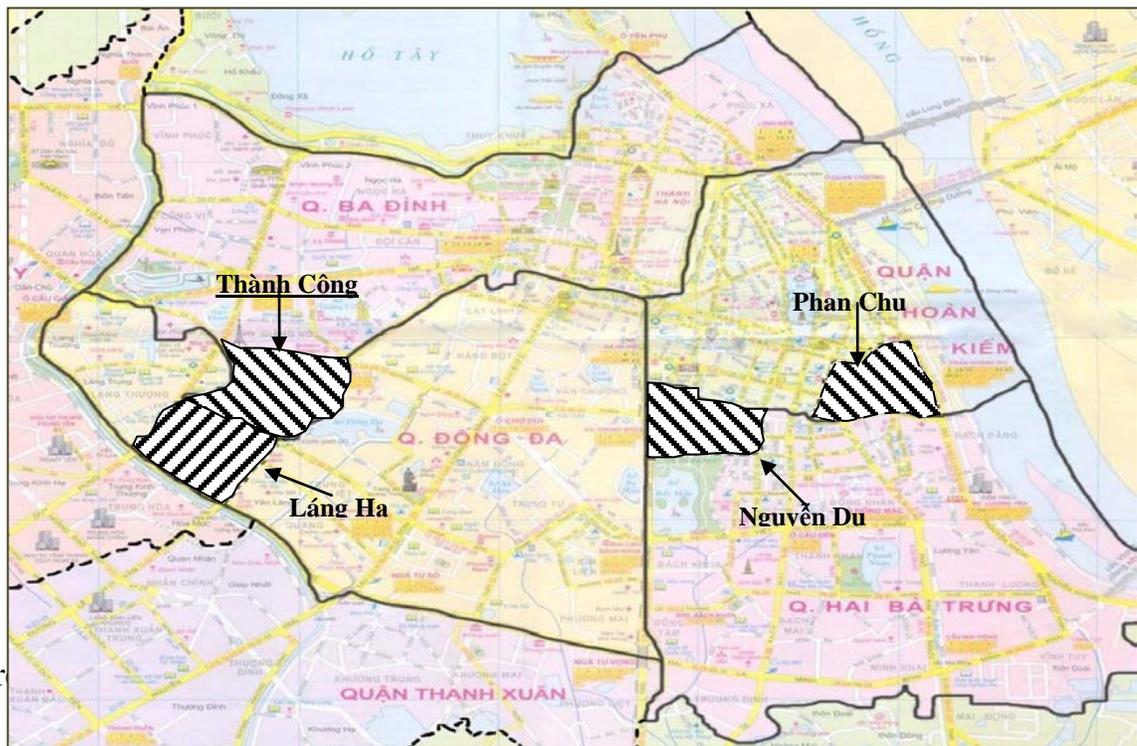2.5 Collective, statistical and analytical methods.

Figure

3. Results and Discussion

3.1 Waste composition in household areas

The existing collection system was changed into a new collection system suitable for source separation which requires residents to keep and discharge waste in new and different ways. Moreover, the new system was designed in consideration of more modern style and conveniences of residents and collection workers. Under this project, waste collection rate in Hanoi urban districts reachs approximately 100%, all kinds of domestic waste are collected, transported and treated daily in order to keep our city always clean and beautiful. Residents have a responsibility to prepare household containers for separated waste for source separation and discharge waste into the regulated separation containers at the designated discharging points and

time. In project complement report, with many efforts and co-operation from many stakeholders, the household waste composition was as following: organic waste 42.98%, paper 5.27%, plastic and rubber 7.19%, wool and cloths 1.75%, glass 1.42%, stone, clay, china 6.89%, bone, shell 1.27 %, metal 0.59% and other 33.67%.
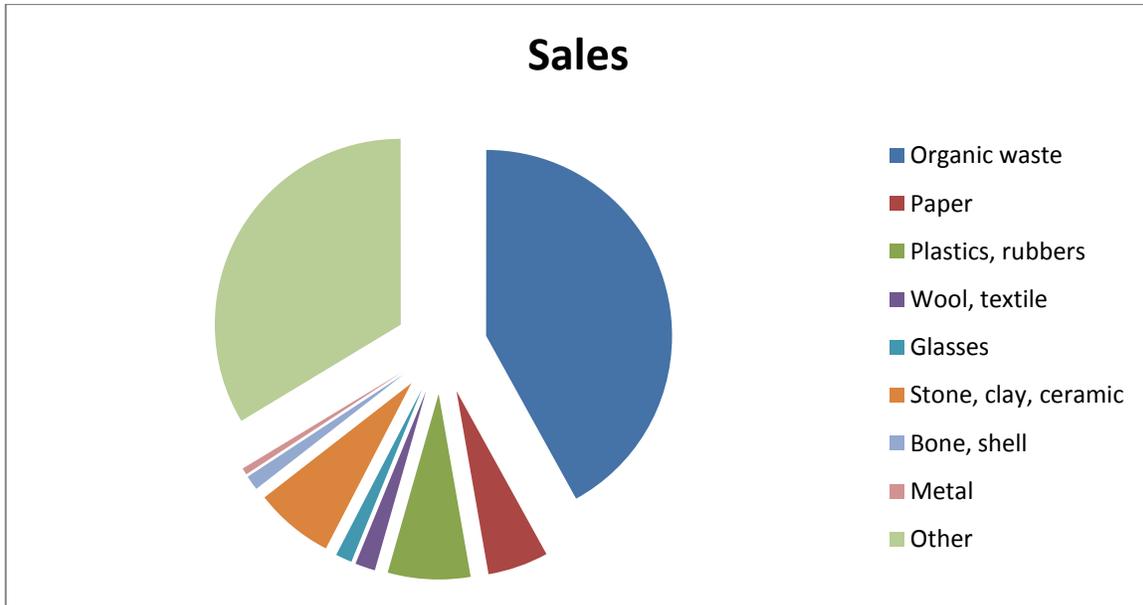
Clearly, in comparison with the old system, all kinds of waste are disposal to landfill site, now waste generation is characterized in many categories with the distinguish aspects: organic waste, inorganic waste and recyclables.

3.2 Waste composition in commercial areas.

The classification of waste in super markets is more easier to conduct because the composition of waste is not as complicated as domestic waste. Moreover, the collectors in some big super markets belong to private companies so they classified generated waste quite carefully.

In contrast with waste composition in super market, waste in free market (out -door markets) doesn't have so high value because almost amount of waste is organic waste with fruit, vegetable and foods.

Waste classification in restaurant system in Hanoi also had some different results. If some big restaurants have clear regulations for separating waste at source other street side restaurants in small and medium size dispose waste freely on the street without any separation.

Hereinafter are some results that author collected in surveying waste classification in super markets, free markets and restaurants:

3.2.1 Waste composition in super markets:
- Carton and paper: 50.5%
- Nilon: 10%
- Metal: 6,5%
- Food residue: 21.5%
- Plastics (Bottle, Pet): 5.5%
- Other: 6%

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Waste composition in super market chain

- Carton and Paper
- Nilon
- Metal
- Food residue
- Other
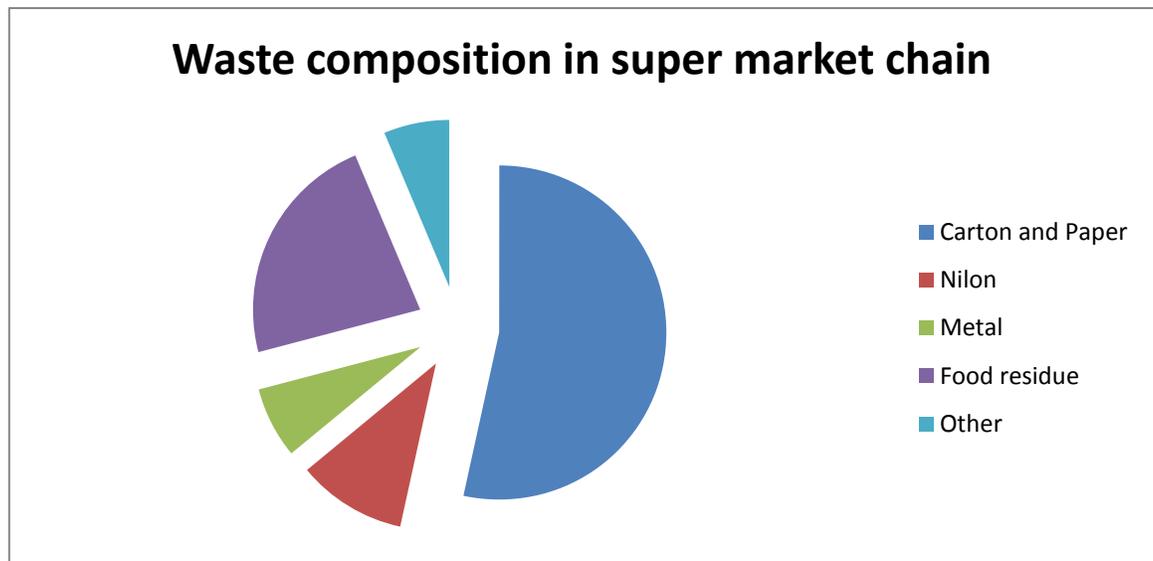
3.2.2 Waste composition in free markets:
- Food residue: 75.5%
- Carton: 10%
- Plastis: 5%
- Other: 9.5%

3.2.3 Waste composition in restaurants:
- Food residue: 65.4%
- Plastic bottle: 8.5 %
- Can, metal: 6,5%
- Glass: 5%
- Paper: 5%
- Other: 9.6%

3.3 Some social and environmental value with new approach.

3.3.1 Indicator 1: Disposed waste to the landfill site is reduced to 30%.

This result is very satisfactory indicator because the burden with Nam Son waste treatment complex now is too big. The target to reduce the landfill weight is very important factor to assess the efficiency of project and it is also important indicator of this fieldwork.

3.3.2   Indicator 2: Percentage of residents in pilot project areas who recognize the sanitation condition of the area is improved is more than 50%.

4. Conclusion

Waste management and environment protection in Hanoi has been the most concerned issue. The government and HPC have been developing a legal and legislation system to construct an appropriate system for waste management. Above are some simple results from author's fieldwork. It need more time to have more careful analysis and assessment about other indicators related to waste composition with new approach for sustainable development for Hanoi in near future.

References

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Solid waste is defined as the unwanted or useless solid materials generated from combined residential, industrial and commercial activities in a given area. Proper SWM has a powerful and positive impact on people's well-being as mentioned in goal 3 "Good Health and Well-being: less disease caused by open dumping and burning". Figure 4 and Table 2 show the evolution of generated solid waste and are based on the Ministry of State for Local Development (MoLD). Moreover, if we aim to decrease MSW generation, tracking the total MSW will be an imperative indicator of success. Hence, the total amount of generated MSW is. 7. What a Waste explores global solid waste management trends and data. The accompanying What a Waste publication will include global, regional, and urban trends on solid waste management from technical and financial issues to environmental and social. The world generates 2.01 billion tonnes of municipal solid waste annually, with at least 33 percent of that—extremely conservatively—not managed in an environmentally safe manner. Worldwide, waste generated per person per day averages 0.74 kilogram but ranges widely, from 0.11 to 4.54 kilograms. Though they only account for 16 percent of the world's population, high-income countries generate about 34 percent, or 683 million tonnes, of the world's waste. Further, based on previous pandemic and disaster waste management studies, this study also presents challenges and opportunities in the aftermath of the ongoing pandemic. The paper recommends alternatives approaches for MSW treatment and disposal and outlines the future scope of work to achieve sustainable waste management during and aftermath of the pandemics. Keywords: COVID-19; Pandemic; Sustainable waste management. In Vietnam, investments in solid waste management are helping the city of Can Tho prevent clogging of drains, which could result in flooding. Similarly, in the Philippines, investments are helping Metro Manila reduce flood risk by minimizing solid waste ending up in waterways. The loan aims to support construction of regional waste management facilities and closure of relevant dumpsites, and provide technical assistance to the sector more broadly. In Azerbaijan, World Bank loans supported the rehabilitation of the main landfill site and establishment of a state-owned waste management company, increasing the population served by the formal solid waste management system from 53% in 2008 to 74% in 2012. 6. Municipal Solid Waste Management Plan Implementation 6.1 Municipal Solid Waste Management Plan Implementation and Requisite Clearances 6.2 Contracting Arrangements for Municipal Solid Waste Management Plan Service Provision. 50 50 52. xviii Manual on Municipal Solid Waste Management. 6.2.1 Enabling Conditions for Successful Private Sector Participation and. Public private Partnership Contracts. Figure 1.2: Seven-Step Approach for Developing a Municipal Solid Waste Management Plan12. Figure 1.3: Municipal Solid Waste Management Gap Analysis. 16. The revised manual is based on 16 years of learning experience gained in India post the publication of its first edition in 2000. 1.1 Salient Features. The revised manual includes