

ENVIRONMENTAL PROTECTION

PUBLIC PARTICIPATION IN SOLID WASTE MANAGEMENT IN N. MACEDONIA

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***Abstract:** Solid waste management is becoming a major public health and environmental concern in urban areas of many developing countries. Skopje is one of the cities in the country where solid waste management is a problem. The main objective of the study has been to investigate the challenges and prospects of public participation in solid waste management. The survey result showed that the community can play a great role in better management of solid wastes by putting the wastes in containers, participating in waste management activities, and paying money for refuse collection and sorting of wastes. Community communications, raising awareness and enforcement mechanisms are better strategies for the participation of the community in solid waste management. The empirical evidence indicates that significant positive impact of awareness, rules & regulations and social participation on public participation has a positive impact on solid waste management. This implies that the major factors that hinder the public from participating in solid waste management are: low awareness, low social participation and low implementation of rules and regulations. It is concluded that public participation in solid waste management is poor because it is not given proper attention by the government (limited budget, poor follow up and poor implementations of rules, regulations & strategies). Therefore, the concerned government bodies should put much emphasis on public participation because the communities have their own skills, knowledge, resources and expertise to solve their own problems.*

***Keywords:** Public Participation, Solid Waste Management, Challenges and Prospects*

1. INTRODUCTION

1.1 Idea and inspiration

Solid waste management has been a major challenge in urban areas throughout the world. Without an effective and efficient solid-waste management program, the waste generated from various human activities, both industrial and household, can result in health hazards and have a negative impact on the environment. Understanding the waste generated, the availability of resources, and the environmental conditions of a

particular society are important for the development of an appropriate waste management system (APO, 2007).

In addition, according to UNEP (2004), solid waste management is becoming a major public health and environmental concern in urban areas of many developing countries. The situation in Macedonia is severe. The public sector in many countries is unable to deliver services effectively, regulation of the private sector is limited and illegal dumping of household and industrial waste is a common practice. In general, solid waste management is given a very low priority in these countries. As a result, very limited funds have been provided to the solid waste management sector by the governments, and the levels of services required for protection of public health and the environment have not been attained. The problem is acute at the local government level where the local taxation system is inadequately developed and, therefore, the financial basis for public services, including solid waste management, is weak.

The gap between waste management policy and legislation and actual waste management practices is widening because of capacity constraints or non-existence of waste management facilities for different waste streams. Resolving this capacity gap will require major investments and access to technical knowhow. Waste generation is expected to increase significantly as a result of industrialization, urbanization and modernization of agriculture in Macedonia. This will further aggravate the currently existing capacity constraints in waste management. Waste generation increases with population expansion and economic development. Urbanization has been increasing with higher speed and scale in recent decades, more than half of the world's population now living in urban centers. By 2050, urban dwellers will probably account for 86% of the population in the developed countries and 64% of the population in developing countries (UNEP-GEAS, 2013).

Poorly managed solid waste causes risk for human beings and the environment. It causes a variety of problems such as contaminated water, attracting insects and rodents, increasing the occurrence of floods due to blocked drainage canals and increasing the greenhouse gas emission. Poorly managed waste has an enormous impact on health, local and global environment, and economy; improperly managed waste usually results in down-stream costs higher than what it would have cost to manage the waste properly in the first place (World Bank, 2012).

Solid waste management in its scope includes all administrative, financial, legal, planning, and engineering functions involved in the solutions to all problems of solid waste. The solutions may involve complex

interdisciplinary fields such as political science, city and regional planning, geography, economics, public health, sociology, demography, communications, and conservation, as well as engineering and materials science (APO, 2007).

The current global municipal solid waste generation levels are approximately 1.3 billion tons per year and are expected to increase to approximately 2.2 billion tons per year by 2025 which is an increase in per capita waste generation rates from 1.2 to 1.42 kg per person per day in the next fifteen years (World Bank, 2012). Thousands of tons of solid waste is generated in Macedonia.

Solid waste management is a major problem, on one hand, due to the fast growth of economy, expansion of urbanization and industries in the major cities of the country and, on the other hand, due to the fact that the government has no sufficient means to solve the problem because of lack of finances, skilled manpower and capacity to work in partnership with the community.

In addition, there is no clear cost recovery structure related to solid waste management in Macedonia which results in extremely low level of returns for efforts. Most municipalities and city councils have become aware of the negative consequences of poor solid waste management and have implemented a system to collect and dispose of solid waste that involves waste collection associations.

Almost all of the municipalities use open dumping systems for the collected solid waste. Even though much remains to be done for their implementation, the government enacted a solid waste management proclamation. Solid waste management is a problem that needs to be addressed.

1.2 Formulation of the Problem

The environment has largely been exploited by the change of the lifestyle, advancement of new technologies and scientific development. The most common problem faced by all the developing countries is the disposal of solid waste (Masheke, 2011: 1). Besides, one of the commonest characteristics of developing nations has been the unbalanced relation between the rapid population growth and the sanitation infrastructure provision which has been worsened by the challenges of poor waste management practices affecting the deteriorating ecosystem of the fast-growing cities of these countries (Elias et.al, 2012: 11). Furthermore, in many developing countries, rapid population growth and increased economic activities combined with lack of training in modern solid waste

management practice complicate the effort to improve the solid waste services (ISWA and UNEP, 2002). Solid waste management is the major challenge for many cities in developing and transitional countries and may represent 20-50% of city's budget with 80-90% of that spent on waste collection (UN-HABITAT, 2009).

In all regions of urban centers, less than half of solid waste processed is collected and ninety-five percent of that amount is either thrown away at various dumping sites on the periphery of urban centers or at a number of temporary sites which typically represent empty lots scattered throughout the city (<http://www.moepp.gov.mk/wp-content/uploads/2014/11/Zivotna-sredina-2019.pdf>).

The solid waste management problem is severe in Macedonia. As in any other countries, the city councils and municipalities have not sufficient means to solve the problems of solid waste management. The major causes of the problem are lack of manpower, finance and capacity to work in partnerships with the local communities (http://www.moepp.gov.mk/?page_id=7973).

The capital city of Macedonia - Skopje is the fastest growing city in the country. Population migration from rural areas to the city and from other towns to the city is increasing alarmingly. Besides, urbanization and industrialization is increasing from time to time. However, due to the changes mentioned above, it is difficult to manage wastes.

Although some studies have been conducted for a similar study area, namely studies, of liquid waste management and factors influencing the sustainability of solid waste collection and transport services related to Micro and Small Enterprises (MSEs), the issues related to challenges and prospects of public participation in solid waste management have not yet been studied.

1.3 Research Objectives and Questions

The main objective of the study was to investigate the challenges and the prospects of public participation in solid waste management. There are different research and specific objectives, such as:

- Identification of the major challenges that hinder the public from participating in solid waste management in the studied area;
- Identification of the roles in the public participation in solid waste management in the studied area;

- Exploration of the present strategies of public participation in solid waste management and recommendation of the best strategies for the future.

The following research questions were used in this study. These are:

- What are the main challenges that prevent the public from participating in solid waste management in Macedonia?
- What roles can the public play to ensure better solid waste management practice?
- What strategies are in place to improve public participation in solid waste management?

1.4 Significance of the Study

This study has provided many benefits. First, as stated in the part dealing with the formulation of the problem, the researcher believed in raising the awareness of different stakeholders about solid waste management with this study. Second, this study provides an information about the current solid waste management practices of the country for intervention by the government, private companies and NGOs. Third, this study will also encourage new scholars or researchers to conduct further studies that will serve as a supporting or reference document in this area of investigation.

2. THEORETICAL BACKGROUND

2.1 Definitions and Concepts

2.1.1 Solid Waste

Although different scholars define solid waste in different ways, the meaning is the same. According to Zurbrugg (2013), solid waste is a material that is not in liquid or gas form. Solid waste are “garbage”, “trash”, “refuse” and “rubbish”. Solid waste includes all those wastes which are neither wastewater discharges nor atmospheric emission (World Bank, 2012). Solid wastes include “all domestic refuse and non-hazardous wastes such as commercial and industrial wastes, street sweeping and construction debris” (AIT/UNEP, 2010). According to Abul (2010), solid waste can be classified into different types, depending on their source; household waste is generally classified as municipal waste; industrial waste as hazardous waste, and biomedical waste or hospital waste as infectious waste.

2.1.2 Municipal Solid Waste

Municipal solid waste refers to solid waste generated from houses, shops, offices and hospitals, streets and public places (Zurbrugg, 2013). Municipal solid waste (MSW) is the term usually applied to a heterogenous collection of wastes produced in urban areas, the nature of which varies from region to region due to difference in living standard, lifestyle and abundance & types of the region's natural resources. Urban waste can be subdivided in to two major components that are organic and inorganic. The primary difference between wastes generated in developing countries and those generated in developed countries is the higher organic content of the former (UNEP, 2005).

Besides, according to UN-HABITAT (2009), the definitions of municipal solid waste (MSW) vary among countries. It is "wastes generated by the households and wastes of similar nature generated by commercial and industrial premises, by institutions such as schools, hospitals, care homes and prisons, and from public spaces such as streets, markets, slaughterhouses, public toilets, bus stops, parks and gardens".

According to O'Connell (2011: 3), the recovery of materials from municipal solid waste remains below 50% in most of the developed countries. Therefore, understanding how to increase participation of different stakeholders in recycling is an important part of moving to a more sustainable waste management system (O'Connell, 2011: 3).

According to Khatib (2011), the main problem in proper management of MSW in many developing countries is the lack of adequate administrative and financial resources. There is no clear reliable framework by which the solid waste sector is administered from the collection, transformation to disposing or treatment phases. This situation is usually coupled with limited investment allocated for the MSW sector with complications of collecting or raising proper service fees. The management activities of MSW are considered public services which are directly controlled by governmental institutions. Such management arrangement is considered weak as it lacks the market mechanisms, and in this case, economic incentives cannot be used to improve and develop the MSW management services.

2.1.3 Solid Waste Management

Solid waste management is defined as a systematic administration of activities that provide for the source separation, storage, collection, transportation, transfer, processing, treatment, and disposal of solid waste (Squires, 2006). Solid waste should be managed through a number of

activities such as prevention, recycling, composting, controlled burning, or land filling (US-EPA, 2002). Besides, solid waste management may be defined as the discipline associated with the control of generation, storage, collection, transfer and transport, processing, and disposal of solid wastes in a manner that is in accordance with the best principles of public health, economics, engineering, conservations, and that is also responsive to public attitudes (Tekele Tadesse, 2004: 5).

Solid waste management (SWM) is one of the most important services provided by municipal authorities in the world. The ways of handling, collection and disposal of the waste can pose risks to the environment as well as the public health (Abiot et al., 2012).

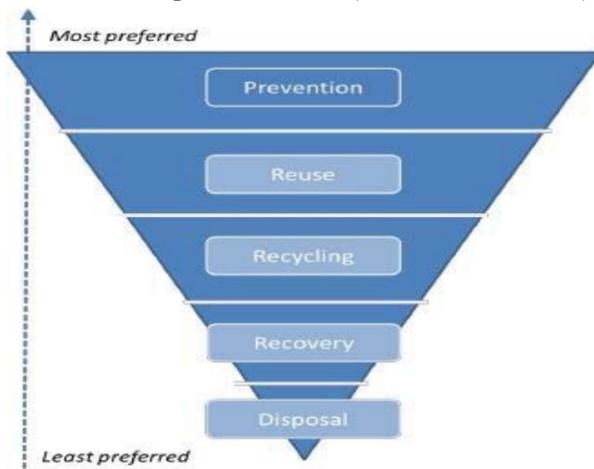


Figure 2.1. Waste Management Hierarchy (UNEP, 2005)

Waste Prevention: It is mostly called source reduction which means reducing waste by not producing it. Waste prevention includes purchasing durable long lasting goods and seeking products and their packaging free from toxic substances (US-EPA, 2002). Besides, according to Lober (1994:6), source reduction is “the prevention of waste at its source by redesigning products or changing patterns of production and consumption”. Preventing waste through efficient use of resources and raw materials is the best option for solid waste management (UNEP-GEAS, 2013).

Waste or source reduction initiatives (including prevention, minimization, and reuse) seek to reduce the quantity of waste at generation points by redesigning products or changing patterns of production and consumption. A reduction in waste generation has a two-fold benefit in terms of greenhouse gas emission reductions. First, the emissions associated with material and product manufacture are avoided. The second benefit is

eliminating the emissions associated with the avoided waste management activities (World Bank, 2012).

Recycling: It makes use of materials that are wastes by turning them into valuable resources (US-EPA, 2002). Recycling is widely practiced by the informal sector “waste pickers” or by the solid waste management staff themselves for extra income. Collection of recyclable waste can be done in several steps such as door to door, transfer station and in disposal sites. The main items that are recycled include soft and hard plastics, glass, steel, paper, cardboard, aluminum, alloys etc. (Visvanathan and Glawe, 2006: 7). Evidence shows that recycling rates achieved by the informal sector can be quite high, often in the range from 20-50% that matches the recycling targets from developed countries (UN-BABITAT, 2009).

The key advantages of recycling and recovery are reduced quantities of disposed waste and the return of materials to the economy. In many developing countries, informal waste pickers at collection points and disposal sites recover a significant portion of discards (World Bank, 2012).

Composting: Composting is the other preferred method of solid waste management due to the high percentage of organic materials in the waste composition (Visvanathan and Glawe, 2006: 7). It is the controlled aerobic biological decomposition of organic matter such as food scraps and plant matter into humus- soil like materials (US-EPA, 2002).

Besides, composting is organics make up 30–80 percent (~70 percent on the average) of the waste stream in Macedonia although this varies with the incomes of the neighborhood, region or country. If this part of the waste stream could be used for composting or methane production, many adverse impacts of open dumps and landfills would be reduced. Landfills would require less space, would last longer and would produce less leachate which is the liquid produced in a landfill from the decomposition of waste within the landfill.

Composting with windrows or enclosed vessels is intended to be an aerobic (with oxygen) operation that avoids the formation of methane associated with anaerobic conditions (without oxygen). When using an anaerobic digestion process, organic waste is treated in an enclosed vessel. Often associated with wastewater treatment facilities, anaerobic digestion will generate methane that can either be flared or used to generate heat and/or electricity. Generally speaking, composting is less complex, more forgiving, and less costly than anaerobic digestion. Methane is an intended by-product of anaerobic digestion and can be collected and combusted.

Experience from many jurisdictions shows that composting source separated organics significantly reduces contamination of the finished compost, rather than processing mixed MSW with front-end or back-end separation (World Bank, 2012).

Combustion/Incineration: It is the controlled burning of waste in a designated facility to reduce its volume and in some cases to generate electricity. Combustion is an Integrated Solid Waste Management (ISWM) option for wastes that cannot be recycled or composted and is sometimes selected by the communities where the landfill space is limited (US-EPA, 2002).

Incineration of waste (with energy recovery) can reduce the volume of disposed waste by up to 90%. These high-volume reductions are seen only in waste streams with very high amounts of packaging materials, paper, cardboard, plastics and horticultural waste. Recovering the energy value embedded in waste prior to final disposal is considered preferable to direct land filling assuming pollution control requirements and costs are adequately addressed. Typically, incineration without energy recovery (or non-autogenic combustion, the need to regularly add fuel) is not a preferred option due to costs and pollution. Open burning of waste is particularly discouraged due to severe air pollution associated with low temperature combustion (World Bank, 2012).

Land filling: Uncontrolled dumping of waste can contaminate ground water and soil, attract diseases carried by rats and insects, and even cause fires. Properly designed, constructed and managed landfills are a safe alternative to uncontrolled dumping (US-EPA, 2002). According to O'Connell (2011), landfills are the major anthropogenic source of methane. Furthermore, they estimated the global landfill emission of methane at 45 billion tons. Methane has 20-23 times the atmospheric warming potential of carbon dioxide. The amount of methane released into the atmosphere by landfills across the world is equivalent to one billion tons of carbon dioxide (O'Connell, 2011: 3).

Landfills are a common final disposal site for waste and should be engineered and operated to protect the environment and public health (World Bank, 2012). Disposal or land filling activities are used to manage waste that cannot be prevented or recycled. One way to dispose of waste is to place it in properly designed, constructed, and managed landfills, where it is safely contained. If the technology is available, properly designed, constructed, and managed landfills can be used to generate energy by recovering methane (US-EPA, 2002).

2.1.4 Integrated Solid Waste Management

The concept of integrated waste management has evolved recently, and it relies on a number of different means to manage waste. It is a holistic approach to waste management from generation to disposal and between all stages (ISWA and UNEP, 2002). Integrated solid waste management (ISWM) reflects the need to approach solid waste in a comprehensive manner, with careful selection and sustained application of appropriate technology, working conditions, and establishment of a 'social license' between the community and designated waste management authorities (most commonly local government) (World Bank, 2012).

According to US-EPA (2002), Integrated Solid Waste Management (ISWM) is a comprehensive waste prevention, recycling, composting, and disposal program. An effective ISWM system considers how to prevent, recycle, and manage solid waste in ways that most effectively protect human health and the environment. ISWM involves evaluating local needs and conditions, and then selecting and combining the most appropriate waste management activities for those conditions. The major ISWM activities are waste prevention, recycling and composting, and combustion and disposal in properly designed, constructed, and managed landfills. Each of these activities requires careful planning, financing, collection, and transport, all of which are discussed in this and other fact sheets.

The activities associated with managing solid waste from the generation point to final disposal normally include generation, reduction, reuse, recycling, handling, collection, transfer and transport, transformation (e.g., recovery and treatment), and disposal. Depending on site specific conditions, a sound waste-management program can be established by combining some of the necessary activities into integrated solid-waste management (APO, 2007).

The first step in an integrated waste management system is to reduce the volume of waste at the source. Households are encouraged to reduce the amount of waste generated, and to separate organic and non-organic rubbish prior to disposal. Once waste is transported to the dump, it is sorted. Organic waste is transported to composting facilities, while inorganic materials are further separated into recyclable and non-recyclable materials. Reusable materials go to recycling plants and only non-recyclable materials remain to be disposed of in landfills or by other means. Integrated waste management not only reduces the overall volume of solid waste, but also generates additional revenues and protects the environment (IUCN, 2009).

Existing waste collection and transport systems often cannot handle the amount of waste generated by large cities with growing populations.

When this occurs, waste is disposed in uncontrolled dumps or openly burned. This type of unmonitored and uncontrolled waste disposal has negative consequences on human health and the environment. Improvements to waste collection and transport can create jobs, decrease open dumping and burning, increase appeal for tourism, and significantly improve public health (US-EPA, 2002).

Integrated solid waste management (ISWM) involves using a comprehensive approach to managing all aspects of municipal solid waste in a manner that accounts for local needs and conditions across a wide range of sectors. An effective ISWM program can help overcome the many financial, demographic, and other challenges to waste management, and can result in numerous human health, environmental, economic, and social benefits for cities and national governments (CCAC, 2010).

2.2 Theoretical and Conceptual Framework

The conceptual framework was developed based on literature and personal observation of the study area. The assumption is that the challenges and prospects of public participation in solid waste management are influenced by many factors that include sociocultural, economic, demographic, institutional, environmental, technological and personal behavior. Therefore, the conceptual framework shows the relationships between explanatory variables and the dependent variable.

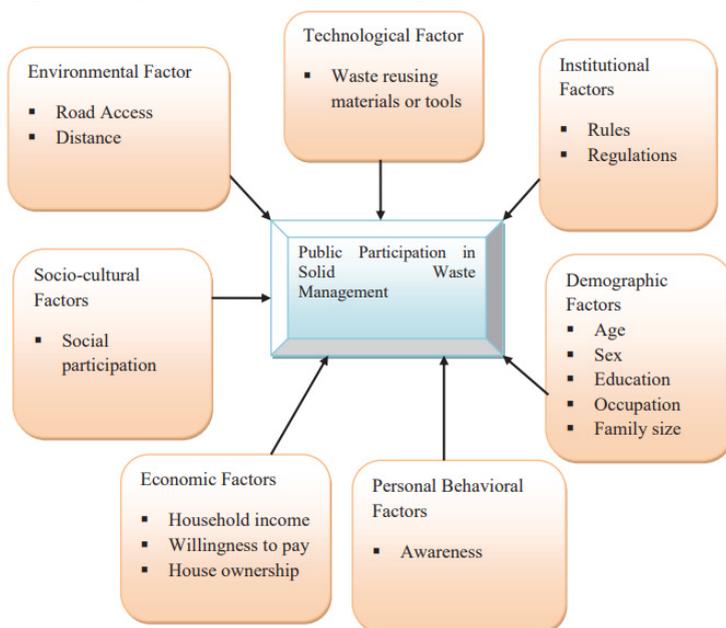


Figure 2.2. Conceptual framework.

3. CHALLENGES AND PROSPECTS

3.1 Review of Challenges in Solid Waste Management

Solid waste management is a challenge for the cities' authorities in developing countries mainly due to the increasing generation of waste, the burden posed on the municipal budget as a result of the high costs associated to its management, the lack of understanding over a diversity of factors that affect the different stages of waste management and linkages necessary to enable the entire handling system functioning (Guerrero et.al., 2012: 8).

According to Zurbrugg (2003: 2), there are many challenges in solid waste management especially in developing countries such as inadequate service coverage for waste collection and operational inefficiencies of services due to lack of financial resources to cope with the increasing amount of generated waste produced by the rapidly growing cities and due to inefficient institutional structures, inefficient organizational procedures, or deficient management capacity of the institutions involved as well as the use of inappropriate technologies; limited utilization of recovery and recycling activities due to high cost of storage and transportation; inadequate landfill disposal due to the financial and institutional constraints which are the main reasons for inadequate disposal of waste especially where local governments are weak or underfinanced and rapid population growth continues; and inadequate management of hazardous and health care waste.

The immense financial, technological, and capacity demands of managing solid waste make proper municipal solid waste (MSW) management a significant challenge for many cities. This challenge is complicated by a number of external stressors. For example, economic growth leads to increased consumption and waste generation. In addition, economic growth often leads to consumption of new types of goods such as electronics that are difficult to recycle. Population growth also leads to increased waste generation. In addition, this growth often occurs in densely populated areas of cities, which can exacerbate difficulties in collecting waste (CCAC, 2010).

The low level of public awareness and lack of consistent separation at the source, particularly from households, results in 70-75 percent of the organic decomposable waste, which can be used for making compost or producing methane to generate energy, being taken to the landfill/dumpsite. The challenges for the operators with solid waste management include: insufficient budget and absence of a cost recovery mechanism; lack of proper truck maintenance; absence of incentive systems; low private sector

involvement; and lack of properly planned landfill (Edwards, 2010). There are also challenges coming from the producers of solid waste at all socio-economic levels as well as the industries and service producers. These include: lack of promotion and education on waste reduction, recycling, recovery, composting and energy generation; rapid, basically unplanned, increase in the populations of cities through both births and rural-urban migration increasing the volume of the waste generated; and communal containers are not properly collected and emptied when full, causing the areas around skips to become littered and foul smelling, thus encouraging illegal dumping.

According to Tekele Tadesse (2004: 5), the problems of solid waste management have been classified into five major components such as low participation of households like low community priority to solid waste management, low willingness to participate in collection and recycling, low willingness to keep public spaces clean, and low willingness to pay; management problems in the form of low willingness to manage, lack of accountability to the community and unrepresentative management; social operation problems such as low salary of operators, low status and bad working conditions, unreliable service, competition from private entrepreneurs and space problems; financial problems like cost recovery problems, inadequate fee collection and low ability to pay; and failing cooperation with municipalities such as direct obstruction of community-based solid waste management and lack of assistance from the municipality.

3.2 Public participation

Public participation is defined as the deliberative process by which interested or affected citizens, civil society organizations, and government actors are involved in policy-making before a political decision is taken (EIPP, 2009). Public participation is not only a matter of procedural justice, but also a precondition for achieving well-being (UNEP, 2005). Public participation can generally be defined as allowing people to influence the outcome of plans and working processes. However, there are different levels of influence (WDEU, 2002).

According to Wongputarugsa et.al. (2010: 9), since 1990s, public participation has been considered as a necessary component of public service delivery at the local level and participatory approach is important in sectors like education, health, water and sanitation. Moreover, public participation involves establishing and maintaining an effective public-local government communication channel, which involves the local government

deciding clearly and reaching consensus on what the local government should do and the public should do (PEPA, 2005).

Public participation may be defined as the involvement of individuals and groups that are positively or negatively affected by a proposed intervention (e.g., a project, a program, a plan, a policy) subject to a decision-making process or are interested in it. Levels of participation vary from passive participation or information reception (a unidirectional form of participation) to participation through consultation such as public hearings and open houses, to interactive participation such as workshops, negotiation, mediation and even co-management (Andre et.al. 2006: 10).

Public participation is considered an essential element of good environmental governance and the development of environment programme was itself a product of an inclusive participatory process (MRC, 2005).

3.2.1 Strategies of Public Participation

Different scholars have paved the way of how the public can participate in any community development activities in different ways. According to PEPA (2005), through information and education processes, public participation in different community development works can be increased largely in many ways including; media: leaflets, posters, notice boards, books, stories, games, videos, newspapers, radio, television. Events: public meetings, community discussion groups, competitions, drama/street theatre/music, theme days, cleanup days.

According to Tekele Tadesse (2004: 5), the public can participate in solid waste management in the form of consultation such as answer preparatory research questions, attending meetings, electing leaders, representatives who manage waste collection, electing members of microenterprises and providing feedback about the collection system/waste services to operating teams or management; and at the highest administration and management level such as taking part in committees, becoming members of a community based organization (CBO) involved in waste collection, environmental education, etc. and participating in decision-making during meetings.

3.2.2 Importance of Public Participation in Solid Waste Management

The main purpose of public participation is to improve decision-making, by ensuring that decisions are soundly based on shared knowledge, experiences and scientific evidence, that decisions are influenced by the

views and experience of those affected by them, that innovative and creative options are considered and that new arrangements are workable, and acceptable to the public (WDEU, 2002).

Public awareness and public participation is very vital in effective implementation of the solid waste management system. The cooperation of citizens is important for solid waste management. The social aspect cannot be separated from the overall waste management system (Visvanthan and Glawe, 2006). Public participation becomes a significant factor for a successful solid waste management. As it is argued that, even if the municipal authority operates with the solid waste management through a sophisticated system, the solid waste problem cannot be solved at all without the participation of the public in the solid waste program (Wongputarugsa et.al. 2010: 9).

Besides, public participation is envisaged to be the first step towards further community participation in operational waste management activities. Central to this issue of public/community participation is the responsibility of the relevant authority to make available any waste management information through the provincial/local government Waste Information Systems (WIS) (Mazinyo, 2009). The growth of the waste management sector and the implementation mechanisms that involve public in terms of participation and/or employment has been improved recently. But, the public has had a negative perception of the waste industry (ISWA and UNEP, 2002).

According to O'Connell (2011), there exists a positive correlation between knowledge and environmentally responsible behavior. He emphasized the need for information about environmentally responsible behavior like recycling and waste minimization that should be incorporated both culturally and emotionally.

To ensure sustainability in waste management, it is vital to consider the roles, interests and power structures of the practice of waste management with different stakeholders. Therefore, the experience of many countries has shown that cooperation and coordination among different stakeholders like city council, government service users, NGOs, CBOs, private sectors, both formal and informal, and donor agencies lead to enhancing the sustainability of the waste management system like change in behavior and sharing of financial responsibilities (Visvanthan and Glawe, 2006).

4. OVERVIEW OF SOLID WASTE MANAGEMENT IN MACEDONIA

Waste management is a growing public concern in Macedonia. In many cities of the country, waste management is poor and solid wastes are dumped along roadsides and into open areas, endangering health and attracting vermin.

As a result, this research resulted in similar findings with regard to the problems that prevent the public from participation in solid waste management. Some of these are: poor awareness, lack of manpower for coordination and work in partnership with different stakeholders including the community at the city administration level, shortage of budget by the city administration, poor social participation causing poor solid waste management, poor rules and regulations implementation regarding solid waste management and shortage of equipment.

5. CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

Solid waste management is becoming a major public health problem and environmental concern in urban areas of many developing countries particularly in Macedonia. In many countries, the public sector is unable to deliver services effectively. The regulation by the private sector is limited, limited funds are provided to the solid waste management and illegal dumping of household and industrial waste is a common practice. The solid waste management problem is high in major cities of the country, where little attention is paid to solid waste management because of the small budget and its consideration as being of a less priority by the government bodies.

The major solid waste of the city has been found to consist of food residuals, plastics and ash. Most of the residents use sacks as a waste container. The majority of the residents are sorting wastes and few of them are not. They put liquid and solid wastes together, they put unnecessary materials like sharpens and non-solid wastes into solid wastes. Waste collectors are collecting wastes regularly and they do this once or twice per week. The main reasons are shortage of vehicles and lack of coordination between the city administration (department of beautification and sanitation) and waste collecting associations. As a result, the services delivered by the waste collectors are not so satisfactory. The community is playing a great role in solid waste management such as reducing wastes at a source, sorting wastes and cleaning waste canals or drainage. Moreover,

the survey identified many roles that the community can play like paying money for waste collectors on time, putting wastes in proper containers, participating in any waste management activities, keeping the morale of waste collectors and informing or providing any information to the concerned government bodies if there is any waste management problem faced or observed.

The city administration has its own strategies regarding the participation of the community in solid waste management. The strategies emphasize that the solid waste management is participatory based approach, the community could participate in labour, money, and education/awareness through health extension workers. In addition, strategies for the community participation in solid waste management that has been identified through the survey results include community communication, enforcement mechanism (penalizing those who are not managing their wastes properly) and incentive mechanism (rewarding or paying to those who are managing their wastes or their surroundings properly).

The efforts made by the city administration in providing solid waste management services are poor. There are no sufficed services rendered by the city administration regarding solid waste management. In addition, there is weak regulatory and follow up by the concerned government bodies about the implementation of the solid waste management system of the city. There are many factors that affect public participation in solid waste management. These are personal behavioral, socio-cultural, economic, environmental, institutional and technological factors. There is a highly statistically significant association between willing to pay, awareness, rules & regulation and public participation in solid waste management.

Finally, solid waste management is not the responsibility of a single party rather it is the responsibility of all stakeholders such as the community, the government, the individuals, the NGOs and the CBOs. However, the facilitation and coordination role is better to be taken by the government. The community has its own resources, skills, knowledge and experiences to solve their own problems. The major factors that prevent the public from participation in solid waste management have been identified through ordered logistic regression analysis. Therefore, through an empirical evidence, it has been found that awareness, rules & regulations and social participation have a positive impact on the public participation which in turn is a positive impact on solid waste management.

5.2 Recommendations

The solid waste management process of the town starts from residents or trade centers where waste collectors are collecting waste and

transport it to a dumping site. However, the waste dumping site is the farmland of the rural people and it affects their health. Moreover, plastics flowing on their farmland prevents them from harvesting the land. The waste management process related to the town partially frees the citizens from their waste, but rural people suffer from the waste of urban people. Therefore, the city administration should advocate recycling technology by attracting investors.

The main factors that prevent public participation which, in turn, affects solid waste management are awareness, social participation and rules and regulations. Therefore, the concerned bodies should give emphasis on public participation through raising awareness, social participation and implementation of rules and regulations for better solid waste management of the city.

The support to the overall solid waste management concerned government body at each authority level is poor. The main reason identified for the poor support by the government includes: limited budget, low implementation, low follow up, insufficient necessary waste management equipment, poor system and less attention paid by the government in general. Therefore, the concerned government bodies should allocate enough money (budget), conduct continuous follow up, establish strong system, procure waste management equipment and pay more attention to solid waste management tasks.

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