Integrated Municipal Solid Waste Planning And Management (IMSWPM) In Developing Countries: A Conceptual Framework

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Abstract

Problems of municipal solid waste planning and management (MSWPM) in developing countries are multiple and interrelated. The nature of these problems has three major implications. First, the conventional approach with its focus on collection, transportation, and disposal activities and its primary goal of technical efficiency in service provision is no longer appropriate. Second, involvement and participation from various actors other than the local waste authorities is called for. Partnerships of stakeholders in MSWPM are necessary. Third, the increasingly complex issues associated with MSWPM and the inability of the conventional approach to deal with them lead to the necessity of an integrated approach to MSWPM in developing countries. This paper is the first of two parts. In this part, a conceptual of an integrated solid waste planning and management (IMSWPM) for developing countries is formulated. Any integrated approach to resources and environmental planning and management embodies two basic dimensions: substantive and procedural. The former can be characterized by four main attributes: holistic, interconnective, goal oriented, and strategic. Thus, the proposed framework suggests that integrated municipal solid waste planning and management is holistic when it takes into account various perspectives, such as public and environmental health, physical, technical, social/cultural, economical/financial, institutional and managerial, political, and legal; interconnective as it is based on interactions among four main components: activities, actors (stakeholders), options, and aspects (perspectives); goal oriented through the identification of common goals among stakeholders; and strategic when it identifies key issues associated with waste generation, source separation, service provision, composting, sorting and recycling, and safe disposal.

Keywords: municipal solid waste management, development, conceptual framework.

1. INTRODUCTION

1.1. Background

Planning and management of municipal solid waste (MSW) are among the most challenging tasks faced by urban governments in developing countries (Schertenleib and Meyer, 1992a). Municipal solid waste has many impacts on urban environments and on urban inhabitants. For example, illegal dumping of waste into drains and rivers is common in many developing countries and results in polluted air, and surface and ground water supplies.

Problems related to planning and management of MSW in developing countries are being exacerbated by a number of factors, including urbanization (Gotoh, 1989; Ouano and Ogawa, 1993), population growth (Sakurai, 1990; Arlosoroff, 1991), industrialization to increase economic growth (ESCAP, 1993; Ouano and Ogawa, 1993; Muttamara, 1994), improved living standards (Ouano and Ogawa, 1993; Muttamara, 1994), and the increased availability of consumer products (Ouano and Ogawa, 1993). The interrelationships of these factors bring about several consequences, including the increasing production of solid waste, the increasing number of people demanding service, a more complex nature of waste being generated, difficulties in providing service due to squatter settlements, and the pressure to provide satisfactory service. These issues have resulted in tremendous pressure upon municipal governments of developing countries. In response, the international community and agencies have put efforts, expertise, and funding into assisting developing countries to deal with municipal solid waste planning and management (MSWPM).

In developing countries, the conventional approach to MSWPM dominates. Major characteristics of this approach include: the sole responsibility of municipal authorities for providing service (collection, transportation and disposal), a view of waste as a nuisance to the public (Cointreau, 1982), and a focus on aesthetics and technical maters (Agunwamba, 1998; Diaz, 1998).

Common shortcomings of the conventional approach to MSWPM in developing countries are inability to cope with the high rate of urban growth and development, limited local authorities' resources (Halla and Mojani, 1999), lack of interest on waste reduction, recycling, and composting (Agunwamba, 1998), and lack of public participation (Soerjani, 1984; Silas and Indrayana, 1993; Sinha, 1993).

Recognizing the inappropriateness of the conventional approach to MSWPM in developing countries, other approaches are necessary. Two approaches have been explored. These approaches are the non-conventional approach (Furedy, 1994b, 1992) and the integrated approach (Erbel, 1982).

The non-conventional approach is proposed by Furedy (1994b) as an alternative to the conventional approach that has been commonly used in many developing countries. She pointed out that the main goals of this alternative approach were based on social and ecological objectives. Empirical findings about this approach are lacking.

While the non-conventional approach is relatively new, the integrated approach has long been known (Erbel, 1982), but it only has gained momentum recently. This approach has been advocated by many as a better approach to deal with urban solid management in developing countries (Agunwamba, 1998; Ali, Olley and Cotton, 1998; Campbell, 1999; Halla and Mojani, 1999; Hoornweg and Thomas, 1999). The integrated approach is also viewed as a multisectoral or comprehensive approach because it takes into account many contributing factors to the problems, and involves stakeholders from different sectors (Ouano and Ogawa, 1993; Furedy, 1995).

The integrated approach has been investigated in this research as an appropriate way to address the complex problems of MSWPM in developing countries. A simple but valid argument for the necessity of the integrated approach is that no single actor or organization can alone solve the complex problems of municipal solid waste. The spirit of partnership advocated by this approach is very important for addressing various problems of MSWPM in developing countries. Based on their work on solid waste management in Asia, Hoornweg and Thomas (1999, 1) concluded that "Municipal governments are usually the responsible agency for solid waste collection and disposal, but the magnitude of the problem is well beyond the ability of any municipal government. They need help. In addition to other levels of government, businesses and the general community need to be more involved in waste management."

1.2. Research Questions and Objectives

Notwithstanding the promising potential of the integrated approach, research about and practice of the integrated approach in developing countries have been scarce. This may be due to problems discovered by several investigators, such as the technocratic and administrative actions taken by municipal officials (Furedy, 1989a; Diaz, 1998) and the opposition of municipal officials to involve the informal sector, in particular waste pickers (Furedy, 1989a; Ouano, 1991b). It is necessary to extend and deepen our understanding about the potential of this approach in developing countries, both conceptually and practically.

As in other developing countries, Indonesia has also faced similar problems and challenges in planning and managing municipal solid waste. In this respect, Hoornweg and Thomas (1999, 1) stated that "Indonesia and the Philippines as well as parts of China and India are the Asia countries facing the greatest waste management challenge, based on projected waste generation rates and relative affluence to deal with the problem."

One major research question pertaining to the potential of integrated planning and management of municipal solid waste in developing countries in general was defined as follows: "What are the critical elements of an integrated municipal solid waste planning and management (IMSWPM) approach in developing countries?" The main objective of this research is to propose a conceptual framework of IMSWPM for developing countries.

2. Formulating the Conceptual Framework of IMSWPM

The literature review on integrated resource and environmental planning and management has shown that any conceptual framework of integrated planning and management should have two basic elements: substance and process (Slocombe, 1993, 1998; Born and Sonzogni, 1995; Margerum and Born, 1995; Margerum, 1997). Therefore, the proposed conceptual framework for IMSWPM will be based on these key characteristics.

2.1. Substantive Dimensions of IMSWPM

The substantive dimensions of integrated planning and management are characterized by four elements: holistic, interconnective, goal oriented, and strategic or reductive (Born and Sonzogni, 1995; Margerum and Born, 1995; Margerum, 1997). These dimensions are incorporated in the proposed conceptual framework for IMSWPM in developing countries.

2.1.1. Holistic

The holistic nature of integrated planning and management is reflected through the breadth and variety of perspectives included (Lang, 1986a, 1986b; Mitchell, 1990b; Born and Sonzogni, 1995; Margerum and Born, 1995; Margerum, 1997). In other words, integrated planning and management is multi-dimensional or systems oriented (Slocombe, 1993). In the context of municipal solid waste planning and management in developing countries, the nature of a holistic view is based on the various problems, constraints, and conflicts that necessitate consideration of a broad range of aspects. The summary of problems, constraints, and conflicts in the literature review points to the need to take into account various perspectives, such as public and environmental

health, physical, technical, social/cultural, economical/financial, institutional and managerial, political, and legal.

2.1.2. Interconnective

The interconnective nature of integrated planning and management implies the necessity of examining interrelationships among various components of the system being addressed (Slocombe, 1993; Muller-Merbach, 1994; Born and Sonzogni, 1995; Margerum and Born, 1995; Margerum, 1997). In the context of IMSWPM in developing countries, this feature calls for a need to identify the components of IMSWPM and their interrelationships. Four main components of IMSWPM are activities, actors (stakeholders), options, and aspects (perspectives).

Any discussion about municipal solid waste planning and management (MSWPM) cannot be separated from associated activities, including waste generation, source separation and storage, collection, transportation with or without transfer, processing and treatment, and disposal (Cointreau, 1982; Gotoh, 1989; Tchobanoglous, Theisen and Vigil, 1993).

Concerning the actors or stakeholders in IMSWPM, Fernandez (1993) provided a generic list of stakeholders regarding solid waste policy and action. They include central government, municipal government, private solid waste businesses, private industry, community organizations, non-governmental organizations (national scope), waste pickers, itinerant buyers, households, individual collectors, and schools. Another stakeholder who should be added to this list is the foreign agencies which have also been involved in MSWPM in developing countries. All these stakeholders can be categorized into five groups: government institutions or departments (ministries), the private sector, individuals, non-governmental organizations (NGOs), and foreign agencies.

The proposed IMSWPM for developing countries involves options, such as reduce, reuse, source separation, recovery and recycling, composting, and disposal. Due to its nature, hazardous waste is not included in the definition of solid waste in this study.

Regarding the aspects to be considered in IMSWPM, the holistic nature of IMSWPM has indicated the various perspectives to be taken into account, such as public and environmental health, physical, technical, social and cultural, economical and financial, institutional and managerial, political, and legal. Figure 1 shows the general relationships of the four components of IMSWPM in developing countries. In this figure, activities become the centre of the relationships among the components because they cover waste from generation to disposal.

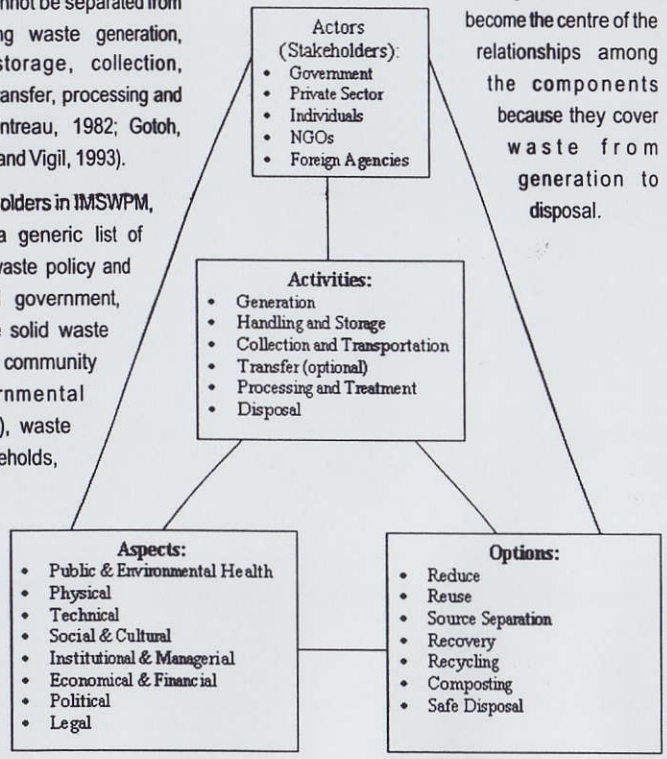

Figure 1. The interrelationships of IMSWPM's components in developing countries

The proposed conceptual framework for IMSWPM for developing countries is based on activities and options (see Table 1). The appropriate options for waste generation are initiatives for reduction and reuse of materials which otherwise will become waste. The significance of these two options has been recognized worldwide (Wilson, 1996). The main objective of waste reduction and reuse initiatives is to reduce the amount of waste generated, and to reduce waste management costs.

Table 1. Interrelationships between activities and options in IMSWPM

Activity	Options
• Waste generation	• Reduce • Reuse
• Handling and storage at source and collection and transportation	• Separation at source into wet and dry streams • Recovery of materials • Small-scale composting at households • Medium-scale composting at community areas • Reuse
• Processing and transportation	• Separation • Recovery of valuable materials • Recycling • Large-scale composting (municipal level) • Reuse
• Disposal	• Landfill • Incineration

The appropriate options for waste handling and storage at source and collection of waste are separation of waste into dry and wet constituents, recovery of valuable materials, in particular the inorganic stream, small-scale composting at households, medium-scale composting at community areas, and reuse of the recovered materials. Composting at households can be conducted voluntarily. Recovery of materials at source can produce cleaner materials than those sorted at final disposal sites because the chance for contamination is less. Itinerant buyers used to buy the separated materials from households or barter with them for other products, such as foods or kids toys. Beside the production of cleaner materials and the ease in collection and disposal, source separation is important because it nurtures the sense of shared-responsibility, caring, and participation.

Suitable options for processing of waste are separation and recovery of waste into organic and inorganic streams at recycling sites, recycling of the inorganic waste, medium- or large-scale composting of the organic waste by municipal authorities or private contractors, and reuse of compost and recycled materials for various purposes by users. Waste that is neither sent to household or community composting facilities nor sent to other users is expected to be delivered to any recycling site. In addition, the mixed waste that is not separated by waste producers will also be sent to these sites for separation. After separation, the organic waste will be sent to the medium- or large-scale municipal composting facilities, while the inorganic stream can either be taken by waste pickers or be processed as well at these sites. The residual left at recycling sites will be brought to any landfill for disposal. In some way, the function of a recycling site is similar to that of a transfer station in order to pool waste from different origins, but with separation and recycling added.

In the recycling sites, waste pickers will be allowed to collect valuable materials. In addition, recycling facilities should be provided by the government, private sector, or other parties. In this way, waste pickers will not only have cleaner materials that are more ready to be marketed to waste brokers, but they may also have a better chance of receiving a good price from their brokers.

Disposal activities may involve two options: landfill and incineration. The use of simple and open dumping is not recommended because of its negative impacts for the environment and urban inhabitants. Landfill is preferred to incineration because it is cheaper. However, in the next five or ten years, incineration may be appropriate for metropolitan or big cities in developing countries because of the pressures from the increasing

production of waste in urban areas, the limited number of landfills available, the difficulty in finding landfill sites, and the need to dispose of waste rapidly. In other words, incineration, currently regarded as inappropriate, may become feasible and appropriate in the metropolitan or big cities in developing countries in the future. The model for IMSWPM in developing countries, linking activities and options, is shown in Figure 2.

It should be noted that, in the proposed framework, collection and transportation activities are not shown. However, they can occur in linking two or more connected activities. As mentioned in the previous section, there are generally two kinds of collection: primary and secondary (Indrayana and Silas, 1993; Silas, 1995). The primary collection service is usually provided by local community organizations, while the secondary collection is provided by the local cleansing authority or the private contractor (Forbes, 1995). In the proposed framework, local community organizations will be responsible for collecting and transporting waste from the source to any temporary storage sites or even to recovery and recycling sites, provided that they are capable of doing it. Meanwhile, the local cleansing authority or the private contractor will collect and transport waste from temporary storage sites to recovery and recycling sites and from recovery and recycling sites to final disposal sites. In the proposed framework, transfer stations are also not incorporated because they are optional. In case transfer stations are used, their main function is to pool waste from various sources, in particular temporary storage (disposal) sites.

2.1.3 Goal Oriented

Some of the goals of IMSWPM in developing countries can be inspired from the goals of integrated waste management in the developed countries and major concerns about urban management in developing countries. As mentioned in the literature review, some of these goals include reducing the amount of waste generated and disposed; improving waste management capacity; minimizing environmental impacts on air, water, and land; conserving valuable resources; and environmentally enhancing waste disposal methods. Based on these goals and the various problems in MSWPM in developing countries, the proposed goals for IMSWPM in these countries are shown in Table 2.

Table 2. Common goals of IMSWPM in developing countries

- Maintaining the cleanliness and health of the urban environment
- Strengthening the capability of the municipal authority
- Providing efficient, effective, equitable, and reliable service
- Promoting reduce, reuse, source separation and recycling, and composting
- Fostering partnerships of stakeholders
- Developing the recycling industry through the involvement of both the formal and informal sectors
- Promoting the use of appropriate technology

2.1.4. Strategic

The idea of a strategic or reductionist approach in integrated planning and management points to focusing on key aspects, parameters, or areas of the system being analyzed. In the context of IMSWPM, the key issues will be determined based on the problems associated with the activities in municipal solid waste planning and management (Table 3).

In waste generation, two key issues should be addressed: government policy on waste reduction and reuse efforts, and public education on waste reduction and reuse. Government policy on waste reduction and reuse is important to support the reduction of waste generated. This proposal is based on the fact that findings from the literature review have rarely indicated the existence of such policy. Therefore, waste reduction and reuse should become an agenda of the government of developing countries. In addition to this policy, public education is also a key ingredient in the success of waste reduction and reuse initiatives. Public education is aimed at providing knowledge, increasing understanding and awareness, and gaining involvement from the public

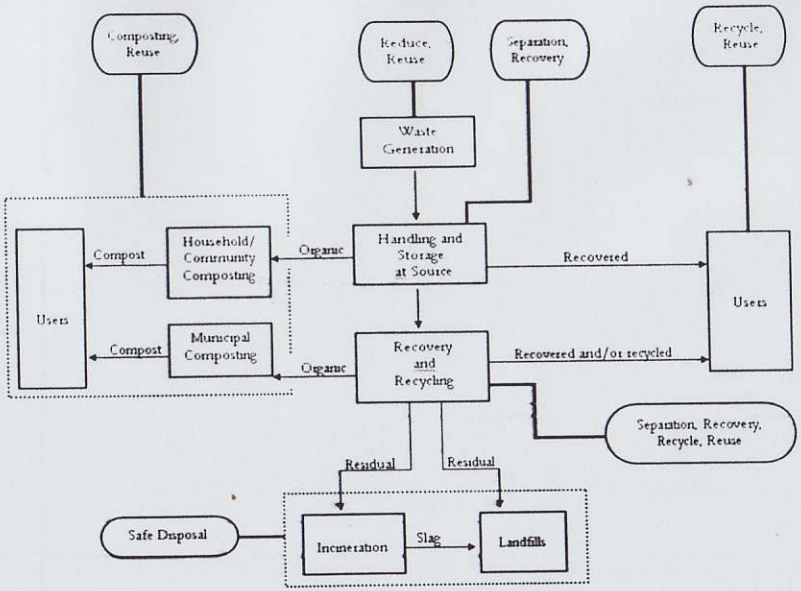

Figure 2 A conceptual framework for IMSWPM in developing countries

Key issues associated with service provision consist of satisfactory (efficient and effective) service, public education about the risks of waste burning and waste dumping to drains, and law enforcement. The provision of satisfactory or efficient and effective service is expected to reduce chances of urban residents throwing away their waste at illegal places or burning their waste because these acts bring about pollution both to the environment and the people. In addition, public education is also considered as important in order to increase the public's understanding and awareness and eventually its willingness not to do illegal dumping and waste burning. Should satisfactory service be provided and the public education also be provided, then it will be necessary to discourage some urban residents from doing these acts by enforcing laws.

Table 3. Key issues in IMSWPM in developing countries.

Component	Key Issues
• Waste generation	• The existence of government policy on waste reduction and reuse initiatives • Public education
• Handling and storage at source	• Public education about source separation • The issuance and enforcement of laws
• Service provision (collection and transportation)	• The provision of satisfactory service • Public education about the risks of illegal dumping and waste burning • Law enforcement
• Household and community composting	• Public education • Provision of funds to build and operate the facilities • The creation of markets for compost
• Recovery and recycling sites	• Getting approval from municipal authorities to change the existing transfer stations into recovery and recycling sites • Seeking funds to provide facilities for resource recovery and recycling • Educating and gaining support from waste pickers • Organizing recovery and recycling activities
• Municipal composting	• Availability of sufficient funds • The creation of markets for compost • The existence of government policy about the use of compost
• Safe disposal (landfill, incineration)	• Ability to provide affordable and sustainable service • Maintaining operation that minimizes health risks to the public and the environment • Law enforcement

With regard to source separation, two key issues are identified: public education and law enforcement. As shown in the literature review, some urban residents were unwilling to do source separation because of the inconvenience (Cointreau et al., 1984; Poerbo, 1991; Indrayana and Silas, 1993). Therefore, public education about source separation should be conducted with urban residents in order to ensure their understanding, awareness and participation. Once public education has been widely conducted, then laws that make source separation mandatory should be issued and enforced.

A few key issues related to household and/or community composting include public education, provision of funds to build and operate the sites, and the creation of markets for compost. The findings in the previous chapter about household and community composting in developing countries have indicated a lack of support from the local community and local government (Poerbo, 1991; Woolveridge, 1994). Despite this fact, composting should be promoted in order to reduce the amount of waste to be disposed and also to produce natural fertilizer. Therefore, I argue that public education on composting still needs to be promoted. Another key issue is the provision of funds to conduct composting pilot projects for promotion or public education and to build the infrastructure and operate the composting sites by households and community organizations. Some funds will be needed to provide facilities for households and in particular community organizations to enable them to do small-scale or medium-scale composting. The third and the most difficult issue is to create and sustain markets for compost (Arlosoroff and Bartone, 1987; Maniatis et al., 1987; Lohani, 1988; Woolveridge, 1994). In Indonesia, for instance, this effort will be challenged by the use of chemical fertilizer by farmers because the use of chemical fertilizer is supported by the government. Some amount of money will be needed in efforts to find and develop markets for compost.

There are several key issues regarding the operation of recycling sites. The first issue is the need to lobby the local authorities to allow the use of the existing transfer stations as sites for sorting waste into the organic and inorganic streams and for conducting recovery and recycling activities. Another important objective of the lobbying is to get approval for involving waste pickers in these centres. Once this idea is agreed, the next issue is to find funding to provide the facilities required for sorting and recycling activities. The third issue is educating and gaining support from waste pickers about the proposed scheme. This is so because many waste pickers who currently work at dump sites will be asked to move to the new sites and some of them may reject the idea particularly if the site of the recycling centre is distant from their homes; or, they may object because they have been satisfied with the current earning and living they have. However, recognizing that there are a large number of waste pickers in urban areas in developing countries, it will be difficult to accommodate all waste pickers at these sites. Nevertheless, the operation of recycling sites is expected to attract waste pickers to work in these sites instead of at final disposal sites. The fourth issue is the need to reorganize waste picking activities. Should the sites be approved and provided by the local government and waste pickers be willing to work in these sites, then their activities should be organized to follow certain rules or guidelines to prevent or minimize pollution to surrounding areas.

Three key issues in municipal composting are the provision of funds, the creation of markets for compost, and the existence of government policy to support the use of compost. Basically the first two concerns are similar to those in the household and/or community composting. The funds will be used in particular to find, create, and sustain markets for compost in the long term. The availability of government policy to support the use of good quality compost as an alternative to the chemical fertilizer will be very important.

Key issues regarding safe disposal include the capability of providing affordable and sustainable service, the necessity of ensuring operation that minimizes health risks to the public and the environment, and law enforcement. Landfills and in particular incineration are not inexpensive options. Therefore, their proper operation should be able to be sustained in the long term, while at the same time their costs must be affordable or otherwise they will either be abandoned because their costs are unrecoverable or their operation becomes improper, for instance by neglecting or violating standards. Therefore, the next related issue is the ability to maintain the operation to minimize risks to the public and the environment. The last key issue is law enforcement in order to ensure proper operation of those facilities.

2.2. Procedural Dimensions of IMSWPM

The process involved in IUSWPM in developing countries should be characterized by partnerships among stakeholders that involve interaction, coordination, conflict resolution, and enforcement. In this sense, partnerships of stakeholders mean arrangements of several actors in order to perform specific tasks, achieve certain objectives, or solve particular problems or key issues associated with planning and management of the municipal solid waste. Partnerships of stakeholders in IMSWPM in developing countries may occur in any initiatives that include waste reduction, reuse (including the creation of markets or users for recycled products), the provision of collection and transportation services and the improvement of service quality, source separation and the operation of sorting and recycling centres, composting (household, community and municipal level), and the operation of safe disposal options. In these partnerships, each stakeholder will have certain role(s), authority, and responsibilities. In this regard, I will adopt the idea of Fernandez (1993) who categorizes stakeholders' roles in urban solid waste policy and action into three: policy maker, supporter or facilitator or catalyst, and the doer or taking of action. Figure 3 shows stakeholders' partnerships in IMSWPM in developing countries.

In general, policy makers may have authority and responsibilities for various tasks, such as providing goals, directions, or guidance; formulating policy; establishing political support; preparing programs; and, providing resources. Facilitators or catalysts may have authority and responsibilities in several arenas, such as facilitating the implementation of policy into action; motivating or encouraging participants; initiating and building communication networks; increasing awareness and educating participants, and, providing support. The doers or those who will take action can have authority and responsibilities in providing voluntary willingness and cooperation in taking action to achieve certain goals or to solve specific problem(s); obeying laws and regulations; conducting monitoring and enforcement; and, implementing programs.

Partnerships of stakeholders in IMSWPM in developing countries will function as a medium for participation and empowerment; distribution of roles, authority and responsibilities; defining goals/objectives; making joint plans and decisions; setting priorities and targets; developing management strategies; sharing various burdens; assessing progress; and, seeking compromise.

A few communication tools that can be used in the partnership of stakeholders in MSWPM in developing countries may include information sharing, regular and informal communication, joint reviews, joint budgeting and/or staff, joint planning process, and plans. Tools for conflict resolution include interpersonal or intergroup communication, special meetings, consensus building, and appeals to higher authority.

Partnerships of stakeholders in IMSWPM offer three main benefits. First, all stakeholders can share their contribution according to their capabilities. Second, partnerships can relieve some burdens usually carried out by the central and/or local government which has limited capacity in providing subsidies. Third, partnerships can not only nurture community or public involvement and participation, but they can also result in more sustainable efforts or actions because every

stakeholder has its own roles, authority, responsibilities, and contribution

In summary, if partnerships of stakeholders in IMSWPM in developing countries can work well so that each actor carries out its tasks according to its agreed roles, authority and responsibilities, then with some mechanisms for coordination and conflict resolution, eventually these partnerships will be capable of achieving goals/objectives or solving/reducing the various and complex problems and/or conflicts in municipal solid waste planning and management.

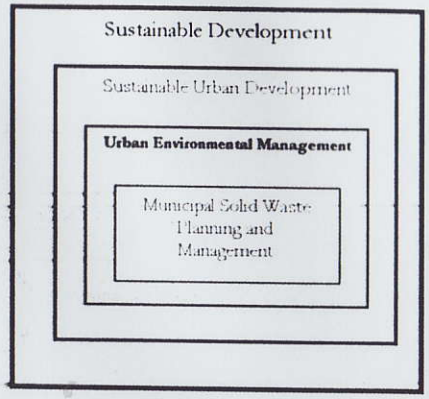

Figure 4. Policy context of IMSWPM

2.3. The Policy Context of IMSWPM

The policy context of integrated municipal solid waste planning and management (IMSWPM) in developing countries based on the literature review, can be outlined into a hierarchy of sustainable development, sustainable urban development, urban environmental management, and municipal solid waste planning and management (see Figure 4).

The concept of sustainable development has been widely accepted by developed and developing countries. National policies for sustainable development are considered as an umbrella for the others. As mentioned in the literature review, various goals or objectives of sustainable development include economic (e.g., reviving growth, changing the quality of growth, merging environment and economics in decision making), social (e.g., ensuring a sustainable level of population, meeting essential needs such as jobs, food, energy, and sanitation), environmental (e.g., conserving and enhancing the resource base), and technological (e.g., reorienting technology, managing risks). Some goals and dimensions of sustainable development at the national level are related to municipal solid waste planning and management. The provision of sanitation, including waste collection and disposal, is required for the satisfaction of basic human needs.

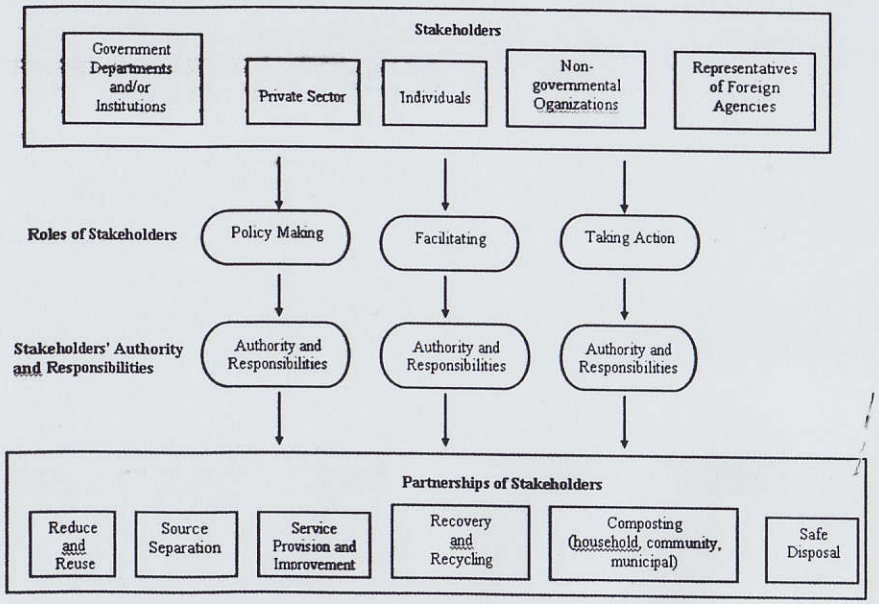

Figure 3. Partnerships of stakeholders in IMSWPM in developing countries

The second policy level of IMSWPM is sustainable urban development. Policies for sustainable urban development are derived from those for sustainable development at the national level. Consequently, there are similarities in concerns and goals. Drakakis-Smith (1995, 1996, 1997), for instance, identified some goals of sustainable urban development, such as economics (e.g., growth, equity, efficiency), ecological (e.g., ecosystem integrity, carrying capacity, bio diversity), and social (e.g., empowerment, participation, institutional development). A few directions for the implementation of sustainable urban development from Drakakis-Smith (1995, 1996, 1997) and Davidson (1996) include: empowerment and participation, people-focused approaches, participative planning, integrated and comprehensive approaches, bottom-up initiatives, strategic decision making for the common good of future generations, an integrated legal backing and institutional basis for enforcement, and a long-term examination of the impacts of action. Some of the issues, goal, and requirements for sustainable urban development are related with IMSWPM.

The third policy level of IMSWPM is urban environmental management. As stated by Ali, Olley and Cotton (1998, 256), a study by UNDP (1997) concluded that "The collection and disposal of rubbish is increasingly perceived as one of the greatest environmental problems facing many metropolitan areas of the developing world." As a result, international agencies have been concerned with the mounting pressures on the urban environments of developing countries. Various kinds of aid have been provided by foreign experts and lending agencies, in particular the World Bank. The primary objective was to support capacity building for urban environmental planning and management at the city or municipal level. Included in this objective was an intention to improve urban waste management capacity and operational capacity. Campbell (1999) argued that the expected outcome of institutional development is an organization or an institution of waste management which is capable of preparing waste management legislation, regulations, guidance, and standards; developing its human resources to maintain effective waste management activities; financing its activities, formulating strategic planning of long-term integrated waste management, authorizing the development of waste management facilities; monitoring and enforcing standards for all waste management services and facilities; and, providing information related to waste.

Recent innovations in urban waste management in developing countries have been focused on institutional development. Two particular themes have emerged: privatization of service and partnerships among governments, the private sector, and local community organizations (Cervero, 1995; Kironde and Yhdego, 1997; Ali, Olley and Cotton, 1998; Diaz, 1998; Halla and Mojani, 1999; Hoornweg and Thomas, 1999). These innovations also represents a shift in policy from the previous "infrastructure provision" to the current "local capacity building". IMSWPM is considered as an alternative form of partnerships and way of increasing the capacity of the municipal authorities to deal with the increasing complex problems associated with municipal solid waste.

The fourth policy level of IMSWPM is any policy formulated specifically to deal with various issues in municipal solid waste planning and management. As mentioned in the literature review, policies for integrated municipal solid waste planning and

management can be related to waste prevention and source reduction, service provision, recycling, composting, and safe disposal. In each component, a combination of policy instruments of information dissemination, economic incentives (carrots), producer responsibility, economic coercion (stick), and legislative coercion may be required (Wilson, 1996).

In conclusion, the policy context of IMSWPM in developing countries indicates three main points. First, there has been a growing recognition by local and central governments as well as the international community about the magnitude of problems in MSWPM and its adverse impacts on the urban environment. Second, improving urban environmental management capacity, including MSWPM, becomes increasingly important in order to achieve some goals of sustainable (urban) development. Third, approaches for urban environmental management and MSWPM that foster partnerships of stakeholders are believed to be capable of improving the local capacity for dealing with the complex issues in MSWPM in developing countries.

3. Further Work

Further work is required to test the proposed framework in any urban area of developing countries in order to see its feasibility and sustainability. A case study will provide valuable insights regarding the fitness of the proposed framework with a local context of an urban in developing countries. These can be benefiting for both ways. In one way, the findings may be indicative of a necessity to modify or revise the proposed framwork. On the other way, an urban area can measure up itself whether it has many similarities with the proposed framework or not. This analysis can lead local municipalities to prepare plans towards the proposed framework of IMSWPM.

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