

**IMPROVEMENT OF
SOLID WASTE MANAGEMENT
IN DEVELOPING COUNTRIES**

KUNITOSHI SAKURAI

**INSTITUTE FOR INTERNATIONAL COOPERATION
JAPAN INTERNATIONAL COOPERATION AGENCY**

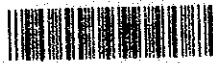
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by

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Preface

It is doubtless that the supply of engineering hardware as a means of effective assistance to developing countries has been overestimated in its importance. Such assistance was considered to be a model of economic cooperation applicable to many developing countries. Hardware assistance, however, when provided to developing countries without the necessary engineering software, tends to be privately owned by some circle, and is not utilized effectively for the whole society.

In the case of solid waste management, most of the developing countries have yet to establish the software required for modern development. It might have been possible for those countries to maximize individual interests, but they have no, or only insufficient, bases essential for a modern community.

The specific meaning of the "completion of technology transfer" in terms of software depends on the definition of the technology concerned. For instance, if solid waste management is considered to be "technology", technical transfer would be completed when management has been left to the local staff and all processes can be handled by themselves alone.

It is the purpose of this book to promote the technology transfer of solid waste management, particularly to those who are working in developing countries. Judging from the author's experiences abroad, there is no room for doubt that the technology transfer of solid waste management provided in this book will be effective in advancing the technology of the developing countries concerned.

Before closing the Preface, I express thanks to the author for giving me spiritual nourishment through this book; socially, too, I am grateful because I have made a good friend through daily correspondence between the author and me; and I well understand that I need to learn much more in every way from the author.

Sachiho Naito

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AUTHOR'S NOTE

Many excellent books are already available on the topic of solid waste management (SWM) in developing countries, including "Management of Solid Wastes in Developing Countries" by Frank Flintoff and "Environmental Management of Urban Solid Wastes in Developing Countries" by Sandra J. Gointreau. Ever increasing solid waste problems in developing countries caused by rapid urbanization and industrialization, however, require more efforts to be made in the development and exchange of innovative SWM approaches addressing the emerging management needs.

The author does not try in this book to cover all the aspects of SWM in developing countries. He tries, instead, to introduce some new methodologies which seem to be useful for the improvement of SWM in developing countries. These methodologies have been developed through his works in the World Health Organization (WHO) and the Japan International Cooperation Agency (JICA). The author will be very happy if this book gives a hint to the people concerned for the initiation of a new challenge for the improvement of SWM in developing countries.

The author wishes to place on record his acknowledgements to the many persons and organizations who have assisted him in the development of methodologies and the preparation of this book. Overall acknowledgement is due to CEPIS/PAHO/WHO (Pan American Centre for Sanitary Engineering and Environmental Science at Lima, Peru) and JICA for facilitating working experiences, and to JICA's Institute for International Cooperation for publishing this book. He also owes a lot to the Ministry of Housing and Local Government of Malaysia and the JICA Study Team for Solid Waste Management in Pulau Pinang and Seberang Perai Municipalities in the preparation of Chapter II and Chapter III respectively. It is not feasible to mention here by name all the individuals who have collaborated and contributed to this publication, but particular appreciation must be expressed of the guidance of the following:

Mr. Alberto Flórez Muñoz, Director, CEPIS/PAHO/WHO
Prof. Dr. Sachiho Naito, President, Kanto-Gakuin University

The author also wishes to clarify that the views presented in this book are solely those of the author and do not necessarily represent the opinion of JICA.

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I. Introduction

I INTRODUCTION

Each country and each city has its own character. The pattern of solid waste management (SWM) differs from country to country and from city to city, based on the technical, economic and socio-cultural peculiarities of each case. However, there are at the same time many common problems of SWM in developing countries that may make possible the exchange of both positive and negative experiences among the cities and countries in the Third World.

To achieve the maximum improvement of SWM in developing countries based on the available limited resources, it is therefore very important to clarify common problems, make concerted efforts to work out innovative and practical measures to overcome them, and diffuse such measures systematically among cities and countries with similar problems.

With that objective in mind, some common problems of SWM in developing countries are presented in the following. Although the clear demarcation is very difficult, category A problems are more or less external to the solid waste sector, and therefore the sector is requested not to overcome them but to live with them. Category B problems are partly external and partly internal to the sector, as such the sector is requested to initiate actions to overcome them in close cooperation with other related sectors. Category C problems are almost internal to the solid waste sector and their solution rests mainly on the initiative of the sector.

A External Problems

- A-1 Population explosion, uncontrolled urbanization, squatter area proliferation
- A-2 Socio-economic crisis (e.g. huge external debt, economic austerities, prolonged recession, three-digit-inflation, high rate unemployment, social disorder, etc.)
- A-3 Insufficient public education and limited communal participation

B External/Internal Problems

- B-1 Accelerated and uncontrolled generation of municipal wastes and industrial hazardous wastes
- B-2 Negligence and lack of interest shown by national and local authorities to SWM problems
- B-3 Lack of inter-sectoral, inter-institutional and inter-municipal coordination
 - e.g.- Inter-sectoral coordination for sanitary education (solid waste sector and public education sector)
 - Inter-institutional coordination (private and public collection)

- services)
 - Inter-municipal coordination (inter-municipal landfills in metropolitan areas)
- B-4 Uncontrolled and/or uncoordinated scavengers' activities
 - e.g.- Sanitarily problematic collection and/or disposal services
 - Necessity of working condition improvement
 - Lack of coordination between scavengers' livelihood programme and SWM programme
- B-5 Insufficient or not duly trained human resources
 - e.g.- High-rate turnover of trained professionals
 - Lack of personnel management programme
- B-6 Labour conflicts such as strikes of syndicated municipal garbage service workers
- B-7 Incomplete and/or obsolete legislations and insufficient enforcement
- B-8 Weak financial basis and limited financial autonomy
 - e.g.- Lack of exact cost determination (lack of independent accounting system for municipal SWM)
 - Inappropriate user charge or tax system
 - Low efficiency in billing and collecting user charges
 - Lack of independent budget administration (in many cases, revenue raised through user charge or taxes becomes a part of the general city treasury, and unexpected demands from other sectors with apparently higher priority draw on funds anticipated for SWM)

C Internal Problems

- C-1 Structural and institutional weakness of municipal SWM system
 - e.g.- Secondary priority in municipal administration
 - Insufficiency and deficiency of allocated resources
 - Fragmented responsibilities borne by various departments
 - Political pressure
- C-2 Lack of short-term, medium-term and long-term SWM planning
 - e.g.- National level: National SWM Action Plan
 - Municipal level: Municipal SWM Master Plan
- C-3 Insufficient or not duly utilized physical resources
 - e.g.- Lack of garbage collection route design
 - Lack of supervision
- C-4 Lack of equipment maintenance programme
- C-5 Application of technically, economically and socially inappropriate technologies
 - e.g.- Street sweeping (mechanical vs. manual)

The author took the liberty to pick up A-1, B-1, C-2 and C-3 as the common problems to be dealt with in this book. Based on the experiences acquired in some developing countries, practical approaches to overcome these problems have been developed and shown in Chapters II-VI.

Chapter II (National SWM Action Plan) and Chapter III (Municipal SWM Master Plan) show how to overcome the problem C-2 (lack of planning) at national and municipal level respectively. Chapter IV (Collection Improvement) deals with the problem C-3 (inefficient collection service) and Chapter V (Collection in Urban Fringe Areas) covers a part of the problem A-1 (proliferation of squatter areas). Lastly, Chapter VI (Hazardous SWM) shows the way to overcome the problem B-1 (accelerated generation of hazardous wastes).

II. National Solid Waste Management Action Plan

II NATIONAL SOLID WASTE MANAGEMENT ACTION PLAN

This Chapter is written to encourage the people involved in solid waste management (SWM) at national level towards the formulation and implementation of national SWM action plans.

2.1 INTRODUCTION

Collection and disposal of municipal solid wastes within an urban area have been traditionally perceived as the responsibility of the local government. However, rapid urbanization and industrialization processes which are widely observed in many developing countries have increased tremendously the complexity of municipal solid waste problems, and it is not allowed any more to leave all the responsibility conveniently to local governments. Different level governments (central, state and municipal governments) as well as service users and consumer goods producing industries are requested to play respective roles in coordinated manner in order to establish an efficient and effective system for municipal SWM*.

* Kitakyushu Declaration made at the International Expert Group on Policy Responses Towards Improving Solid Waste Management in Asian Metropolises 16-21 October 1989 Kitakyushu, Japan advocates on this point as follows:

A group of experts met in Kitakyushu, Japan on 16-21 October 1989 discussed and explored ways and means to improve SWM in Asian metropolises.

The group, recognizing

(a)~(e)

(f) the need for central and provincial governments to provide policy and programme support for urban SWM services; and

(g)

declares that:

(a), (b)

(c) Asian governments have to be more committed to systematically diagnose SWM problems and formulate national action programmes to increase efficiency and effectiveness;

(d)~(g)

In many local governments, the SWM has been given only the second priority even if it is not the last. Expertise is scarce and planning and control function is very weak making their SWM an intuitive and less efficient one. Insufficient collection and inappropriate final disposal of both municipal and industrial solid wastes are threatening public health and environmental sanitation. High unit cost of the service caused by low productivity is putting unnecessarily a heavy financial burden on the local governments. All this situation is aggravated more by the lack of effective short-term and long-term national action plans for municipal SWM.

Based on the above-mentioned understanding, this Chapter tries to clarify various roles to be played by national governments for a systematic improvement of municipal SWM. To achieve more improvement with less input, these roles should be played by national governments not in an isolated manner but in an integrated manner. This integration can be realized through the formulation and implementation of national action plans for municipal SWM. National action plans will consist of many component programmes which correspond to the above mentioned roles. Therefore, it can be said that the overall role of national governments is the formulation and implementation of national action plans.

In this Chapter, firstly discussions will be made in general manner on justification of national action plan formulation and implementation. Secondly, procedures to be followed in the formulation and implementation of the national action plan will be explained. Thirdly, a case study will be made using Malaysia as a model. Recently a national action plan denominated ABC (Action Plan for a Beautiful and Clean Malaysia) has been successfully formulated and put into operation in Malaysia. And fourthly, examinations will be made on the interrelationship to be achieved between national governments and the leading municipal governments, namely, metropolitan governments.

2.2 JUSTIFICATION OF THE FORMULATION AND IMPLEMENTATION OF NATIONAL SOLID WASTE MANAGEMENT ACTION PLANS

The essence of the formulation and implementation of a National Solid Waste Management Action Plan is to :

- (a) Adopt a policy;
- (b) Establish its objectives, goals and targets;
- (c) Design an operational, institutional and financial system for the solid waste sector;
- (d) Implement a process to allow the expansion of public cleansing service coverage including sanitary disposal of wastes; and
- (e) Lead to a continuous balance between the service demand and supply.

The formulation and implementation of such an Action Plan can be

justified by the following reasons:

- (1) Through the diagnosis study to be carried out in the first phase of the Action Plan formulation, it becomes possible to have an objective knowledge about the national situation of solid waste problems. Through the monitoring system of the Action Plan implementation, an objective and updated information about the sector situation will continue to be supplied.
- (2) The Action Plan will give a basis to ask for the optimum and equitable allocation of limited resources to the solid waste sector as a whole as well as to the individual projects in the sector by the national economic planners. By getting it incorporated into National Economic Development Plans, a sound development of the solid waste sector will become more probable in harmony with the development in other sectors.
- (3) Through the national level coordination with other sectors, a series of joint policies can be worked out which tend to reduce the solid waste problems and/or make their solutions easier. The followings are the typical examples:
 - New housing estates' development with due consideration to their SWM (coordination with town planning sector);
 - Acquisition of future landfill sites in planned manner (coordination with town planning sector);
 - Development of public awareness about cleanliness (coordination with education sector as well as tourist industry promotion agencies);
 - Development of standardized locally-manufactured equipments which are adapted to local conditions (coordination with equipment manufacturing sector).
- (4) The Action Plan will make clear the responsibility and interrelationship of institutions which comprise the solid waste sector. It will also identify areas where the strengthening of institutional set-ups is required. This will contribute to the improvement of the overall performance of the sector.
- (5) Based on the results of the diagnosis study, the definition, identification and delimitation of the area where priority work must be done will be made. This will guarantee a cost-effective approach making it possible to do more with less.
- (6) The Action Plan will propose several alternatives concerning coverage and quality of services, operational systems, maintenance of equipment, financing, administration, etc. to allow an analysis for the selection of the most appropriate alternative.

- (7) A harmonious and balanced development of public cleansing services in different local governments will be promoted through:
- Rational and technical application of public resources;
 - Systematic diffusion of know-hows from outstanding services to other services;
 - Standardization and application of operational, administrative and financial models in local governments' public cleansing services.
- (8) The standardization of equipment may produce scale economies.
- (9) Human resource development programmes and R&D programmes of appropriate technologies can be organized more efficiently through the Action Plan than by individualistic approaches by each local government.
- (10) The Action Plan will increase the possibility to establish a national financing system for the sector that will allow to channel the necessary domestic and foreign financial resources, setting well defined financing standards for all local governments and establishing a redistribution criterion for soft and hard loans. In other words, low financing capacity services will have access to soft loans while those services with a satisfactory index of profitability will get a different deal.
- (11) The Action Plan will make it possible to determine the priorities and identify the projects that may later be submitted to local and/or foreign financing.

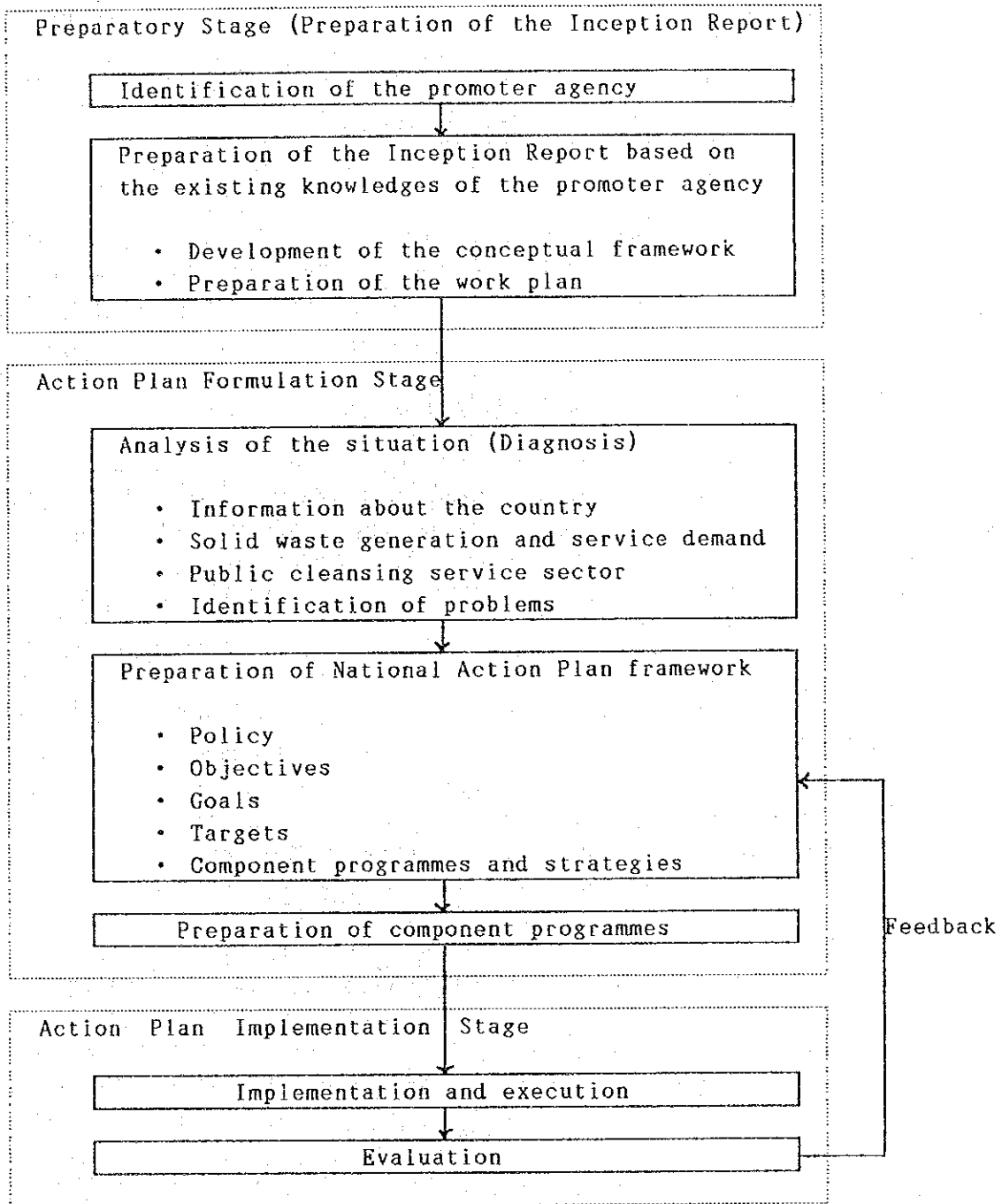
2.3 FORMULATION AND IMPLEMENTATION OF THE ACTION PLAN

2.3.1 Three Stages for Action Plan Formulation and Implementation

Formulation and implementation of the National Solid Waste Management Action Plan will consist of the following three stages and the interrelationship of these three stages is shown in Figure 2-1:

- (1) Preparatory Stage (Preparation of the Inception Report)
 - 1-1 Identification of the promoter agency
 - 1-2 Development of the conceptual framework
 - 1-3 Preparation of the work plan
- (2) Action Plan Formulation Stage
 - 2-1 Analysis of the situation (Diagnosis)
 - 2-2 Preparation of the National SWM Action Plan framework
 - 2-3 Preparation of the component programmes
- (3) Action Plan Implementation Stage
 - 3-1 Implementation and execution
 - 3-2 Evaluation

Figure 2-1 : Flow Diagramme of Formulation and Implementation of a National Solid Waste Management Action Plan



Typical activities to be carried out in the three steps of the Action Plan Formulation Stage (steps 2-1, 2-2 and 2-3) and their terms of reference are shown in detail in Annex 1 (Activity Chart for Action Plan Formulation / Terms of Reference of Each Activity).

2.3.2 Preparatory Stage (Preparation of the Inception Report)

Proper preparation is the requisite for any successful works. The works of the National SWM Action Plan formulation and implementation are not the exceptions to this rule.

The appropriate work load distribution between the Preparatory Stage and the Action Plan Formulation Stage is about one to ten (1 : 10). The works in the Preparatory Stage should be carried out in such a manner that they would be finished within two to four weeks by the existing staffs of the promoter agency to be mentioned below while the works in the Action Plan Formulation Stage may require six to twelve months. It is not advisable to spend more than one year to formulate an action plan with too much detail because the achievement of tangible improvement effects in a relatively short time is the only justification of this kind of plan.

2.3.2.1 Identification of the promoter agency

For any national action plan to be formulated and implemented efficiently and effectively, some national agency which has appropriate attributions on the matter has to dedicate itself to the works of plan formulation and implementation. Such agency is called in this Chapter as the promoter agency of the national action plan. Generally speaking, the most appropriate agency as the promoter of the National SWM Action Plan is the Environmental Health Section of the Ministry of Health of each country.

The potential promoter agency of the National SWM Action Plan is requested to initiate actions necessary for the realization of its mission. The first action to be made by that agency is to identify itself as the promoter agency of the National SWM Action Plan. Based on this self-identity, the promoter agency should manifest, in the form of the Inception Report, its intention to formulate and implement the National SWM Action Plan.

Because many other agencies are involved in municipal SWM, it is very important for the promoter agency to win the proper understanding of and active support for the plan formulation and implementation from such agencies. For winning such understanding and support, it is indispensable for the promoter agency to send a clear message to such agencies. This message can be sent through the Inception Report.

The objective of the Inception Report is to show the basic design of the works to be carried out in the stages of the National SWM Action Plan formulation and implementation. Proper basic design will guarantee the efficient and effective works in these two stages.

The promoter agency has its own informations, experiences, views and opinions on municipal SWM even without the National SWM Action Plan. Such knowledges accumulated in the promoter agency should be used to the maximum in the preparation of the Inception Report.

The Inception Report should consist of the conceptual framework of the National SWM Action Plan and the work plan for the Action Plan's formulation and implementation. The conceptual framework will answer to the following questions (1) and (2) while the work plan will deal with the question (3):

- (1) WHY the National SWM Action Plan is necessary ?
- (2) WHAT the contents of the National SWM Action Plan are ?
- (3) HOW the National SWM Action Plan will be formulated and implemented ?

Once prepared, the Inception Report should be submitted first to the decision makers of the promoter agency for their authorization. Then, it should be submitted to the coordinating committee for the formulation and implementation of the National SWM Action Plan for its approval. Establishment of such a coordinating committee, which consists of the SWM-related agencies, is recommended to win positive responses from such agencies.

2.3.2.2 Development of the conceptual framework

The definitive framework of the National SWM Action Plan is supposed to be worked out in the Action Plan Formulation Stage after the analysis of the present situation and the identification of problems and constraints. It is necessary, however, to develop its conceptual framework in the Preparatory Stage based on the knowledges already accumulated in the promoter agency. Such conceptual framework will assist the promoter agency to use its limited planning resources efficiently to develop the National SWM Action Plan with necessary detail.

The steps to be followed for the development of the conceptual framework are as follows:

- (1) To review the existing reports which deal with the municipal SWM in the country, identify the major problems and constraints, and list up the past and ongoing efforts which should be incorporated into the National SWM Action Plan as the positive heritage of the SWM sector. It is recommended to take into account the Paragraph 2.3.7 of this Chapter.
- (2) To determine the target wastes, target area and target year of the Action Plan taking into account the Paragraphs 2.3.4, 2.3.5 and 2.3.6 of this Chapter, and identify, at the same time, the priority wastes, priority geographical area and priority issues to be addressed in the Action Plan based on the results of the step (1).
- (3) To review the Paragraph 2.3.8 of this Chapter with special emphasis on the study of applicability of policies and strategies mentioned in this Chapter, and list up possible component programmes of the Action Plan taking into account the priority issues identified in the step (2) and the positive heritage of the SWM sector identified in the

step (1).

- (4) To list up the major parties both public and private involved in municipal SWM, clarify the responsibility of each party, and identify the coordination required between them.
- (5) To compare the two possible approaches (the approach without the Action Plan and the approach with the Action Plan) in dealing with the problems identified in (1), and describe the comparison results in the form of justification of the Action Plan formulation and implementation. It is recommended to study whether the justification shown in 2.2 is relevant or not.

As already mentioned, this conceptual framework has to be reviewed and finalized as the definitive framework through the works in the Action Plan Formulation Stage.

2.3.2.3 Preparation of the work plan

It is necessary to prepare, as the second part of the Inception Report, the work plan for the formulation and implementation of the National SWM Action Plan. As already mentioned in 2.3.2.1, the work plan is expected to deal with the question "HOW the National SWM Action Plan will be formulated and implemented?". The steps to be followed for the preparation of the work plan are as follows:

- (1) To estimate the available resources (human/physical/financial) in the promoter agency and other SWM-related agencies for the formulation and implementation of the National SWM Action Plan.
- (2) To prepare a time table for the National SWM Action Plan formulation based on the Figure 2-1, and work out an activity chart using the Annex 1 as a reference. Period required for the Action Plan formulation should not exceed twelve months. Only the essential and high priority activities should be included in this chart so that the Action Plan formulation would be finished within twelve months based on the available planning resources.
- (3) To prepare the terms of reference for each activity in the activity chart using the Annex 1 as a reference.
- (4) To study whether it is necessary and possible to organize a coordinating committee for the formulation and implementation of the National SWM Action Plan, list up, if it is affirmative, the agencies to be represented in that committee, and prepare the terms of reference for that committee reviewing the Annex 6.

2.3.3 Baic Requirements for Successful Plan Formulation

Any national plans become useful only when they are implemented successfully. Therefore, the followings are the basic requirements for the formulation of the Action Plan:

- (1) The unit which could work as a promoter of national reform in the area of municipal SWM should be identified, created and/or strengthened;
- (2) Any proposals in the Action Plan should have application feasibility within national reality;
- (3) Scope of the Action Plan (target wastes, target area and target year) should be clearly defined;
- (4) Any proposals in the Action Plan should be selected through a comparative study of various alternatives;
- (5) The structure of the Action Plan as well as its implementation strategies should be as simple as possible in order to promote the fast attainment of objectives;
- (6) The Action Plan should establish a series of incentives and disincentives that would motivate the active intervention of operational levels (local governments).
- (7) The Action Plan should establish a periodic evaluation system to check the efficiency or performance of the SWM sector. The evaluation result should be fed back to facilitate the timely modification of the Action Plan.

2.3.4 Target Wastes

In the Action Plan, target wastes should be clearly defined. Generally speaking, the following wastes will be covered as target wastes:

- (1) Domestic wastes including garden wastes;
- (2) Commercial wastes;
- (3) Institutional wastes (markets, schools, hospitals, public offices, etc.);
- (4) Street sweeping and grass cutting wastes;
- (5) Wastes collected from small drains.

The target wastes of the Action Plan can include, if necessary, the industrial wastes which are and/or can be accepted in municipal landfills. However, a separate national plan or strategy for the management of toxic and hazardous wastes should be prepared by relevant organizations at national level. Both national plans (one for municipal SWM and the other for toxic and hazardous SWM) should be compatible and properly coordinated.

2.3.5 Target Area

The Action Plan should cover the whole territory of the nation in question as its target area. However, priority target areas can be established covering only urban areas for practical purposes*. There are countries where capital cities and other municipalities are under the supervision of different ministries of central/federal governments. Coordinating committees will be required in that case to cover the whole national territory in the formulation and implementation of the Action Plan.

2.3.6 Target Year

The Action Plan should be prepared and implemented in accordance with the time frame of national development plans. Because of the action-oriented nature of the Plan, the target year should not be too far. Preferable plan period is from 5 to 7 years. Within the framework of the Action Plan, the activities to be carried out in each year should be duly planned, implemented and evaluated. Modification of activity plan should be done periodically based on the evaluation of the preceding year activities (See Annex 7).

2.3.7 Analysis of the Situation (Diagnosis)

The analysis of the situation can be carried out, among others, through the following measures:

- (a) Review of the existing documents and statistic information;
- (b) Interviews of the SWM related agencies at central/federal government level**;

* Definition of urban areas should be clear with little possibility of misunderstanding by the people who are expected to fill in the questionnaire (See Annex 3), appropriate for the purposes of the Plan and workable with little difficulty in data collection (especially demographic data). Generally speaking, the Action Plan will pursue to increase service coverage and improve the quality of public cleansing services (service approach) in urban areas while appropriate individual management of solid wastes by generators themselves (individual approach) will be promoted in rural areas through health education programme. Therefore, urban areas should be defined in such a manner that they just cover the areas where the service approach is cost-effective and the individual approach is physically impeded. It is not an easy task, but it is indispensable to work out a definition of urban areas which would satisfy all of the above-mentioned three conditions to a reasonable extent.

** A model checklist for the interview survey of SWM related agencies is attached as Annex 2.

- (c) Interviews of and field visits in the representative local governments*;
- (d) Mail survey to all/sampled local governments using a standardized questionnaire**.

In the analysis of the situation, the following items should be studied to examine comprehensively the present condition of the SWM:

(1) Information about the country

- Geography and climate
- Population
- Urbanization
- Health aspects
- Economic aspects

(2) Solid waste generation and service demand

- Solid waste generation
- Solid waste characteristics

(3) Public cleansing service sector

- Policy
- Planning of the sector
- Supply of public cleansing service
- Organizational aspects
- Equipment maintenance
- Technology
- Researches
- National industry
- National plans and projects in operation
- Human resources
- Garbage scavengers
- Financial aspects

(4) Identification of the problem area

- Unsatisfied service demand (coverage and quality)
- Operational aspects

* In the field survey of representative local governments, emphasis should be put on the identification of good experiences to be shared with other local governments as well as common problems encountered by them.

** As a reference, a questionnaire used in Malaysia is attached as Annex 3. Each country should prepare its own questionnaire taking into account its special conditions. It is advised to test the questionnaire before its use.

- Institutional aspects
- Managerial aspects
- Financial aspects
- Social aspects
- Implications for the environment and natural resources

Comprehensiveness of the diagnosis study should be determined taking into account the availability of study resources such as manpower and budget.

2.3.8 Action Plan Framework

After the analysis of the situation and in the light of the problems identified through that analysis, a framework for the Action Plan should be worked out including the following items:

- (1) Policies;
- (2) Objectives;
- (3) Goals;
- (4) Targets;
- (5) Component programmes and strategies of the Action Plan.

2.3.8.1 Policies

Policies are the most basic and long-term guidelines for the sector and will involve the decisions already made or to be made at the highest level. They should be consistent with other relevant plans such as the national development plan. The followings are the examples of such policies:

- (1) All solid waste should be collected and disposed of adequately in such a manner so as not to create public health and environmental problems;
- (2) Solid waste should be treated as a resource and all efforts must be made to recycle and recover most of the materials that are presently burnt or buried;
- (3) SWM services should be self financing and appropriate user charge should be imposed on beneficiaries of the service;
- (4) The private sector will be encouraged to provide solid waste collection and disposal services to a great extent;
- (5) The public will be continuously educated on cleanliness through cleanliness campaigns and the strict enforcement of the anti-litter regulations;
- (6) All urban centres will prepare SWM plans extending into the future;
- (7) Land for solid waste disposal will be identified and reserved for the

purpose;

- (8) Local governments throughout the country will be strengthened to be able to handle the SWM system in their area.

2.3.8.2 Objectives

Generally speaking, objectives of the Action Plan shall be to establish a firm technical, institutional and financial basis for providing a sound waste management system for the urban communities, to safeguard public health, to ensure clean urban centers, and to promote a higher standard of environmental quality. These objectives should be studied and modified based on the analysis of the situation.

2.3.8.3 Goals

Goals shall be set realistically in order to solve the problem of SWM and achieve the objectives. They shall be divided into service goals, economic goals, financial goals, institutional goals and social goals.

2.3.8.4 Targets

The evaluation of implementation results implies the quantification of goals through formulation of targets. Targets must consequently be set in detail about WHAT is expected to be achieved, HOW MUCH should be achieved, WHEN and WHERE.

2.3.8.5 Component Programmes and Strategies

Component programmes and strategies shall be identified and developed based on the above mentioned policies, objectives, goals and targets, and the identified problems and constraints of the existing SWM system. In other words, such programmes and strategies that would eliminate or reduce problems, and promote the achievement of objectives should be identified. Strategies should be developed taking into account the basic requirements shown in 2.3.3 and they may include the following:

- (1) Creation of model institutions with the help of motivated local governments and external technical assistance;
 - Formulation and implementation of master plans
 - Installation and use of weighbridges
 - Introduction of Solid Waste Management Information System (SWMIS) (computerized system)
 - Improved privatization (model contract and supervision)
 - Construction and operation of authentic sanitary landfills
- (2) Creation of a national financing (subsidy or soft loan) system to promote the installation and use of strategic but not expensive

facilities such as weighbridges coupled with the diffusion of standardized SWMIS know-hows;

- (3) Creation of a national training programme which diffuses the experience and know-hows of the model institutions to other local governments;
- (4) Introduction of a set of SWM-Maco-indicators (SWMMI)* which allow the objective evaluation of the performance of public cleansing services. SWMMI will make it possible to compare the performances of an institution in different times as well as those of different institutions. SWMMI should be introduced together with SWMIS;
- (5) Promotion of multimunicipal approaches for the final disposal in continuously urbanized metropolitan areas;
- (6) Promotion of intersectoral approaches such as shown in 2.2.(3);
- (7) Promotion of formulation and implementation of master plans in all local governments;
- (8) Persuasion of decision makers through the use of good quality audio-visual programmes and brochures on the necessity of systematic approaches to solid waste problems**.

2.3.9 Preparation of Component Programmes and Projects

The component programmes identified through the previous stage should be designed in detail and the required projects should be identified with the purpose to fulfill the Action Plan objectives and expedite the obtention of financing. Each programme or project should be developed so as to eliminate or reduce the problems and promote the achievement of objectives including, among others, the following items:

* As a reference, the macro-indicators developed by the Malaysian Government for the monitoring of municipal SWM master plans are attached as Annex 4. Usefulness of macro-indicators such as unit costs depends very much on the exact costing which is not so easy because of the deficient accounting system. As such the improvement of municipal accounting system is a must for the improvement of municipal SWM.

** Attractive naming of the Plan will be useful to get active cooperation of decision makers and other parties concerned. ABC (Action Plan for a Beautiful and Clean Malaysia) is the codename for Malaysia's National Solid Waste Management Action Plan.

- (1) Description of programme;
- (2) Objectives, goals and targets;
- (3) Implementation steps;
- (4) Implementation schedule;
- (5) Necessary human, physical and financial resources;
- (6) Financing;
- (7) Responsible agencies and their roles;
- (8) External technical assistance;
- (9) Administration and coordination of programme.

Concrete activities of the Action Plan are to be realized only through the implementation of each component programme. Therefore, the success or failure of the Action Plan will depend very much on the careful preparation of component programmes. Since the Action Plan is required to achieve tangible improvement effects within short and medium time period, its component programmes should be prepared as realistically as possible putting emphasis on full mobilization of existing resources*.

2.3.10 Implementation and Execution

Once the objectives, goals and targets of the Action Plan are defined, activities are programmed and financing is concrete, it arrives to the stage of implementation and execution of the Plan. As mentioned in 2.3.3.(1), the successful implementation of the Plan can become possible only through the dedicated works of the Plan's promoter agency. Although the promoter agency should endeavour to improve the municipal SWM based mainly on existing resources, it will be convenient to try to acquire additional resources if such additional input enhances remarkably the expected output.

Some of the additional input should be used for the strengthening of the promoter agency itself because it will contribute to the improvement of overall productivity. Therefore, the promoter agency should assess the necessity and possibility of its own development, and work out a practical plan to strengthen its technical, financial and institutional resource base.

It may also be necessary and convenient for that promoter agency to transform the coordinating committee for the formulation of the Action Plan into the one for its implementation. The coordinating committee for the Action Plan implementation should have the authority to draw the people and agencies and get them involved for the improvement of municipal SWM. The duties of the committee are, among others, as follows**:

* An example of component programme summaries is taken from ABC and shown in Annex 5. Preparation of programme summaries like this is indispensable to get the ideas of the Plan promoter agency understood by all the related parties.

** As a reference, the terms of reference of the Coordination Committee organized in Malaysia for the formulation and implementation of ABC are attached as Annex 6.

- (1) Coordinations of such activities that would enhance the efficiency and effectiveness of municipal SWM;
- (2) Supervision on and advice for the promoter agency of the Action Plan; and
- (3) Evaluation of the progress of the Action Plan.

It could be said that implementation and execution have their implicit elements in the programming and evaluation stages. However, the monitoring of progress and achievement of laid down objectives is so important that the highest level of the Action Plan will carry out its supervision. At the operative service level (local governments), the managers themselves will handle the process of implementation, since at this stage a whole series of intra and interinstitutional factors become relevant, including relations with the community that must be defined at that level of decision making. Making a decision is the fundamental element at this stage of execution and, in favour of that, the decision making level of all institutions engaged with the Action Plan should be permanently and concisely informed of the development of every activity of the process, through clearly defined indicators that will measure the progress and achievement of the programmed targets.

2.3.11 Evaluation

This fundamental stage is a basic instrument in the whole process of the Action Plan that expedites the revision of policies and laid down objectives as well as the redesigning and readjusting of some programmes and projects*. To this effect, both the efficiency and effectiveness of the Action Plan should be evaluated. The efficiency is connected with the internal functioning of the Action Plan, that is to say, how programmed activities are developed. The effectiveness is related to all the obtained benefits through the development of programmed activities. This stage also allows the systematization of data which can cover a wide range like: payroll; operation expenses in vehicles; inventories; register of personnel; information about any service charge (type of area, property evaluation, etc.); waste amount measurement; register of and payments collected from special users; cost control for services rendered; equipment maintenance; systematization of accounting; billing and collection of user charges.

* Periodical evaluation of the progress and plan readjustment can be promoted through the periodical meetings of the Coordination Committee (at least once per 12 months). A sample of evaluation reports presented to such a committee is attached as Annex 7.

2.4 MALAYSIA CASE STUDY:-ACTION PLAN FOR A BEAUTIFUL AND CLEAN MALAYSIA (ABC)-

2.4.1 Background

Malaysia is located in South-East Asia and a member country of ASEAN. She comprises the Malay Peninsular (West Malaysia), and Sabah and Sarawak (East Malaysia) as shown in Figure 2-2. Malaysia is a federative country consisting of thirteen states and the Federal Territory of Kuala Lumpur (Capital City). Her population is estimated to be 17.4 million as of June 1989. Malaysian economy used to depend mainly on primary commodities such as rubber, tin, timber, crude oil and natural gas. However, her conversion to industrialization in recent years has been remarkable.

Accerelated industrialization and urbanization in Malaysia will definitely complicate her SWM which is already a heavy financial burden for local governments. TABLE 2-1 and Figure 2-3 show that 27.9 per cent (average) of total local government expenditure is assigned to municipal SWM in the case of large local governments called Municipal Councils. In the case of small local governments called District Councils, the figure is even higher marking 50.7 per cent. In spite of this large financial input, collection service coverage is not sufficient, collection service quality is deficient especially in commercial areas and urban kampong areas*, and the final disposal is done in many cases as open dumping with its all environmental implications.

To cope with the above mentioned problems and to address the changing service demand in a systematic manner, it is indispensable for a National Action Plan for SWM to be formulated and implemented by national level relevant organizations to lead with a minimum cost to a continuous equilibrium between the service demand and supply quantitatively and qualitatively. Without the clear orientation of such a plan, many valuable resources will be wasted by the duplication and contradiction of efforts before the ever changing situations.

Malaysia's development has been guided by her Five Year Development Plans. Although municipal SWM is the most expensive part of the operation carried out by local governments, so far it has not been given due considerations in the Five Year Malaysia Development Plans. However, the Malaysian Government has been keen in improving the cleanliness of the country

* Urban kampongs are marginal settlements developed mainly along rivers and railways. Delivery of public services is deficient in urban kampongs including garbage collection.

Figure 2-2 Map of Malaysia

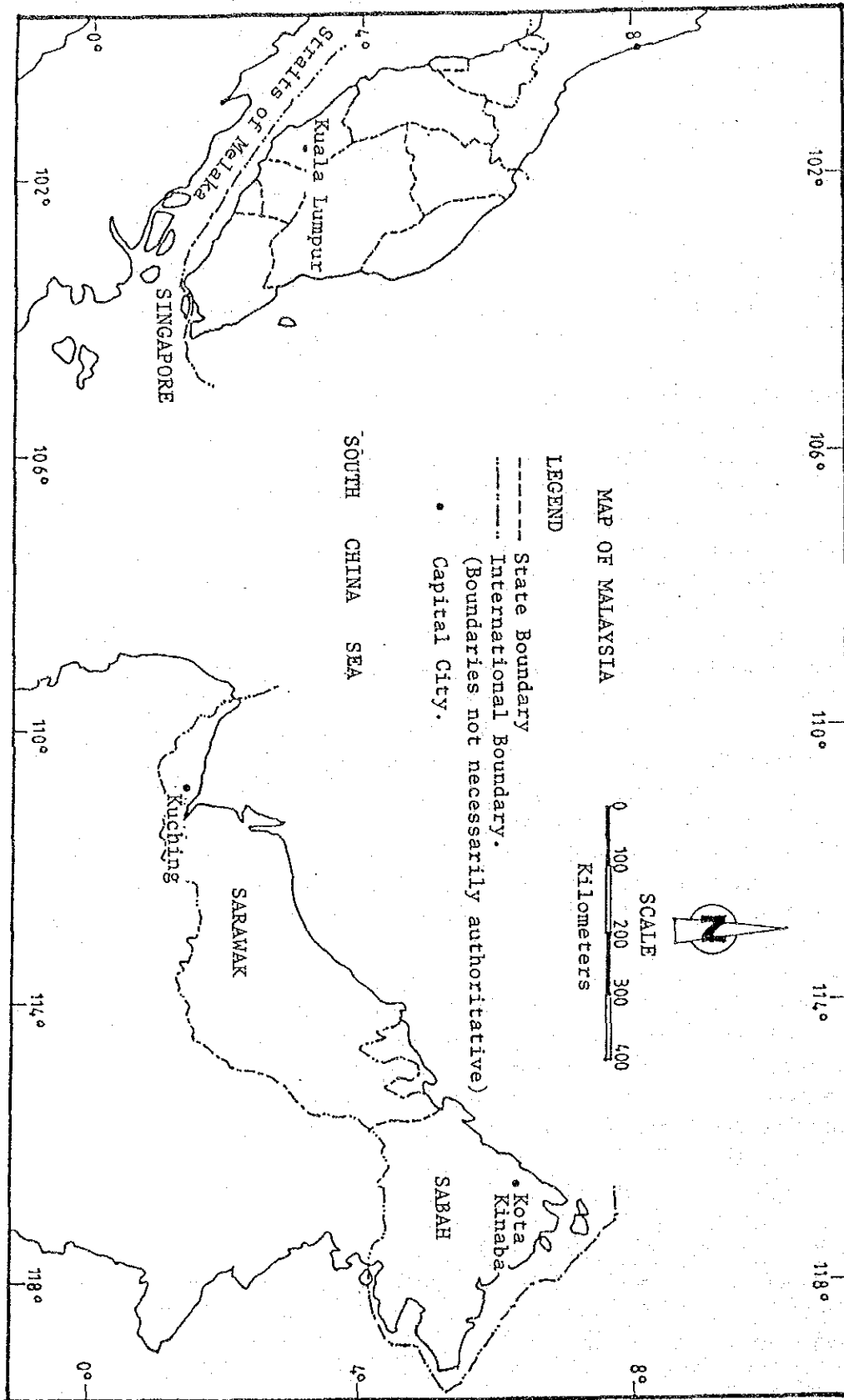


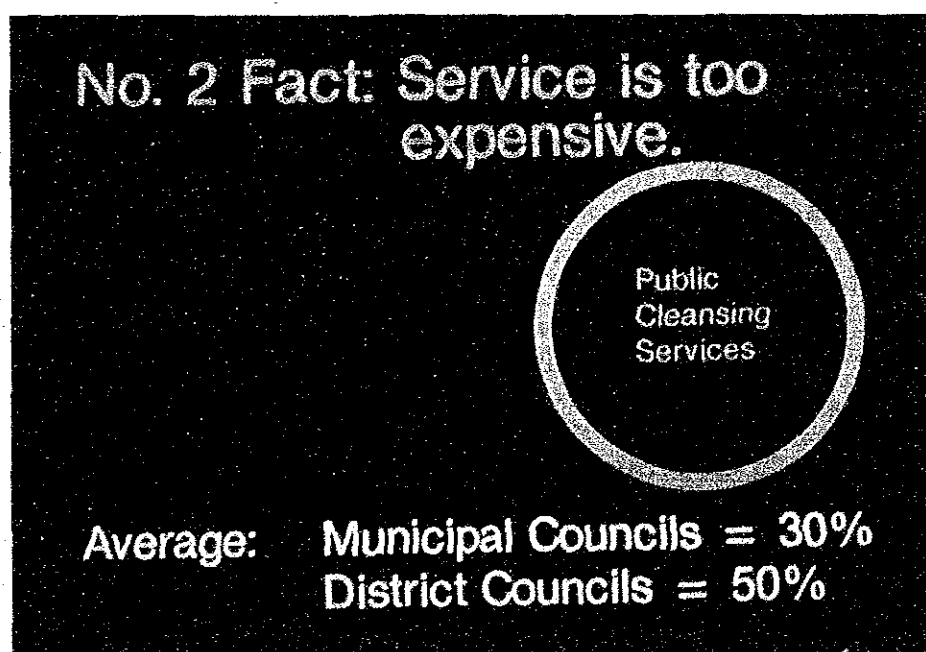
TABLE 2-1 : EXPENDITURE FOR PUBLIC CLEANSING SERVICES IN TOTAL EXPENDITURE OF MALAYSIAN LOCAL GOVERNMENTS

Percentage of Expenditure for Public Cleansing Service in Total Expenditure	Number of Local Governments			Percentage
	MCs	DCs	Total	
less than 10 %	0	0	0	0 %
10 % - less than 20 %	1	1	2	9.1 %
20 % - less than 30 %	5	0	5	22.7 %
30 % - less than 40 %	1	4	5	22.7 %
40 % - less than 50 %	0	1	1	4.5 %
50 % - less than 60 %	0	5	5	22.7 %
60 % - less than 70 %	1	1	2	9.1 %
70 % - less than 80 %	0	1	1	4.5 %
80 % - less than 90 %	0	1	1	4.5 %
90 % - 100 %	0	0	0	0 %
Total	8	14	22	100.0 %

Source : Action Plan for a Beautiful and Clean Malaysia (ABC), p.40
 Averages : MCs (Municipal Councils) = 27.9 per cent,
 DCs (District Councils) = 50.7 per cent

- Notes : (1) Total expenditure means the expenditure corresponding to operational and development budgets.
 (2) This Table covers all the relevant answers to the questionnaire survey carried out in May 1987. Although there are 15 MCs and 75 DCs in Peninsular Malaysia, only 8 MCs and 22 DCs contested.

Figure 2-3 An Illustration Which Shows Heavy Financial Burden Caused by Public Cleansing Service (from ABC Auto-Slide Programme)



and it is best shown by the fact that the National Cleanliness Campaign was launched towards the end of 1983 by her Prime Minister himself. The problem is that this initiative has not been supplemented by any concrete policies, plans and programmes leading to the strengthening of the municipal SWM system in Malaysia which is vital to sustain long-term cleanliness. This was just the reason why the formulation and implementation of a National Action Plan were required.

The necessity of national plan formulation and implementation was pointed out firstly in 1982 by PEPAS/WHO located in Malaysia*. Dr. Nakamura, the system engineer of PEPAS/WHO at that time, even formulated a conceptual framework of the national municipal SWM plan for the Government of Malaysia. This necessity was strongly perceived by Malaysia after 1983 National Cleanliness Campaign, and a request was made to Japan International Cooperation Agency (JICA) for the dispatch of a long-term expert specialised in SWM with the objective of national plan formulation. The author was dispatched to Malaysia as a JICA expert from October 1986 to November 1988. Malaysian National Action Plan for Municipal Solid Waste Management was code-named, for publicity reasons, as ABC (Action Plan for a Beautiful and Clean Malaysia). ABC formulation was carried out from April 1987 to June 1988 as a joint work of Malaysian Government staffs and the author. In Annex 1, the activity chart for the ABC formulation process is shown together with the terms of reference for each activity. After the successful formulation, ABC entered into its implementation stage in June 1988.

2.4.2 Basic Informations on ABC

Basic informations on ABC such as plan promoter agency, target area, target wastes, target year, etc. are shown in the following:

2.4.2.1 Promoter agency of ABC

The Technical Section of the Local Government Division of the Ministry of Housing and Local Government has been identified as the promoter agency of ABC. The Technical Section was formulated in 1980 to serve as a technical advisory section to local governments in all public health engineering and other engineering functions in urban areas, including SWM, sewerage and urban sanitation, urban drainage, road and building. Its activities consist of preparation of technical guidelines and by-laws, technical advice, design of key facilities, training of officers from local governments, research and evaluation of consultants' technical reports.

* "Development of a conceptual framework for the national urban solid waste management plan", Assignment Report 28 April - 12 May 1982 by Dr. Masahisa Nakamura, PEPAS/WHO

2.4.2.2 ABC Steering Committee

The most important three legislations relevant to municipal SWM are Local Government Act 1976, Town and Country Planning Act 1976, and Street, Drainage and Building Act 1974, and the matters related to these three legislations are the attributions of the Ministry of Housing and Local Government. However, these legislations are valid only in Peninsular Malaysia (West Malaysia). Sabah and Sarawak (East Malaysia) are not subject to these legislations because of the historical background of Malaysia. In West Malaysia, the Ministry of Housing and Local Government has the attribution to give advice to all the local governments except the Federal Territory of Kuala Lumpur (City of Kuala Lumpur). The City of Kuala Lumpur is under the direct supervision of the Prime Minister's Department. Therefore, the Ministry of Housing and Local Government has established a coordinating committee for the formulation of ABC (ABC Steering Committee) inviting all the major institutions relevant to SWM including the City of Kuala Lumpur. At the same time, the Ministry tries to diffuse the ideas of ABC to East Malaysia through the National Council for Local Government (NCLG), because the States of Sabah and Sarawak are represented in NCLG and its resolutions bind all states and federal territories including Sabah and Sarawak. NCLG is one of the two national councils established by the Constitution of Malaysia and the Ministry of Housing and Local Government works as its Secretariat.

2.4.2.3 Target area of ABC

The target area of ABC is the whole of Peninsular Malaysia including the Federal Territory of Kuala Lumpur. However, priority is given to urban and semi-urban areas where the service approach for municipal SWM is cost-effective and individual approach is physically impeded, while appropriate individual management of solid wastes by generators themselves will be promoted in rural areas by the Ministry of Health through the health education activities of National Environmental Sanitation Programme.

2.4.2.4 Target wastes of ABC

In ABC, the following wastes are covered as target wastes:

- Domestic wastes;
- Commercial wastes;
- Institutional wastes (markets, schools, hospitals, public offices, etc.);
- Street sweeping wastes;
- Garden wastes and grass cutting wastes;
- Construction wastes;
- Wastes collected from drains and water courses in urban areas;
- Beach cleansing wastes;
- Industrial wastes which are and/or can be accepted in municipal landfills (toxic and hazardous wastes are excluded).

As for toxic and hazardous wastes, a national plan for their management had already been prepared by the Department of Environment at the time of ABC formulation.

2.4.2.5 Target year of ABC

The target year of ABC is set for 2010. In ABC, a National Policy on Municipal Solid Waste Management is proposed. The objective of the proposed Policy is to establish by the year 2010 such municipal SWM systems that would cover the whole of Malaysia (both East and West Malaysia) which are uniform, cost-effective, environmentally sound and socially acceptable enhancing further the image of Malaysia as a beautiful and clean country. ABC is planned to be implemented in four phases covering the periods 1988-1995, 1996-2000, 2001-2005 and 2006-2010 coinciding with the phasing of Malaysia Development Plans. The First Phase ABC is formulated in such a manner that immediate, short-term and medium-term improvements would be achieved by 1995 which is the last year of the Sixth Malaysia Plan.

2.4.2.6 Planning framework of the First Phase ABC

Planning framework of the First Phase ABC is as follows:

	1988	1995
(1) Urban population in Peninsular Malaysia (million)	6.05	7.80
(2) Refuse collection service coverage (per cent)	85	100
(3) Served population (thousands)	5.14	7.80
(4) Refuse generation rate (kg/capita/year)	241	277
(5) Refuse bulk density (kg/cu.m.)	200	186
(6) Collected refuse tonnage (million ton/year)	1.24	2.16
(7) Collected refuse volume (million cu.m./year)	6.20	11.60
(8) Public cleansing service cost (million Malaysian Dollars/year, 1US\$=2.57M\$)	124	216

2.4.2.7 Benefits of ABC

A series of benefits are expected to be realized through the implementation of ABC. These benefits are:

- (1) the establishment of a public cleansing system at the local government level which is simple, complete and dynamic;
- (2) a higher standard of public health;
- (3) a clean and beautiful environment;
- (4) better quality of life;
- (5) better flood control, especially in urban areas;
- (6) higher social discipline and heightened public awareness;
- (7) a congenial environment to promote tourism;
- (8) reduction in cost and optimization of existing resources.

As for reduction in cost, it is expected that ABC when implemented would achieve at least ten per cent cost saving which is estimated to be 22 million Malaysian Dollars per year in 1995. As mentioned in 2.4.4, a total of 26 million Malaysian Dollars (10 million US Dollars) would require to be expended to carry out the First Phase ABC (1988-1995). Thus the cost saving to be achieved by ABC implementation is large enough to justify the expenditure for ABC.

2.4.3 Strategic Programmes of ABC

The first phase of ABC covering the period 1988-1995 consists of twelve sector programmes each with specific objectives and goals towards a systematic development of SWM in Malaysia. The title and the brief description of each programme are shown in the following:

Programme 1 : Institution building

To promote the establishment of Urban Services Department in all local governments to purely look after public cleansing service and put the manpower and equipment necessary for this service under the control of that Department.

Programme 2 : Inter-agency and inter-ministerial coordination

To identify systematically the necessities for inter-agency and inter-ministerial coordination and carry out these coordinations through appropriate channels.

Programme 3 : Master Plans for all Municipal Councils

To promote the formulation and implementation of municipal SWM master plans for all Municipal Councils*.

Programme 4 : Municipal SWM improvement in District Councils

To develop appropriate practices of municipal SWM for District Councils adapting Programme 5, Programme 6 and Programme 10 to the technical, financial and institutional conditions of District Councils through model projects and applied researches (Programme 12). The appropriate practices thus developed shall be diffused to all District Councils through Programme 7 and guidelines.

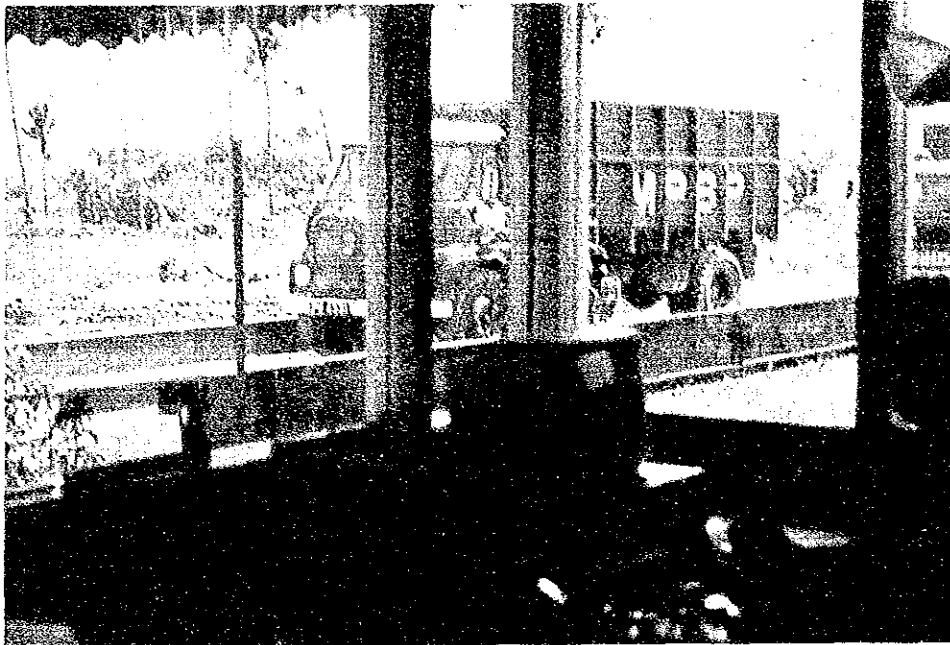
Programme 5 : Productivity improvement in refuse collection coupled with the use of weighbridges

To carry out training workshops on time and motion study, supervise the implementation of productivity improvement action plans to be formulated in the workshops and promote the installation and use of weighbridges**.

* The model master plan has been formulated and put into operation for the Municipal Councils of Pulau Pinang and Seberang Perai getting the technical assistance from JICA.

** Eleven computerized weighbridges have been installed at the entrance of strategic landfills in Peninsular Malaysia getting the technical assistance from JICA. In some Municipal Councils such as Seberang Perai, their use has already achieved a remarkable improvement in the productivity of refuse collection. See Figure 2-4.

Figure 2-4 A Computerized Weighbridge Installed at the Entrance of Permatan Pauh Landfill Site of the Municipality of Seberang Perai according to Programme 5



Programme 6 : Sanitary landfills for all Municipal Councils

To design, construct and operate sanitary landfills in all Municipal Councils and carry out training workshops on sanitary landfill.

Programme 7 : Establishment of permanent training system of SWM personnel

To strengthen the component of municipal SWM in the training programmes of public health inspectors and public health assistants, develop prototype workshops on principal topics of municipal SWM and repeat these workshops using the network of existing training institutions.

Programme 8 : Strengthening of SWM enforcement and education

To develop a guideline on SWM enforcement and education based on a study of successful cases and encourage local governments towards better SWM enforcement and education through diffusion of the guideline, training of their staff at collection productivity improvement workshops and direct advices.

Programme 9 : Improvement of equipment management

To develop and diffuse improved equipment management system through demonstration projects which include as components, among others, planned preventive maintenance, planned replacement, vehicle history recording, spare parts inventory control and drivers and mechanics training.

Programme 10: Careful and successful privatization of SWM services

To revise the existing draft guideline on the privatization of collection service adding the guidelines on the privatization of other related services, organize a training workshop on privatization and give technical

advice on the matter of privatization to local governments on request basis.

Programme 11: Development of SWM information system and the monitoring of ABC performance

To develop a computer-based Solid Waste Management Information System (SWMIS) through demonstration master plan studies of Programme 3, diffuse SWMIS know-how through various training workshops to be organized under Programme 7 and promote the installation of hardwares (electronic road weighbridges fitted with micro-computers) getting the assistance of international technical cooperation agencies. To develop macro-indicators for municipal SWM (MIMSWM), promote the use of MIMSWM by local governments and evaluate MIMSWM to monitor ABC. ABC performance shall be monitored also by watchdog agencies such as the Department of Environment, the Tourist Development Corporation and the National Cleanliness Campaign Committee.

Programme 12: Promotion of applied researches

To identify the urgent needs of applied researches for municipal SWM and coordinate their conduct as well as the diffusion of research results.

These twelve sector programmes are designed to achieve definite and tangible improvement effects on SWM by 1995 mobilizing fully the existing resources with minimum but obligatory additional resource inputs.

2.4.4 Implementation Mechanism of ABC

Any national plans become useful only when they are implemented successfully. Experiences also show that successful implementation can take place only when these plans are equipped with such units that could work as dedicated promoters of the plans. In the case of ABC, it has been confirmed that the most appropriate unit as its promoter is the Technical Section of the Local Government Division, the Ministry of Housing and Local Government, because of its attribution to work as an advisory agency for local governments regarding technical matters related to municipal SWM.

To guarantee strong coordination among SWM related agencies in the stage of ABC implementation, the ABC Steering Committee which worked for the formulation of ABC has been transformed into the Permanent Standing Steering Committee for ABC. This Committee has the authority to draw the people and agencies and get them involved for the improvement of municipal SWM. The duties of the Committee are, among others, as follows:

- (1) Coordinations of such activities that would enhance the efficiency and effectiveness of municipal SWM.
- (2) Supervision on and advice for the promoter agency of ABC (Technical Section).
- (3) Evaluation of the progress of ABC.

The Committee meets at least once in every six months to review the proposals and reports prepared by the Technical Section. Proposals show the

activities to be done in the next six months for each of twelve strategic programmes as well as the agencies responsible for their implementation. On the other hand, reports show the evaluation of the activities done in preceding six months. Through this evaluation, the achievement of proposed activities is systematically measured and remedial measures are proposed if necessary.

As mentioned in 2.4.1, substantial financial resources have already been allocated to solid waste sector. As such the use of new resources for ABC should be restricted to the absolutely necessary cases. Then, the motto of ABC is to do more with less through the efficient and effective use of existing resources within/without the country. Additional financial resources required for the first phase of ABC (1988-1995) are estimated to be 26 million Malaysian Dollars (10 million US Dollars) to cover 7.8 million urban population (estimated for 1995) in Peninsular Malaysia (0.16 US\$/person/year). Required additional financial resources are broken down as follows:

- (1) Preparation of 15 master plans-----10.0 million Malaysian Dollars
- (2) Installation of 14 weighbridges*---1.0 million Malaysian Dollars
- (3) Design and construction of 15 sanitary landfills
-----15.0 million Malaysian Dollars

To acquire the full support for ABC from national and local level decision makers as well as international aid agencies, and to get the abovementioned additional financial resources allocated for ABC, it is crucial to get them to understand the essence of ABC using good quality Audio-visual materials. As such the Technical Section has prepared the ABC auto-slide programme in both Malay and English (See Figure 2-5). Through the projection of that programme in various forums, ABC has won recognition from various parties.

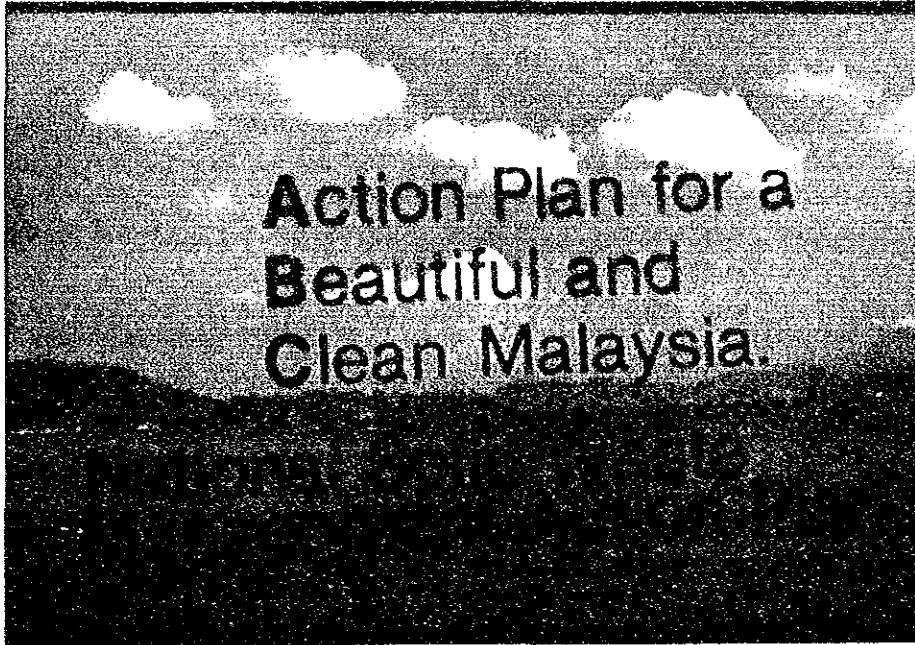
2.4.5 Achievements of ABC

The evaluation of ABC achievement was done one year later after the commencement of ABC implementation phase. According to that evaluation, ABC had been implemented more or less as planned achieving some tangible improvement effects.

A model municipal SWM master plan has been successfully formulated for the Municipal Councils of Pulau Pinang and Seberang Perai (planning procedures of master plans are discussed in detail in Chapter III). Immediate improvement plans prepared together with the master plan have already been implemented with favourable results. Other Municipal Councils are advised by the Ministry of Housing and Local Government to follow this model.

* Projects (1), (2) and (3) are planned for 15 Municipal Councils. However, one weighbridge had already been installed in one Municipal Council at the

Figure 2-5 Title of the ABC Auto-slide Programme



Eleven weighbridges fitted with computer have been donated by JICA and installed at the entrance of landfills of eleven Municipal Councils. Therefore, twelve from fifteen Municipal Councils in Peninsular Malaysia are now equipped with computerized weighbridges. Some Municipal Councils have increased collection productivity by the use of weighbridges. Some others are now practising sanitary landfill method in the final disposal of collected solid wastes.

Training activities have been carried out actively to develop well prepared personnel for SWM. Workshops for the training of public health inspectors have been held on the topics of collection productivity improvement, sanitary landfill, privatization of services, and master plan formulation and implementation. Applied researches have also been carried out to develop appropriate solid/liquid waste management systems for urban marginal settlements.

2.5 ROLE OF METROPOLISES IN NATIONAL ACTION PLANS

Metropolises in developing countries are the leading local authorities in their respective countries serving as models for other local authorities. They are endowed with better physical, financial and human resources compared with other local authorities. As such they are expected to play special roles within the framework of national action plans.

With better coordination by national action plans, metropolises can serve as models in more efficient manner. Their efforts to adapt their SWM systems to changing environment will be supported by the national governments. Their experiences and know-hows thus acquired will be disseminated systematically to other local authorities through relevant programmes of national action plans.

Benefits to be achieved through close cooperation between the national level promoter agencies and the solid waste services of metropolises are mutual. On one hand, metropolises will receive extra inputs from national governments. On the other hand, national level promoter agencies, who are not the operators of solid waste services, can conduct pilot projects only through that kind of cooperation.

Establishment of an association of public cleansing services under the initiative of the national government and the metropolitan government may be useful to carry out the exchange and transfer of experiences and know-hows in a systematic manner. Such an example is the case of Japan Waste Management Association (JWMA) which was founded in 1947 under the strong initiative of Tokyo Metropolitan Government and other metropolises in Japan. JWMA was reorganized into a national government authorized institution in 1976. Since then JWMA has been enjoying the systematic support from the Japanese Government and it possesses nowadays approximately 1000 local governments as its members. JWMA serves as an important forum to crystalize concerted efforts of Japanese local governments to overcome ever increasing solid waste problems.

However, it is recommended to assess carefully the applicability of the abovementioned concept in each case. Conditions of metropolises may be too different from those of other less privileged local authorities to apply their experiences. It is probable that metropolises suffer from such problems that are not common for smaller local authorities. It is also probable that metropolises and other local authorities are under different ministries of national governments. That is the case for Malaysia. Above-mentioned cooperation may not be so easy in such cases. To overcome that difficulty, the Ministry of Housing and Local Government of Malaysia has established a Permanent Standing Steering Committee for ABC getting the participation of the City of Kuala Lumpur.