MINISTRY OF PUBLIC WORKS
THE REPUBLIC OF INDONESIA

THE REPUBLIC OF INDONESIA

DEVELOPMENT OF BASIC DESIGN OF DRAFT MANAGEMENT CRITERIA FOR SEWERAGE SERVICE PROVIDERS

BASIC DESIGN OF DRAFT MANAGEMENT CRITERIA FOR SEWERAGE SERVICE PROVIDERS

(FINAL)

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JAPAN INTERNATIONAL COOPERATION AGENCY
NIHON SUIDO CONSULTANTS CO., LTD.

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Exchange Rate

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FOREWORD

This Basic Design of Draft Management Criteria for Sewerage Service Providers is a part of the survey report of a project of "Development of Basic Design of Draft Management Criteria for Sewerage Service Providers in Republic of Indonesia" conducted by Japan International Cooperation Agency (JICA), carried out by Nihon Suido Consultants Co., Ltd. (NSC), and is targeting to provide the basement of draft guidelines for management mainly for newly establishing sewerage service providers in Indonesia.

These draft criteria introduces general introductions and typical methodologies on each issue as criterion, and should be reviewed, examined and developed by additional study or survey and review by Indonesian side or/with international technical assistance.

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

DEVELOPMENT OF BASIC DESIGN OF DRAFT MANAGEMENT CRITERIA FOR SEWERAGE SERVICE PROVIDERS IN REPUBLIC OF INDONESIA

BASIC DESIGN OF DRAFT MANAGEMENT CRITERIA FOR SEWERAGE SERVICE PROVIDERS

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List of Abbreviations

Abbreviation	Definition
ADB	Asian Development Bank
ADSCR	Annual Debt Service Coverage Ratio
B/S	Balance Sheet
BLUPAL	Public Service Organization of Sewerage Management
BOT	Build-Operate-Transfer
BOO	Build-Own-Operate
CFS	Cash Flow Statement
DSCR	Debt Service Coverage Ratio
DSDP	Denpasar Sewerage Development Project
E&M	Electrical and Mechanical
EIA	Environmental Impact Assessment
EIRR	Economic Internal Rate of Return
EMS	Environmental Management System
ERM	Emergency Response System
ERS	Emergency Response Manual
EUR	Euro
FIRR	Financial Internal Rate of Return
FIS	Financial Information System
G/T	Goal and Tool
GIS	Geographic Information System
GNP	Gross National Product
Ha	Hectare
HRD	Human Resource Development
HRM	Human Resource Management
I/S	Income Statement
IBRD	International Bank for Reconstruction and Development
IDA	International Development Association
IDIJ	Infrastructure Development Institute - Japan
IDR	Indonesian Rupee
IFC	International Finance Corporation
ISO	International Organization Standardization
JICA	Japan International Cooperation Agency
JPY	Japanese Yen
LFL	Like-For-Like
LIBOR	London Inter-Bank Offered Rate
LLCR	Loan Life Coverage Ratio
lit	Litter
NGO	Non-Governmental Organization
NRW	Non-Revenue Water
NSC	Nihon Suido Consultants Co., Ltd.
O&M	Operation and Maintenance
OJT	On-the-Job Training
PD PAL JAYA	Jakarta Raya Local Sewerage Management Enterprise
PDAM	Water Supply Enterprise
PF	Pour Flush
PI	Performance Indicator
PKK	Empowerment of Family Welfare
PLCR	Project Life Coverage Ratio
PPLP Bali	Provincial Environment and Sanitation Development Agency of Bali
PS	Pumping Station
PT SMI	Multi Infrastructure Facilities Limited Company
QMS	Quality Management System
RPJMN	National Medium-term Development Plan
SANIMAS	Community-Based Sanitation in Indonesia
SOP	Standard Operating Procedure
STEP	Special Terms for Economic Partnership
STF	Special Task Force
THB	Thai Baht
USD	United States Dollar
WASH	Water and Sanitation for Health Project
WB	World Bank
WS&SSE	Water Supply & Sewerage Service Enterprise
WWTP	Wastewater Treatment Plant

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List of References

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CHAPTER 1

INTRODUCTION

CHAPTER 1 INTRODUCTION

1.1 General

The overall service rate of large-scale sewerage systems in Indonesia remains as low as 1.3 % to 3.0 %. According to the Census 2007, coverage ratio of basic sanitation facilities i.e. septic tank is 90.5 % in urban area and 67 % in rural area. On the other hand coverage ratio of off-site system is only 2.3 % in 12 cities. The urgent challenges for Indonesian for sewerage sector are to commence the establishment of sewerage service and management structure, development and improvement of sewerage systems, and development and expansion of sewerage service covered areas.

Although sewerage works is one of the public services, it is quite different from other public works such as road and rivers.

The most substantial difference is the importance of maintenance and enormous budget required for maintenance of sewerage system. Once it commenced operation, wastewater treatment plant has to treat inflow sewerage as long as it is there. More over, if an appropriate maintenance is not implemented, sufficient function is not derived and no expected result for sewerage works is obtained.

The second difference is that construction and maintenance of sewerage works requires not only technical knowledge of civil and architecture but also that of electricity, machinery, biology, chemistry and so on. It is sometimes not easy for organization newly participate in sewerage works to hire engineers of those technical fields from the beginning.

The third significant difference is that sewers, pumping stations and wastewater treatment plants are considered to be a sequence of sewerage system. In case of road or park construction for example, a partial completion may perform some degree of functions. However in case of sewerage works, without any of sewers, pumping stations and wastewater treatment plants, no function is derived. Therefore sewerage works require long period and huge budget from the commencement of the works till appearance of service effect of the works.

In consideration of these differences, importance of management of sewerage works comes to light.

The management of sewerage has responsibility of making effort to work out to sustain and improve sanitation, preserve the water quality, take measure of the stormwater and environmental effect with following policies.

1.1.1 Basic Concept for Management of Sewerage Service Provider

Sewerage system must be managed to provide necessary service to all user with holding the convenience as possible. Therefore, the basic concepts what sewerage service provider must keep are listed as follow:

- To manage sewerage service with following of laws, regulations, standards and so on, with respect of natural condition and regional culture and tradition, and with taking other factors into consideration.
- To define the function and role of each organization, department and section to clarify the responsibility.
- To establish clear, reasonable and fair charge structure.

- To ensure soundness of system over the long term with consideration of economic impact.
- To meet the needs and matters of areas and users.
- To optimize the cost efficiency with consideration of environmental issues.
- To ensure the transparency and fairness in the management.
- To aware the importance of sewerage to the users.
- To manage the sewerage system properly.
- To make effort of improvement of the sewerage system.
- To ensure financial well-being.
- To make effort of cost saving and administrative improvement.
- To analyze of management with appropriate methods.
- To evaluate the condition and performance of management by objective indicators.
- To prepare documented procedure and instruction of risk management.

1.1.2 Support for Needs of Users

Required special considerations concerning satisfaction of users against sewerage services are listed as below:

- To recognize the needs of users and reflect to the management.
- To deal complains and pointed issues from users quickly and appropriately.
- To provide for face to face meetings between service provider and users.
- To hold events with using sewerage facilities.
- To attend regional or community events.
- To disclose information lucidly.

1.1.3 Water Resources Conservation and Environmental Protection

Sewerage has responsibility of reduction of negative impact to public water body, preservation of water quality and production of comfortable water environment. Policies below are required to fulfill the sewerage service provider's work obligations:

- To make contributions to create integrated and sustainable water cycle.
- To conserve the water quality in public water body.
- To protect water resources for water supply.
- To operate sewerage system in consideration of environmental protection.
- To announce and disseminate the material which have negative impacts on public water body and sewerage system.
- To announce and disseminate duty to connect to sewerage system.
- To observe the laws and regulations in parallel with consideration of the needs of users such as quality of effluent, exhaust gas, noise, vibration, odor, and so on.
- To mind treatment, disposal and effective utilization of sludge.
- To make arrangement of overflow water from combined sewerage system.
- To make arrangement of non-point contamination of stormwater from separated sewerage system.
- To create sound water cycle by recycle-use of treated sewerage.
- To make efficient use of generated sludge, byproducts and energy for green farm, construction material and so on.

1.1.4 Operation and Maintenance of Sewerage System

Sewerage system is lifeline of lives of inhabitant and urban activity, therefore continuous and systematic operation and maintenance is required. The activity of operation and maintenance are mentioned as follows:

- To operate and maintain sewerage system to keep appropriate quality of services and precaution of accident such as provision for structural deterioration aged equipment, road sagging caused by damaged sewer pipe and so on.
- To retain stable effluent quality despite of fluctuation of influent quantity and quality.
- To establish the system for handling of the emergency disasters or accidents as listed in followings:

  - To provide the disaster information to relevant organizations.
  - To make effort for measures of storm water drainage system by appropriate operation and maintenance.
  - To ensure the public sanitation on the assumption of damages.
  - To establish the system for handling in case of leakage or influx of toxic, hazardous, or detonable substances.
- To carry out periodical maintenance of the backup equipment.
- To recover the system rapidly.
- To innovate new technologies or methods for improvement of services.
- To improve monitoring system for prevention of inflow of hazardous substances from industrial sectors.
- To reduce leakage or influx of water in the sewerage system.
- To hold communications with relevant organizations periodically.

1.1.5 Staff

Special considerations required for management of sewerage system and services are listed below:

- To ensure the health and safety of staff.
- To identify the level of abilities and capacity of staff, and allocate proper arrangement of personnel.
- To make staff keep observation of laws and regulations.
- To train staff for capacity building and development.
- To arrange qualified personnel in management and control position.
- To work in a cordial and friendly atmosphere.

1.2 Purpose

The purpose of development of this Basic Design of Draft Management Criteria is the basis as the sample for the preparation of the more detailed and concrete management criteria which shall be prepared and developed by Indonesian side to establish new providers or improve the existing providers. Again, Indonesian side should be proactive in developing the management criteria. These draft criteria introduces general introduction and typical methodologies on each issues as criterion, and should be reviewed, examined and developed by additional study or survey by Indonesian Side or/with international technical assistance. The further development of the management criteria needs basic concept and policies based on National Sewerage Law.

1.3 Target of Appliance

This basic design is mainly targeted on sewerage service provider which newly implements sewerage works. However it will be useful for reviewing sewerage works for sewerage service provider where sewerage works have been operated already. And some of contents can be applied to water supply sector.

CHAPTER 2

SEWERAGE DEVELOPMENT

CHAPTER 2 SEWERAGE DEVELOPMENT

2.1 General

Development of sewerage works usually proceeds by the following process. (See ***Table 2.1.1***)

Table 2.1.1 - Process of Sewerage Development

Process	Contents
Decision of Implementation of Sewerage Works	Development method, target year and financial measure etc. are decided by municipality.
Master Plan	Service area, scale of sewerage works in circa 20 years, treatment process and treatment site etc. are revealed.
Feasibility Study	Identify the most important and feasible project in the master plan
Environment Impact Assessment	Wastewater treatment plant is an object for environment impact assessment.
Acquisition of Treatment Site	Based on the basic design, treatment site of required dimension is acquired. Wastewater treatment plant is always considered to be troublesome facilities for vicinity resident therefore diligent communication with them is required.
Detail Design	Based on the basic design, those facilities are minutely designed.
Approval of Sewerage Works by National Government	
Construction	Construction term of treatment plant is usually 1 to 3 years which depends on treatment process and capacity. Construction of sewer net works lasts until sewered area covers master plan area.
Commencement of Operation	
Management of Sewerage Works	Operation and maintenance of sewerage facilities, customer service and service charge collection etc. are carried out. Asset management is implemented for intentional rehabilitation to come.

It takes approximately 4 to 7 years from the decision of implementation of sewerage works to commencement of operation of treatment plant, which depends on wastewater treatment process and scale of sewerage works. However management of sewerage works including expansion of service area, operation and maintenance of sewerage facilities and rehabilitation has to be carried out ever afterwards of commencement of operation. Therefore sewerage works has to be designed in consideration of the following three respects in order to prevent financial burden of sewerage service provider.

2.1.1 Importance of Prospect

Without prospects for various parameters to come, no sewerage plan can be implemented. And prospects are in need of supposition. Therefore appropriate supposition is important for an appropriate sewerage plan. It is necessary to consider importance of each parameter and balance of whole parameters. In order to cope with contingencies in the future, flexible plans such as step-by-step construction, provisional facilities and simple plants should be adopted.

2.1.2 Efficient Development Procedure

It requires huge budget to construct and maintain sewerage system. Consequently sewerage works has to pursue efficient development. In order to avoid futility of the works, it is effective to adopt common design specifications and common use of facilities. When recycled use of treated wastewater is required, relevant advanced treatment processes like biological nitrogen removal process, biological phosphorus removal process and ozonation have to be considered. However because construction and O&M cost for advanced treatment is much higher than other process, it is necessary to consider who pay for additional cost in advance.

Some examples of standardize and coalitions are shown as follows:

(1) Examples of standardization

- Applications Format
- Abbreviations
- Unit of Measurements
- General Specifications
- Contract Format
- Cost Estimation System
- Drawing Format
- GIS Format
- Format of Asset and Customer Database
- Construction Materials and Equipment
- Examinations and Qualifications
- Others

(2) Examples of coalitions

- Water Supply Management and Sewerage Management and System
- Policies, Strategies, Plans, Programmes and Projects
- Survey, Assessment, Planning, Design, Construction & Supervision and O&M
- Offices, Monitoring & Control System and Equipment
- Customer Service System, Service Centres, Call Centres and Communications
- Asset & Customer Database and Management System
- Billing and Collection System
- Computer Network and Equipment
- Sewer Collection System and Pumping Stations
- Treatment Plant
- Laboratory Facilities and Equipment
- Mobile Sludge Disposal Facilities
- Sludge Transportation Equipment
- O&M Equipment
- Sludge Disposal and Treatment Facilities and Equipment
- Public Communication, Awareness and Educations
- Emergency Response System and Manuals
- Quality Control Systems
- Risk Management Systems
- Human Resources Management & Development and Technology Development
- Others

2.1.3 Preservation of Cooperative Relation with Inhabitants

Sewerage serves for preservation of amenity lives of people and vicinity environment, therefore resident tax, connection fee and service charge are used for construction and maintenance of the system. However sewerage system is not always beneficial. For example sewer pipe construction may cause traffic block and wastewater treatment plant may cause complaint of people on the periphery of the plant by generating stench. If residents' understandings for sewerage works are insufficient, they may estimate their damage excessively.

Therefore, residents' awareness, understanding and agreement of sewerage works are strongly required from the beginning of the project to commence the project smoothly. It may form a proper relationship with relevant residents.

Sewerage system is usually invisible but sewerage works should be visible for residents. Basic framework of sewerage works, construction schedule, cost burden, efficiency of the works and so on are recommended to be announced.

2.2 Basic Survey

It is obvious that sewerage services must conform technologically to the topography of the site and the distribution of the population, but after commencement of service, conformation of condition of economy, industry, and existing water, sewerage and other sanitary facilities are required from management perspective. In addition, through socio-economic survey such as questionnaires or personal interviews with the inhabitants, it must be ascertained what their needs are and what would be a feasible charge.

2.2.1 Socio-Economic and Industrial Conditions

Sewerage works have a close connection with the socio-economic and industrial fields, such as the characteristics of the region in question, the state of social development, economic activity, population, residential environment of the inhabitants, etc. For the reason, the following information and data must be collected in order to judge the feasibility of the introduction of sewerage system into the area.

(1) Budget of the central government, that of the local government in the district where the project is planned and plans of national and regional development
(2) Economic indices (GNP, GNP per capita, foreign currency earnings, consumer price index, resident income levels)
(3) Industrial structure and leading industries in the project area
(4) General utility and water charges

Sewerage works require a vast amount of capital investment. After commencement of operation, cost for operation and maintenance (O&M) of facilities also requires a vast amount of budget, and it sometimes exceeds the cost for depreciation of capital investment.

An important point that must first be borne in mind in sewerage works projects is to select the optimum facilities for the region at a low construction cost, and optimum operation and maintenance of facilities. In other words, the project management for sewerage service must be sufficiently profitable in order to be continued.

Regarding financial aspects, for judging profitability a grasp of the necessary indices in the socio-economic and industrial fields, such as the special features of the region where the project is carried out, the state of social development, economic activity, population and the residential environment of the inhabitants is required.
In order to implement a specific sewerage project several basic standards of selection are necessary to be satisfied as below:

(1) Scale of the national budget in question and proportion of the budget allocated to the public works including sewerage works, and the connection with national development plans which is precedent to regional development plan are required. And outline of the local government budget which controls the project area and the plans for regional development is needed.

(2) The confirmation of economic indices such as Gross National Product (GNP), GNP per capita, and foreign exchange income, consumer prices and resident income levels is a basic requirement for judging the scale of a project. When domestic procurement is difficult for the construction of facilities, and procurement of foreign products is necessary, foreign exchange income and consumer prices are the basis of estimating the total amount of budget.

(3) In the preferred form of project management, there should be a close connection with the industrial structure and leading industries in the region. Grasping their actual state will be beneficial for the continuation of management.

(4) Because sewerage service charges are the basis of project income, investigating ordinary public service charges (e.g. water, electricity, telephone, mobile phone, gas and internet) and checking the relation between these costs and residents' income is important for setting a new sewerage charge.

2.2.2 Income Levels and Living Standard in the Project Area

In order to provide a basis for fixing the scale of investment in initial facilities at the time of introducing sewerage system, and to use these facilities to put sewerage service on a business basis, the following data is needed regarding residents receiving the service and other beneficiaries in the project.

(1) Job composition and income level (high income, medium income and low income) of residents who will be beneficiaries
(2) Survey of family and household scale, including household income and expenditure
(3) Type and scale of industries and factories
(4) Public facilities such as schools, hospitals and mosques

When introducing new sewerage facilities, there is a need to avoid vast investment and to fix the scale of investment in suitable initial facilities not only from the viewpoint of the scale of the facilities, but also from that of lasting O&M. In order to put sewerage service on a business basis, the following information and data is required regarding residents receiving the service and other beneficiaries in the project area.

(1) Level of attention of residents in sewerage service who will be beneficiaries, their job composition and income levels (high, medium and low) in the area
(2) Family and household scale, including household income and expenditure
(3) Type and scale of industries and factories
(4) Public facilities such as schools, hospitals and mosques

Even though the main objective of sewerage projects is urban area, but when sewerage system is planned in a rural area where the opportunities for the residents to obtain cash income are limited, adoption method which is suitable for the situation in the region has to be investigated and considered.

These information and data are obtained from the on-site survey of the area carried out at the planning stage, and from questionnaires and personal interviews of the local community and residents who will become the beneficiaries.

2.2.3 Public Health and Sanitation Standards

In many cases, the state of safe drinking water and the method of treating sewerage are influenced by the culture and lifestyle of the region under survey. In a region where sewerage facilities have not yet been constructed, domestic and industrial sewerage are discharged directly into rivers or streams and, as a result of this discharge, problems in health hazards to the residents and in public sanitation will arise. The following items should therefore be surveyed.

(1) Preliminary verification of health condition and knowledge of sanitation of residents
(2) Rate of infecting water-borne diseases
(3) State of safe drinking water
(4) Actual state of sanitation habits such as using latrines
(5) Present state of medical facilities
(6) Sanitary facilities and their condition

(1) Preliminary Verification of Health Condition and Knowledge of Sanitation of Residents

Because Indonesia has huge area and is spread in many islands, great differences are perceived in sanitation concepts and knowledge in urban and rural area in Indonesia. Is sanitary education being carried out, such as spreading knowledge of the correct way to deal with infectious diseases? Alternatively, have suitable health and medical services been established in the area? For example, are the kitchen and latrine adjacent, is no distinction made between towels and floor cloths, is an infiltration type latrine placed near or upstream of a well? Many rural areas suffer from such problems from a sanitation aspect.

(2) Rate of Infecting Water-Borne Diseases

In places that rely on well water or water from mountain streams for their daily needs, many inhabitants can be seen who have contracted gastro enteric disorders or skin diseases.

(3) State of Safe Drinking Water

Direct access to city mains, common tap, well water, spring water

(4) Actual State of Sanitation Habits Such as Using Latrines

Direct access to city sewerage, household treatment tanks, septic tanks or vertical pit latrines

(5) Present State of Medical Facilities

In case of contract to disease possibility of access to hospitals, clinics or other medical facilities

(6) Sanitation Facilities and Their Condition

Diffusion rate of facilities listed in (5)

All these items must be surveyed in order to grasp the state of public health and sanitation hazards.

2.2.4 Conditions Pertaining to Development and Operation of Water Supply and Sewerage

It is important to confirm the current situation of existing waterworks facilities in the area in order to obtain local water use and water supply situation. In case when drinking water is obtained from such as shallow well, location of sewerage facilities, wastewater Treatment conditions should be confirmed. In area where sewerage facilities are adopted, wastewater Treatment methods have to be confirmed. The data from ascertaining the above factors can be used in planning for the operation of project.

(1) Conditions of areas with and without water supply
(2) Conditions of areas with and without sewerage
(3) Method of wastewater treatment in areas without sewerage (septic tank, leaching cesspool, discharging directly)
(4) Condition of facilities and operation and maintenance in areas with water supply and sewerage
(5) Performance of water supply, service charges for water supply and sewerage, and percentage of charge collection
(6) Operation, structural and financial status of water supply and sewerage services

In establishing sewerage plans, it is necessary to consider other sewerage plans implemented in the past or scheduled in the future to estimate required water supply and spread of pollutant load in the future accurately. For this, it is important to estimate the pollutant load produced by industrial wastewater from factories and domestic wastewater from households in the target areas that already has access to water supply.

It is necessary to:

(1) Ascertain conditions of areas with and without water supply service.
(2) Ascertain conditions of areas with and without sewerage service.
(3) Ascertain methods of wastewater treatment in areas without sewerage services.
(4) Have an understanding of the status of facilities and operation and maintenance in areas with water supply and sewerage services.
(5) Investigate performance of water supply, water supply or sewerage service charges which are the revenue source for the service; in case when service charge of sewerage is included in that of water supply, these service charges have to be looked into as well, percentage of charge collection, and related information such as organizations structure, accounted-for-water ratio, scale etc.
(6) Recognize operation condition, structural and financial status of water supply and sewerage services, and utilize financial documents such as, profit and loss statements, budget sheets and balance sheets, which are the basis for understanding operational, organizational and financial conditions for a future project. In addition, it is necessary to examine tax systems applicable to sewerage services, such as sales tax, revenue tax and property tax. Details of insuring fixed asset, inventory and so on should be fully understood.

2.2.5 Importance of Willingness to Pay Survey as Part of Social Surveys

Survey of "Willingness to Pay" determines user interest and intention to pay for a sewerage service. The survey serves to help establishing a sustainable project plan and pricing as well as giving a base for sound management system. It is advisable to consider the following;

(1) Need for water supply and sewerage system
(2) Awareness of residents for understanding and paying for the facilities
(3) Suitable payment system

In establishing project plans, the reflection of the situation and opinions of residents is an important factor for leading to the success of the project. In the initial stage of the project plan, it is necessary to conduct a survey as shown in **Section 2.2.1** to **2.2.4** to gather opinions and ideas of residents as well as to be aware of the current situation. For this, the community must be involved in the survey. All parties that have stakes in the project should be promoted to participate as much as possible. A major factor is to prevent any gender bias in the gathering of the opinions of residents. In other words, the opinions of the weaker members of the community must be heard to prevent a bias towards the powerful and influential members.

The key to the sustainable operation of a sewerage service is the compatibility of the allocation of funds, return on investment and ensuring fairness for residents who will benefit from the project. Attaining this compatibility is often difficult in developing countries.

Willingness to Pay Survey is important because it determines user interest and intention to pay for a sewerage service. This survey is conducted by giving out questionnaires to residents who will be covered directly and indirectly by the service.

The survey may help to raise awareness of resident participation and creates enthusiasm for the project so that after the project is completed sustainable O&M is possible. The results of the questionnaires can be used for a base to set sewerage service charges and draw up an income and expenditure plan making them a valuable foundation for sound project management.

These surveys should be conducted in the initial stages of the project plan, before considering sources of funds other than what can be collected from residents, or funds allocated from outside alternatives.

Three additional factors should be included in these questionnaires:

(1) Need for a water supply and sewerage system
(2) Awareness of residents for understanding and paying for the facilities
(3) Suitable payment system

Response from questionnaires supplying the above information and indications of willingness to pay are strongly interrelated with household income. A question to categorize income brackets included in the questionnaire form is essential.

Important points to be included in the Willingness to Pay are listed below:

1) Residents should have freedom to choose in the following points:
   - Whether they want to participate to the project or not
   - Whether they want to pay more for better quality/service
   - When and how the service will be provided
   - How funds will be managed and used
   - How the service will be managed and used
2) Whether residents should have access to ample information and whether there is decision making procedure adopted by the community.
3) Whether the government has shown a national policy and strategy for encouraging involvement of parties concerned and for promotion of education and raising proficiency.
4) Whether a favourable community environment is in place for broad participation by Non-Governmental Organizations (NGOs) and the private sector for the procurement of goods and services and technical assistance.

A sample form of the questionnaire for the Willingness to Pay is shown in ***Attachment 2.2.1***.

A social survey has the significant role of raising the awareness of residents to show the necessity for the participation of beneficiaries and is a vital parrot of the decision making process planning and implementing. This community awareness raises the sense of responsibility in the community after the service has commenced and sewerage service charges are levied. In addition, the sewerage system that has been chosen by this process is of a technology in low-cost.

The Willingness to Pay Surveys are not completely problem-free. For example, once the realities of the plan have sunk in, problems arise, such as the project being scaled down gradually, a result that is fluid and unreliable, and a result where residents are willing to pay only meagre 1 % of household income and so on.

It is recommended to consider not only the “willingness to pay” but also “affordability to pay” which will be derived from household income or expenditure for appropriate tariff system. The affordability to pay is described in **Section 2.2.2** and method of approximating affordability to pay is described in **Section 7.3** as an example method.

2.3 Key Issues and Factors

2.3.1 Methods of Analyzing Factors from Management Perspective

Factors for implementation of sewerage service management are like allocation of construction funds (loan and subsidies) for initial projects, securing O&M budget by sewerage service charges and/or others forms of income, employment of staff and training.

The implementation of sewerage projects begins with selecting the optimum system compatible with the regional characteristics. In selection of efficient and economical system, living conditions, characteristic in the area, geography, weather, amount of influent and regional conditions have to be fully considered before establishing the treatment, method, location of treatment plants and the construction process. Next is to construct facilities of a suitable scale at the lowest cost. Following that, a long-term financial plan with considering of future O&M costs, forecasted treatment costs, a suitable service charge and the effect of loss to the accounts should be formulated.

In O&M costs, it is important to focus on the large portion of expense and attempt to cut costs. An example of operation and maintenance costs is shown in ***Figure 2.3.1***.

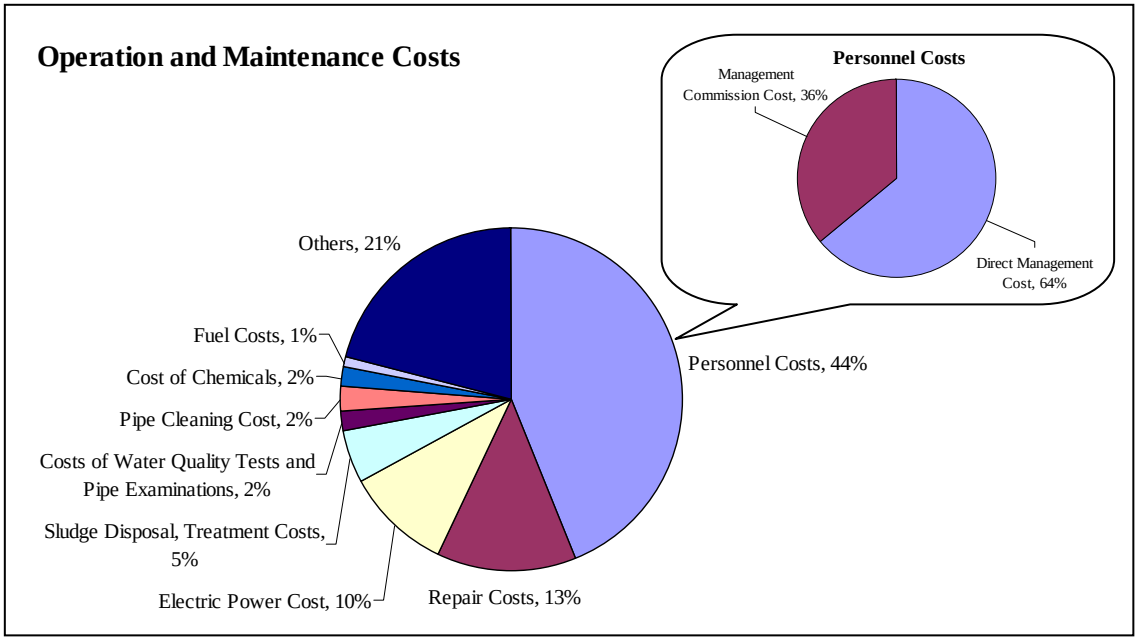


Figure 2.3.1 - An Example of Operation and Maintenance Costs
Source: Guidelines for Management of Sewerage Facilities in Development Countries (Draft) by IDIJ, July 2002

This figure shows ratio of power and personnel costs which makes a large portion of expenses. It is advisable to lower these costs as much as possible.

In case of shortage of construction funds forecasted, loans and subsidies have to be considered. In case of loans, conditions such as repayment and interest terms have to be considered. These conditions influence O&M of the system and need to be thoroughly understood. Conditions of loans from overseas assistance organizations are shown in **Section 7.7** which shows key points for consideration methods of procuring funds.

Organizational and systematic problems are embraced in implementation of sewerage works management. A cornerstone and major task for O&M of the works in establishment of institution is the employment of suitable and qualified personnel to allow an organization to function effectively. It is necessary to plan for employing adequate and qualified personnel and establishment of organization is indispensable during the initial stage of a project. At this initial stage, it is not appropriate to aim to establish organizations that are in the final stage. It is advisable to expand the structure and scale of organizations as the sewerage project progresses. Training programmes and on the job training should be planned regularly to improve job proficiency for all personnel from management to operations.

2.3.2 Establishing Future Frames

For establishing future frames of sewerage works, business and industrial activity, factors such as urban plans established for the service area, land use plans, industrial development plans, housing development plans and other related plans must be fully grasped. In particular, the financial aspects of these plans and trends, and plans implemented by various enterprises should be carefully studied. These factors and conditions must be complied and pertinent estimates should be made.

(1) Future population (distribution of population by income group)
(2) Industry (manufacturing trends)
(3) Other business trends
(4) Characteristics of each development plan
(5) Water supply plan

(1) Future Population

Along with past and current population statistics, the basic points to grasp are projections of the future structure of business and industry, those of the medical system and of the spread of sanitation

1) Vital Population Statistics

Past and current population statistics are important. If possible, future population estimates should be based on data from the national census or surveys conducted by regional public organizations. When such data is not available, it becomes necessary to look for basic materials that can be used or to find actual population estimates.

It is advisable to break down these vital population statistics by area, to examine factors that have a significant implication for population estimates. This includes such factors as the population of each income group, which is often strongly correlated to area populations, the density of the population in each area, and density levels resulting in saturation.

2) Estimates of Population Changes

Population until the fiscal year of the plan is a key element in the sewerage plan. When vital population statistics are the basis for all population figures, population growth may be linear or exponential. Accordingly, it is advisable to use population estimation methods that consider area population density and saturation levels, along with area urban planning, population distribution planning, and projections of the future structure of business and industry and programmes for sanitation education, including birth control.

In estimating population trends, it is advisable to project saturation density levels for each district in the areas under consideration. Again, the breakdown of population by area will correlate quite closely with distribution of population by income group. This type of categorization will be important because the factors involved will be related to differences in basic units for water volumes used and population loads.

(2) Industry

To survey the trends of major related industry sector to sewerage in the target areas is important. Categorized industrial sectors are show as follows:

1) Heavy Industry

- Iron and steel
- Production of energy sources and refining industries

- Chemicals
- Heavy machinery
- Transportation equipment industry

2) Light Industry

- Machinery
- Transportation equipment industry
- Assembly plant for various machines and other industries
- Communication equipment and other manufacturing
- High technology industries
- Food processing
- Textile and manufacturing of textile products

3) Small-Scale Industry

- Machinery and part manufacturing
- Food processing
- Manufacturing of textile products

(3) Other Industrial Trends

To survey the trends of other industrial sectors in the target areas is also important. Examples of such other industrial sectors are show as follows:

- Mining
- Agriculture, plantation agriculture
- Fisheries, fishponds (for cultivation)
- Commerce, tourism
- Others

(4) Characteristics of Development Plans and Financing Measures

To survey the related development plans and information for future land-use plan in the target areas is very important such as shown below:

- Design plans for housing complexes
- Plans for commercial areas
- Plans for industrial areas
- Plans for educational and research facilities
- Plans for recreation areas and facilities
- Plans for plantation agriculture and fish ponds (for cultivation)

(5) Plans for Water Supply Systems

The primary issue is to secure an abundant and safe supply of water necessary for daily life. This priority should be kept uppermost in mind in sewerage planning.

The used water volume per capita from the water supply system and the distribution plan must be accounted for in sewerage planning. The volume of water from the water supply system and wells discharged to the sewerage system is a key point in planning. Factors such as the unit loads in water supply planning, the volume of water supplied for daily life and the volume of water required for business activity are important planning considerations in place where high quality water from wells is not available and water for daily life must come from a water supply system. However, problems remain. These include determination of ratio of accounted water volume, in other words, level of prevention of leakage.

In areas where high quality water form wells are available, there is a higher possibility that water from the water supply system will not be used. In such case it is important to plan for a significant volume of sewerage from well water entering into the sewerage.

2.4 Development of Sewerage Service

2.4.1 Facility Planning

The weather conditions, topography, land values, exchange rates, the portion of expenses to be paid in local and foreign currencies and energy costs are the factors that must be examined in facilities planning. Every effort should be made to develop a plan that will maximize value and realize "cost-effectiveness" in handling construction and O&M expenses. It should be assumed that the plan must also include an Environmental Impact Assessment (EIA), and allocation of time and money required.

(1) Most of the organizations are perplexed with a lack of capital, which means that the factors discussed below must be carefully considered in the development process of plan.

1) Weather

Weather conditions in Indonesia are mostly tropical climate, therefore the biological treatment facilities work favourably.

2) Topography and Land Value

The topography and the land value in the project area are key considerations in making decisions of treatment processes as well as target areas, type of collection systems and sewer pipe routes. These two factors also greatly affect for reducing construction and O&M costs. For example, in case of decision of a route for a sewer main, it is recommended to adopt gravity flow to the treatment plant. In choosing treatment processes, it is necessary to consider that construction and O&M cost of aerated lagoons and stabilization ponds system is much lower than that of oxidation ditches. However, the land requirement for aerated lagoons and stabilization ponds is several times greater than that for oxidation ditches. The cost of land is a key issue in consideration.

3) Sources for Procurement of Construction Materials

Construction materials made in Indonesia such as sewer pipes, reinforcing bars and cement are much cheaper than imported materials. Therefore, when there is no problem in quality, construction materials should be purchased in the areas where the project is undertaken. Also it is recommended to save money by increasing the portion of materials costs paid in local currency.

4) Energy Costs

Energy costs in O&M expense account for high ratio. In planning of treatment facilities, it is recommended try to adopt processes that consume less energy like oxidation pond.

5) Personnel Costs

Personnel costs required for sewerage works depend on unit labour fee and number of labours. Therefore cost comparison between mechanical automation and reliance upon human resources has to be carried out in planning stage of sewerage works. Government policy for measures against unemployment also has to be considered.

6) Water Quality in Surrounding Area

Water bodies in surrounding area of cities are often badly polluted by discharge of large amount of untreated sewerage due to high population density. In such situation, certain

compromises must be made. Instead of aiming for high treated water quality, it is advisable to set design treated water quality at lower levels and move ahead with construction that is less concentrated - spread out over a wider area.

(2) Construction of sewerage systems requires long time and huge amount of money. This means that, in designing facilities, consideration must be given to project management and efficiency measures. Along with planning construction in carefully designed stages, try to make the fullest possible use of existing facilities. Examples of this approach are provided below:

1) Construction of Treatment Plants

At beginning of operation of wastewater treatment plant, low influent quantity lasts for many years because of low household connection rate. If treatment facilities in the final layout are completed at the beginning, O&M cost for surplus capacity becomes in vain. In order to prevent the situation, partial operation of facilities or adoption of primary treatment process such as lagoon system has to be considered. In proportion to increase of influent quantity, increase of operation facilities or improvement of treatment process is carried out.

2) Sewers

Provision of sewerage is a priority task in high density area and in the area where there are customers who will discharge large amount of wastewater into sewerage system in the initial stage.

3) Use of Existing Facilities

In many cities in Indonesia, many types of sewer pipes and sanitary facilities have been used. Until new sewerage system covers those areas, such pipes and facilities have to be efficiently used.

(3) For sustainable development and protection of the environment, Environmental Impact Assessment (EIA) has been implemented in Indonesia. The cost and time required for EIAs has to be considered. The EIA is normally conducted before detailed design in Indonesia.

2.4.2 Estimation of Approximate Cost

Conditions dealing with domestic and foreign currency for procuring funds differ from the type and combination of assistance, such as the central government, donors, grants-in-aid, foreign loans and investment. For the estimation of project cost, these conditions should be considered with a clear direction so that possible procuring funds can be explored.

Project costs are composed of construction costs and operation and maintenance costs. Construction costs are the cost to build facilities and are categorized into machinery, material and labour costs. In case of machinery supplied from overseas, it is counted in the foreign currency section. In case of domestic supply it is counted in the domestic currency section. This separation of domestic and foreign currency points to the fact that items purchased with the currency of that country are counted in the domestic currency section and items purchased with the currency of foreign countries are counted in the foreign currency section.

It is possible to cover project costs by foreign aid organizations and central government loans and subsidies. Combination of bilateral assistance organizations such as international loan organizations also is acceptable.

2.5 General Schedule of Sewerage Works

Figure - 2.5.1 shows general schedule of sewerage works. Required term until commencement of operation of wastewater treatment plant is approximately 4 to 7 years, which depends on wastewater treatment process and scale of sewerage works.

Even though many of provincial municipalities have insufficient budget and staff to carry out planning, designing and construction of sewerage facilities and they have to entrust implementation of sewerage works to national and provincial government, they should be involved in the works closely because they have to manage the works for long term.

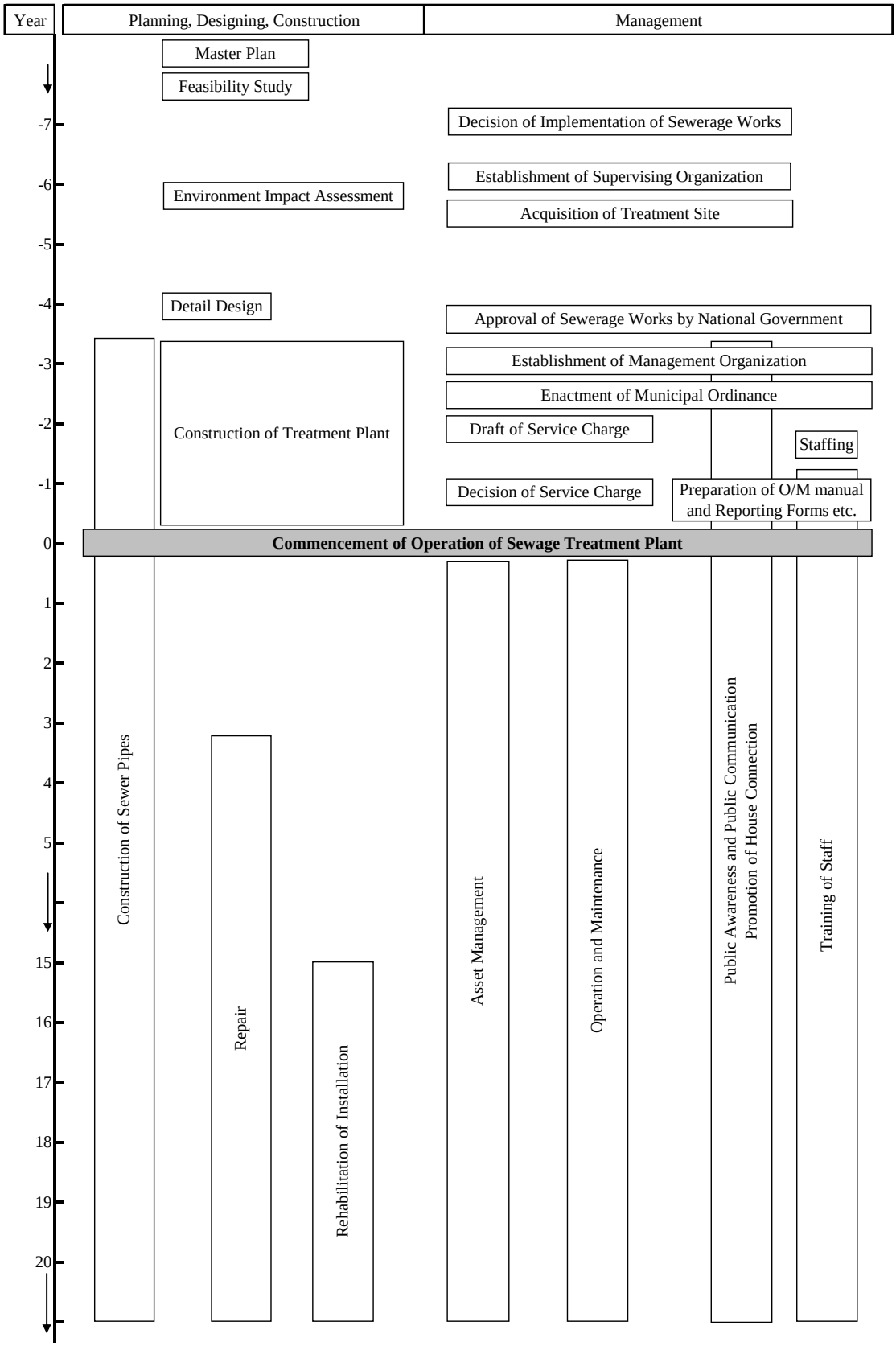


Figure 2.5.1 - General Schedule of Sewerage Works

2.6 Case Studies

Table 2.6.1 shows the implementation processes of sewerage works in the three service providers surveyed. In case of PD PAL Jakarta, existing storm water reservoir is used for treatment plant as a pilot project of Jakarta Metropolis therefore the implementation process might be somewhat different from that in common. In case of Denpasar, it took fifteen years after the completion of the master plan to commence the operation of treatment plant. When many years has passed after implementation of master plan, social conditions like population, urban area or water supply in that day might shaded off; therefore revision of the master plan is indispensable.

Table 2.6.1 - Implementation Process of Sewerage Works in the Three Service Providers

Service Provider	Implementation Process
PD PAL Jakarta	1977 Implementation of M/P 1983 Decision of Implementation of Pilot Project 1986 Commencement of Treatment 1987 Establishment of Management Structure
PDAM Bandung	1979 ~ 1994 Expansion of Sewer System by ADB Loan
BLUPAL Denpasar	1993 Implementation of M/P 1994 Loan Agreement 2005 Establishment of BLU 2006 Establishment of BLUPAL 2008 Commencement of Operation

CHAPTER 3

LEGISLATION AND STANDARD

CHAPTER 3 LEGISLATION AND STANDARD

3.1 General

In the Indonesia, Sewerage Law which is essential for implementation of sewerage works is now under preparation and the works are carried out based on the Regulation of Ministry of Public Works No.16/PRT/M/2008, "Policy and National Strategy for Development of Settlement of Sewerage Management System". The regulation is based on the Millennium Development Goals, i.e. decrease 50 % of population who can not access safe water and proper sanitation by 2015, and National Medium-Term Development Plan (RPJMN), i.e. "free from open defecation by 2014."

On the other hand State Ministry of Environment and Ministry of Health have prepared laws and regulations against discharge of sewerage to environment in order to protect environment and healthy lives. ***Figure 3.1.1*** shows relevant laws and regulations for sewerage works in current situation and ***Figure 3.1.2*** shows required relevant laws and regulations for further development of sewerage.

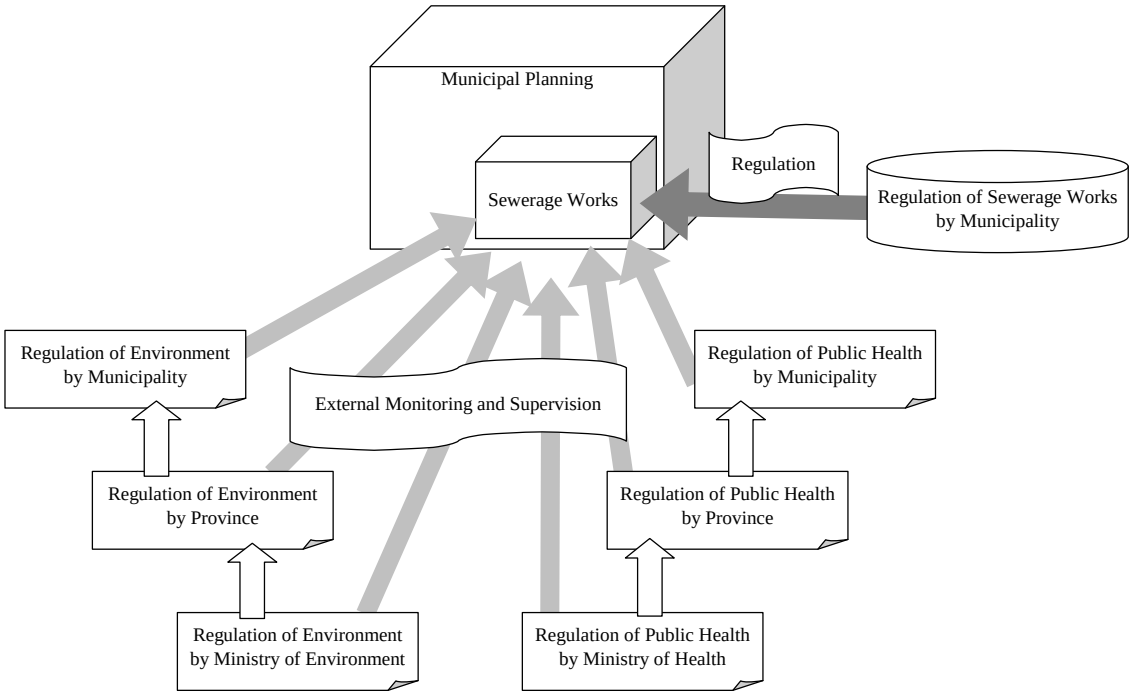


Figure 3.1.1 - Relevant Laws and Regulations for Sewerage Works in Current Situation

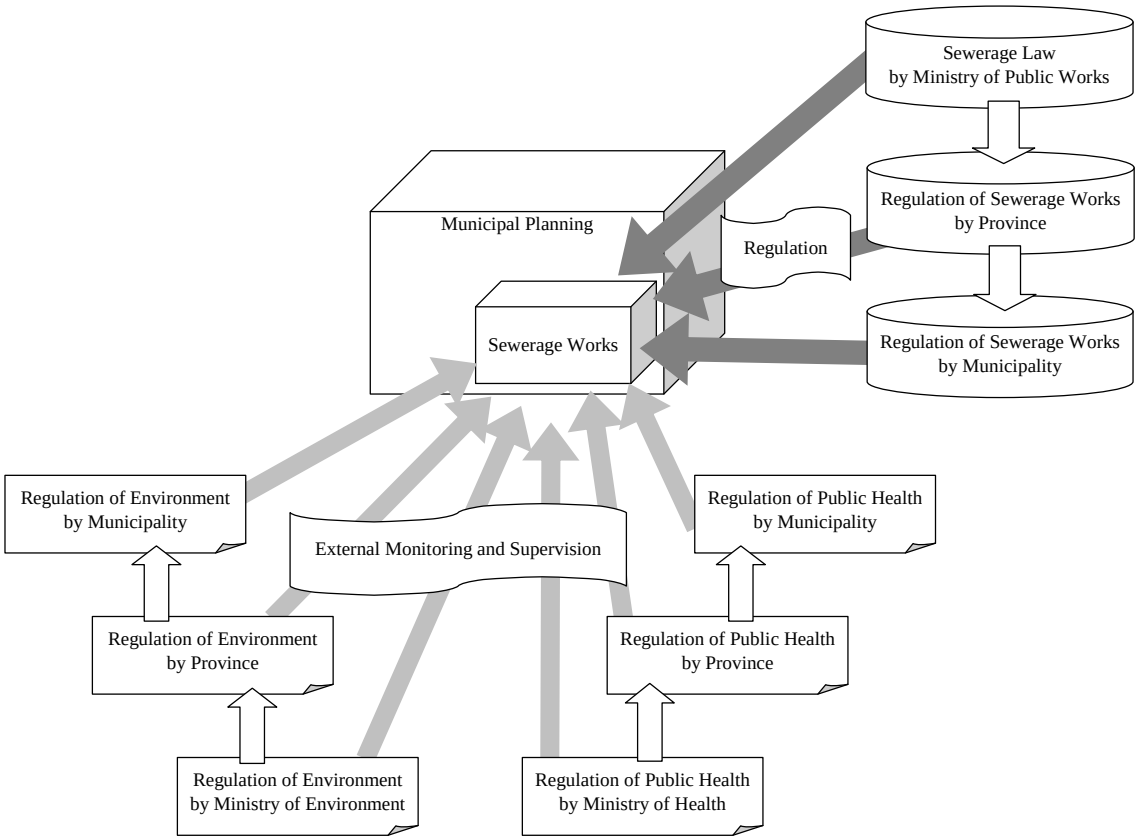


Figure 3.1.2 - Required Relevant Laws and Regulations for Sewerage Works for Further Sewerage Development

3.2 Sewerage Law

Central Government shall legislate the Sewerage Law as the essential law for implementation of sewerage works of local municipalities. Sewerage Law should contain at least the following articles.

(1) Purpose of sewerage works
(2) Definition of terms
(3) Items of consideration for obtaining permission of national government
(4) Technical standard to which sewerage facilities have to conform
(5) Technical standard to which effluent of wastewater treatment plants have to meet
(6) Duties of installation of house connection and pre-treatment of factories
(7) Service charges
(8) Operation and maintenance of wastewater treatment plants
(9) Certifications which are required to carry out sewerage works
(10) Penalty clauses

Comments below are based on Japanese Sewerage Law as an example.

(1) Purpose of sewerage works like improvement of public sanitation, preservation of public water bodies is mentioned.
(2) Terms regarding sewerage works like wastewater management, wastewater treatment plant and wastewater collection system etc. are defined.
(3) Respects which are required for obtaining permission of implementation of sewerage

works by central government are mentioned.

(4) Structural standards of which sewerage facilities have to follow are mentioned.

(5) Quality standards of which effluent of wastewater treatment plant has to keep are mentioned. Effluent standard has to be set for every treatment process. Effluent standard for aerated lagoon process has to be set low level than that for conventional activated sludge process. In case when sewerage system accepts industrial wastewater, wastewater quality discharged from factories also has to be mentioned.

(6) Duties of which users of sewerage system have to follow, like installation of house connection and pre-treatment facilities of factories or restaurants are mentioned.

(7) Principle of setting service charge is mentioned.

(8) Necessity of analysis of effluent water quality and appropriate operation and maintenance is mentioned.

(9) Qualifications required for designing, supervision of construction, operation and maintenance of sewerage works are mentioned.

(10) Penalties against damage for sewerage system, obstruction to discharge of sewerage, false notification etc. is mentioned.

3.3 Municipal Regulation of Sewerage Works

Based on the sewerage law, each municipality has to legislate own regulation regarding sewerage works. Regional regulation has to contain at least following articles.

(1) Evidence for implementation of sewerage works
(2) Establishment of sewerage system
(3) Definition of terms
(4) Duty of installation of house connection
(5) Connection method and pipe diameter
(6) Verification of house connection plan
(7) Supervision of construction of house connection
(8) Construction of house connection
(9) Discharge restriction from industrial sectors and business, commercial and public places (e.g. such as restaurants, the hospitals, hotels etc.) which may discharge harmful sewerage in case when sewerage system accepts industrial sewerage
(10) Installation of pre-treatment facilities in factories in case when industrial sewerage is accepted into sewerage system
(11) Requirement of notification when user commences to use sewerage system
(12) Levy of service charge
(13) Assessment method of service charge
(14) Assessment method of discharging sewerage quantity
(15) Order for improvement of house connection, pre-treatment facilities of factories, etc.
(16) Permission for private use of sewerage facilities
(17) Penalty clause

Comments below are based on municipal regulation in Japan as an example.

(1) Evidence of implementation of sewerage works is mentioned.

(2) Establishment of sewerage works for improvement of environment and lives is declared.

(3) Terms regarding sewerage works like sewerage, wastewater treatment plant and treatment area etc. are defined.

(4) Duty of installation of house connection is mentioned.
(5) Connecting method and required diameter of house connection is mentioned.
(6) Verification of house connection plan by municipality is mentioned.
(7) Inspection of construction of house connection by authorized inspector is mentioned.
(8) Requirement of certificated company for construction of house connection is mentioned.
(9) Discharge restriction from factories which may discharge harmful sewerage is mentioned in case when sewerage system accepts industrial wastewater. Discharging wastewater quality is fixed referring to environmental standard constituted by State Ministry of Environment.
(10) Order for installation of pre-treatment facilities in factories when they may discharge harmful wastewater into sewerage system in case when sewerage system accepts industrial wastewater.
(11) Requirement of notification to municipal government when user commences to use sewerage system is mentioned.
(12) Levy of service charge which is fixed in other regulation is mentioned.
(13) Assessment methods of service charge like certain percentage of water supply charge or dimensions of floor are mentioned.
(14) Assessment methods of discharging wastewater quality like proportion to water supply quantity or addition of well water are mentioned.
(15) Order for improvement of house connection and pre-treatment facilities of factories when these conditions are inappropriate, is mentioned.
(16) Requirement of permission for private use of sewerage facilities is mentioned.
(17) Penalties against violation of regulation such as denial for installation of house connection, installation of house connection without verification by municipal government, illegal installation of house connection, denial for installation of pre-treatment facilities in factories, use of sewerage facilities without permission and violation of discharging standard of factories into sewerage system are mentioned.

3.4 Determination of Service Charge

Service charge is the basis of sewerage works and key points to be considered are shown as follows: (An example method for setting of charge is shown in **Section 7.3.3**.)

(1) For ideal management of sewerage works, cost for operation and maintenance of sewerage facilities has to be covered by service charge.
(2) Service charge must be fixed fairly for everybody. Water supply consumption is recommended to use for fixing service charge because used water is discharged to sewerage system.
(3) Service charge should be collected in consideration of convenience of customers.
(4) Amendment of service charge usually has to be carried out every two to four years.

(1) Because only beneficiary can use sewerage system, cost for operation maintenance of sewerage facilities should be covered by service charge. It is unfair for people who do not use sewerage system if service charge is fixed low and shortage of cost for operation and maintenance is transferred form municipal general budget. Moreover the transfer from general budget may bear down upon municipal finance.
(2) In Indonesia not only water supply consumption but also building floor dimension is used for reference of service charge. In some countries in Middle America, electrical power consumption is used for the reference.

(3) In consideration of convenience of customers, payment of service charge should be asked in addition to water supply charge. It may also be effective to reduce non-revenue wastewater quality. When it is difficult to add to water supply charge, addition to other service charge like power supply charge should be considered. In Indonesia, credit transfer has been general; therefore it should be applied for the payment of service charge for the convenience of customers. It may also be effective to efficient collection of service charge.

(4) Service charge is reviewed and revised usually every two to four years in consideration of price index and business situation. In Jakarta for example, service charge is revised every three years.

3.5 Relevant Laws and Regulations

Besides Laws and regulations regarding sewerage works, sewerage service providers have to consider the following laws and regulations:

(1) Environment
(2) Preservation of Water Source
(3) Solid Waste
(4) City Planning

(1) Effluent of wastewater treatment plant is regulated by laws and regulation regarding environment.

(2) Effluent of wastewater treatment plant is regulated by laws and regulation regarding water source when effluent has probability to contaminate water sources.

(3) Sludge and screenings generated in wastewater treatment plant is regulated by laws and regulation regarding solid waste.

(4) Location of wastewater treatment plant and sewerage service area for example is regulated by city planning.

3.6 Standards and Guidelines

In order to implement sewerage works efficiently and secure definite quality, Ministry of Public Works has to prepare the following standards and guidelines.

(1) Guideline for Planning of Sewerage Works
(2) Design Standard
(3) Guideline for Operation and Maintenance
(4) Water Quality Analysis Methods

(1) In order to prevent disorderly development of sewerage works, guideline for planning have to be prepared. Methods for preparation of sewerage master plan, wastewater and sludge treatment process, operation and maintenance methods, finance of sewerage works etc. are mentioned in the guideline. National policy of Indonesia that centralized treatment plant is adopted in area where population density is more than 300 capita/Ha, modular plant, like anaerobic buffer reactor is adopted in area of 100 to 300 capita/Ha of population density and individual treatment process like septic tank is adopted in area of less than 100 capita/Ha, should be contained in the guideline.

(2) In order to avoid construction of low quality sewerage facilities, design standard for sewer pipes, pumping station and wastewater treatment plant has to be prepared. However it takes long time to prepare Indonesian standard, therefore simple criteria for design inspection is recommended to prepare for the time being.

(3) In order to carry out efficient operation and maintenance, guideline for operation and maintenance has to be prepared. Appropriate effluent quality can be retained and operational cost and energy consumption can be reduced. The guideline is prepared by each treatment process and each facilities.

(4) In order to secure certain quality level of sewerage analysis, wastewater quality analyzing methods have to be prepared referring to the methods which is adopted in national central laboratory. Usually pollutant concentration in sewerage is much higher than that in river, sea and lake water; therefore analyzing methods of sewerage have to be determined in consideration of concentration and significant figure.

3.7 Preparation of Laws, Regulations and Standards

Even though laws, regulations and standards above mentioned are required, it is impossible to prepare them in short time. Therefore they should be prepared one by one deliberately.

Figure 3.7.1 shows an example for preparation schedule of laws, regulation and standards above.

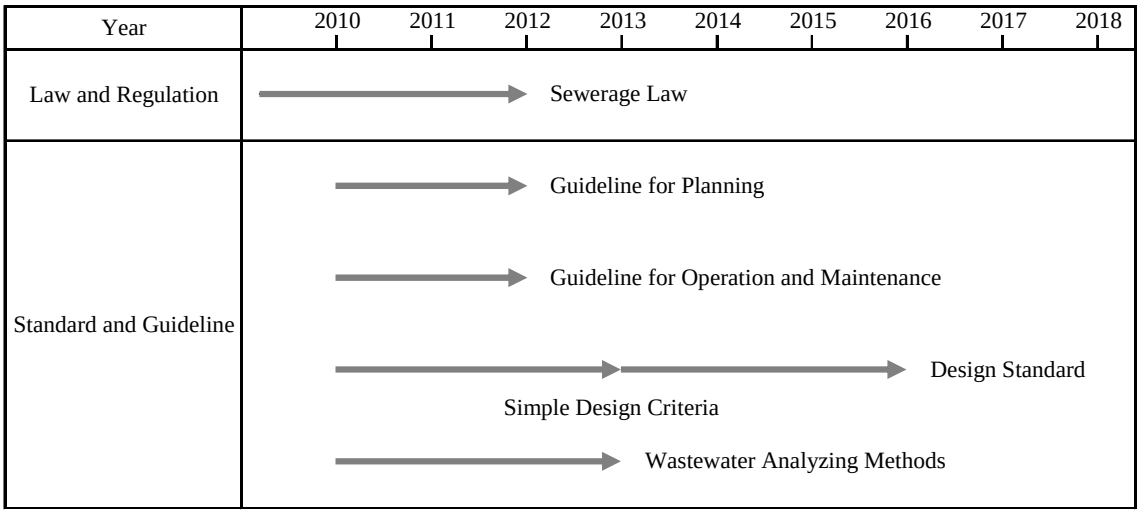


Figure 3.7.1 - Example for Preparation of Laws, Regulation and Standards

3.8 Case Studies

Table 3.8.1 shows the national laws and regulations regarding sanitation. Many laws and regulations have been established regarding sanitation, however there is no "Sewerage law" which must be the basis of national policy of sewerage works. It should be prepared rapidly in order to implement consistent sewerage works in the whole country.

Table 3.8.1 - Laws and Regulations Regarding Sanitation

No	Law/Regulation	Stipulation
1	Constitution (UUD) No. 45 : Article 33 Clause 3	'Land, water and wealth beneath governed by state and utilized for the greatest benefit of people welfare'
2	Law (UU) No.23 Year 1992:	Health
	Chapter IV, Article 9	Government has tasks to mobilize community participation in administering and finance of health
	Article 10	Efforts to realize optimum health for community as a preventive approach
	Chapter V,	Environmental health covering water and air pollution control, protection against solid waste, liquid waste, gas emission, radiation, and noise, control of diseases vector, and other protection.
	Fifth Part. Article 22	Environmental health, diseases abatement and health education represent part of health efforts.
	Article 38	Health education for improvement of knowledge, awareness, willingness, and capacity for health life
3	Law No. 23 Year 1997	Environmental Management
	Chapter III, Article 5 Clause 1	Privilege of well being and health environment for all people
	Chapter V, Article 14 - 17	Protection of environmental function
	Chapter VI	Requirement for environmental arrangement
4	Law No. 22 Year 1999	Local Government: Province, Kabupaten, and Kota have authority to govern and administer local community interest according to their own aspiration based on community aspiration.
5	Law No. 25 Year 2000	National Development Programme (2000 - 2004) on health environment, health behavior, and community empowerment. Settlements of infrastructure and facilities development programme at local level.
6	Law No. 32 Year 2004	Local Autonomy
7	Government Regulation No. 25 Year 2000	Government and provincial authority as autonomous district
8	Government Regulation No. 82 Year 2001	Water Quality Management and Water Pollution Control
9	Government Regulation No. 7 Year 2005	Rural development Acceleration of infrastructure development
10	Government Regulation No. 16 Year 2005	Development of Water Supply System which integrated with sanitation infrastructure and facilities development Sewerage infrastructure and facilities Solid waste infrastructure and facilities related to raw water source protection
11	Ministry of Health Decree No. 907 Year 2002	Requirement for Healthy Drinking Water by type
12	Ministry Public Work Decree No. 409 Year 2002	Administration of KPS (Government-Private Sector Cooperation) in administration and/or management of water supply and sanitation
13	State Ministry of Environment Decree No. 111 year 2003	Requirement and procedure for permission of wastewater discharge
14	State Ministry of Environment Decree No. 112 Year 2003	Domestic wastewater quality standard

Source: Domestic Sewerage Services and Facilities in Indonesia: Policy and Regulation Role, WEPA: Water Environment Partnership in Asia, July 2007

Table 3.8.2 shows the regulations and decrees which have been enforced in the three service providers.

Table 3.8.2 - Regulation and Decree in the Three Service Providers

Provider	Regulation and Decree	Stipulation
PDPAL Jakarta	decree No. 1470/2006 by governor of DKI Jakarta Province	Service charge and connection fee,
PDAM Bandung	decree of West Jawa Governor No.658.31 /Kep.829-Binprod/2001	Permission of discharge to the river, Preservation of water quality of the river,
	decree of West Jawa Governor No.658.31 /SK.637-HUK/99	Water quality control of the discharging water body,
	decree of Ministry of Living Environment No.112 in 2003	Domestic wastewater quality standard
	Local regulation No.17/PD/1986 and Mayer's regulation No.194.2002	Service charge
BLUPAL Denpasar	Acts No.1 year 2004	State treasury
	Regulation of Government No. 23 Year 2005	Finance Management of Public Service Agency
	Joint Decree of Governor of Bali, Regent of Badung, and Major of Denpasar No.10 Year 2002, No.640 Year 2002, No. 276 Year 2002	Implementation of Joint Management of Sewerage System
	Regulation of Ministry of Home Affairs No.61 Year 2007	Technical Guideline for Finance Management of Local Public Service Agency
	Joint Regulations of Governor of Bali, Regent of Badung, and Major of Denpasar No. 37A Year 2006, No.1 Year 2006, No.36A Year 2006	Implementation of Joint Management of Sewerage System
	Decree of Governor of Bali No. 404/04-F/HK/2007	BLUPAL as implementation agency

The relevant organizations of the three service providers have prepared regulations and decrees required step-by-step.

CHAPTER 4

GOVERNING STRUCTURE

CHAPTER 4 GOVERNING STRUCTURE

4.1 General

The governing structure for sewerage services is advisable to be managed with water supply service, and the position of sewerage shall be same level of water supply services, and well-supported, since both works (water supply and sewerage services) are in the same area (water works) and there are many advantages on database management, billing and collection, financial management, planning and design, construction, quality management, risk management, public communication, public awareness and education, regal framework, capacity development, etc. in the combined structure of water supply and sewerage services.

4.2 Existing Sewerage Service Providers

The current management bodies and ownerships of existing sewerage service in Jakarta, Bandung, and Denpasar as examples are summarized as follows:

Jakarta

The sewer is owned by Jakarta Raya Local Sewerage Management Enterprise (PD PAL JAYA) while the wastewater treatment plant is owned by the Central Government (Ministry of Public Works) and operation is by the Provincial Public Works Service Agency of DKI Jakarta. PD PAL JAYA is an institution located under Provincial Public Works Service Agency of DKI Jakarta.

Bandung

The sewerage systems and management belong to Water Supply Enterprise (PDAM) of Bandung City of the local government. The owner of Bandung PDAM is the mayor of Bandung.

Denpasar

Public Service Organization of Sewerage Management (BLUPAL) was established by Denpasar Sewerage Development Project (DSDP), which manages the sewerage system in Denpasar and Badung together with DSDP. BLUPAL is an institution located under Provincial Public Works Service Agency of Bali, and the owner of BLUPAL is Governor of Bali Province, Mayor of Denpasar and Regent of Badung. Assets of sewerage system belong to DSDP. DSDP is an institution located under Provincial Environment and Sanitation Development Agency of Bali.

4.3 Establishment of Governing Structure

4.3.1 Setting of Goals (Setting of Service Level)

It is important to set realistic service level goals and carry out a systematic construction plan. In addition to existing sanitation conditions, key consideration include socio-economic factors, financing measures needed for sewerage operation, and users' affordability of paying for services. Planning a management system suitable for the targeted scale and content of services is also required for setting goals.

(1) Set appropriate goals for the target area
(2) Plan a systematic approach that takes into account limited factors and policy goals and methods
(3) Plan for a management system that will enable raising the targeted level of services

(1) Goals for each area to be served

The categories outlined below can be utilized for analysis when developing a sewerage plan for each area to be served.

1) Breakdown according to differences in receiving water bodies for treated sewerage,

No matter what type of receiving water is used, the anticipated amount of treated sewerage that is discharged will correspond to the water used in a given region or district. Legal requirements must be adhered to when water quality environment standards and effluent standards have been established. However, raising the level of treatment will naturally entail added construction costs and operation and maintenance expenses, and whether such costs fall within the scope of the budget becomes an issue. Issues such as those discussed in "C." below arise when the receiving water is a marsh, lake, lagoon, bay or other enclosed or semi-enclosed body of water. Legal requirements, the effect of sewerage on the water quality environment and economic and industrial conditions must be considered when analyzing the area where treated sewerage is discharged.

A. Areas where sewerage is discharged into rivers,

Points that must be considered are the existing quality of the water, the improvement of water quality that will result from the development of sewerage, and the effects of final effluent from the wastewater treatment plant. Economic conditions and treatment methods also must be examined.

B. Areas where sewerage is discharged into the ocean,

For the most part, the points that must be considered are the same as those that must be considered for rivers. In addition, fishery and maritime industries in the area must be considered, particularly areas where small-scale fishing activity such as shellfish gathering and seaweed harvesting take place. The effect of discharge on tourism is another possible issue.

C. Areas where sewerage is discharged into a marsh, lake, lagoon, bay or other enclosed or semi-enclosed body of water,

The lack of sewerage results in inflows of domestic wastewater and industrial wastewater and pollution of enclosed and semi-enclosed bodies of water. Sewerage development is expected to result in improved water quality. This is fully possible when pollution is mainly caused by domestic wastewater. However, it is often the case that industrial wastewater, agricultural sewerage and non-point sources such as discharge of animal waste from livestock breeding and impact from natural resources (forest-derived) etc. are a major problem. Regional efforts are needed to eliminate pollution in entire drainage basins and to implement industrial reforms.

In addition to the above, stagnation of inland bodies of water can lead not only to organic pollution, but also to increased concentrations of nitrogen and phosphorous that promotes eutrophication. A particularly high level of treatment becomes necessary when these bodies of water have various sources of water. Nevertheless, the cost of high-level treatment is often too great to bear. In these cases measures such as recycling treated water for agricultural uses become necessary.

2) Classification of areas that are part of urban planning,

The current land-use situation must be considered when area usage is established according to an urban planning. To a certain extent, this will enter into the planning for future zoning of districts for commercial, industrial or residential use.

To some extent, planning targets can be based on average levels for standards of living and

income derived from design population density in districts included in urban plans.

3) Area classification based on current land utilization

Whether planned or not, extremely densely populated areas are often characterized by confusion and a lack of social organization. It is often doubtful that development plans for sewerage service will be matched with plans for land use.

It is often the case that people has been illegally lived in publicly owned land, used by railroads or similar areas. Although this may be illegal, people are living there, and usually, it cannot be expected that they will be moving somewhere else in the near future. Most of these people are faced with extremely bad sanitation conditions, and their needs for better sanitation cannot be ignored. It is difficult to quickly move ahead with construction of sewerage in such areas because these residents do not have land ownership rights. It becomes easier to negotiate with them when a place for them to move to has been prepared. Once they have moved, regulation can be strengthened to prevent the situation from reoccurring. Along with this, realistic measures can be taken to ensure that a proper level of sanitation is attained in the area they have moved to

4) Area classification according to differences in types of latrines used

In relation to the two points discussed above, consideration should also be given to area classification based on types of latrines used. Here differences in income levels can serve as an axis, and the history, cultures, religions and customs of the country or region should be considered.

A. In neighbourhoods with rows of homes with gardens or yards, where each home has its own latrine, and generally even if there is no connection to sewerage system, septic tanks or flush toilets or household wastewater treatment tanks can be used to provide a certain level of wastewater treatment.

B. In residential, commercial and other areas, where each unit has its own latrine and septic tanks, etc. are located in empty lots or under the flooring of dwellings for initial wastewater treatment. The wastewater can then be discharged to side ditches or street gutters. These areas lend themselves to sewerage system operation.

C. In residential, commercial and other areas where each unit does not have its own latrine, there is common use of latrines. In some communities where religious practices include bathing several times a day, there will be public and private facilities providing latrines for the use of residents. In these areas, a great many sanitation problems can be solved by connecting sewerage to the bathing facilities. However, the problem of discharge from kitchens would be remained.

D. In poorer neighbourhoods, even if public, common-use latrine are in place, the people cannot afford to pay service charges to cover operation and maintenance costs, so often enclosed spaces are created to enable people to relieve themselves over a pond or creek, etc. In these areas, the residents simply rely on nature to take care of wastewater. A different dimension of economic assistance and subsidies will be needed before areas such as these can benefit from a sewerage system.

(2) Policy goals and methods, and other restrictions related to improvement of sewerage system in stages

The gap between the rich and the poor is large, and it is not economically feasible to expect to build very high level sewerage systems. In such cases, it is indispensable to set clear goals when planning sewerage projects. While carefully considering the levels of economic and technological resources available, in four broad stages, the policy goals to improve water environments should be the following:

- To first aim to raise health and sanitation standards
- Then, to improve living environments
- Then , to improve public water body environments
- And then, to improve amenities (provided by public utility services)

To reach the **1st goal**, to improve health and sanitation, is to cut the links between excreta and what people drink and eat. This will directly improve sanitation and save lives. A strong correlation exists between infant mortality rates and sanitation facilities. This problem should be given the highest priority. Here, concrete measures to be adopted are the building of public latrines that will enable the isolation of excreta, and the construction of discharge systems to remove sanitary sewerage from living spaces.

Goal 2, to improve the living environment, is to make household life more pleasant. An important concrete measure would be to install in each home toilet with anaerobic treatment functions to treat excreta.

Goal 3, to improve public water body environments, means protecting rivers, lakes and marshes from water pollution, including pollution from domestic wastewater, to maintain a healthy natural environment. Here, aerobic treatment by household treatment tanks or wastewater treatment plants will be needed to treat large volumes of domestic wastewater.

Goal 4, to improve amenities (provided by public utility services), should involve creating water amenity spaces, which tend to be lost in cities due to the use of recycled sewerage. Advanced wastewater treatment facilities will be needed to do this.

Other beneficial measures could involve such important options as using drying areas for recycling of resources.

It can be seen from the above alignment of measures and goals that existing water supply systems and economic conditions impose constraints on the selection of methods that can be applied.

Limitations imposed by water supply systems, at each stage, from public latrines, to household latrines, etc., hand carried water supply limits (as an upper limit) sewerage improvement to common latrines, and water supply from a common tap makes Pour Flush (PF) latrines the upper limit of possible improvement.

As for economic limitations, the ability or lack of affordability of residents to pay service charges that would cover construction and operation/maintenance for each level of service makes it advisable to compare construction and operation unit costs with amounts residents can pay. It should be remembered that such unit costs will vary by area.

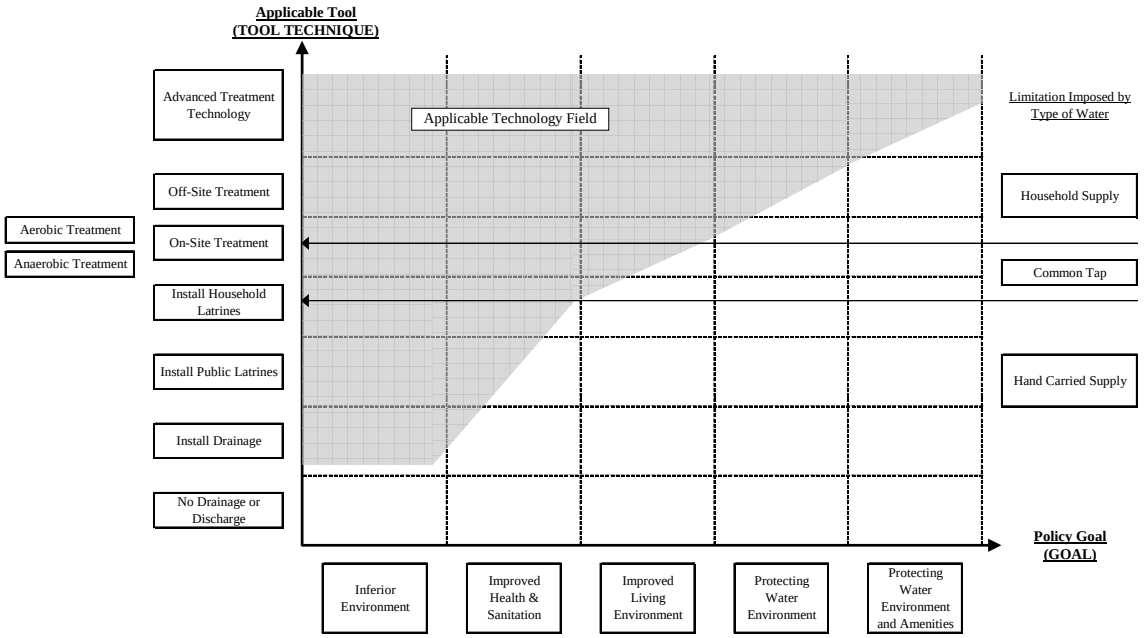


Figure 4.3.1 - Goal and Tool Matrix
Source: Guidelines for Management of Sewerage Facilities in Development Countries (Draft) by IDIJ, July 2002

The matrix interrelationship which illustrates the points is shown in ***Figure 4.3.1*** above.

The vertical axis on the conceptual graph below indicates a progression of tools (Technology). The horizontal axis shows a progression of policy goals. Together they form a Goal and Tool (G/T) matrix. Advancing upward along the vertical axis, the technologies become increasingly complex, height determines their ranking. The ranking of the policy goals goes up as their positions on the horizontal axis move from right to left. Use of the graph involves, first, finding the policy goal to be reached. Then look for the level of technology needed to achieve that goal. The shaded portions of the graph indicate the field of technologies that can be applied. In addition, the vertical axis on the right side of the graph can be used to determine what limitations will be imposed by the type of water supply system being utilized.

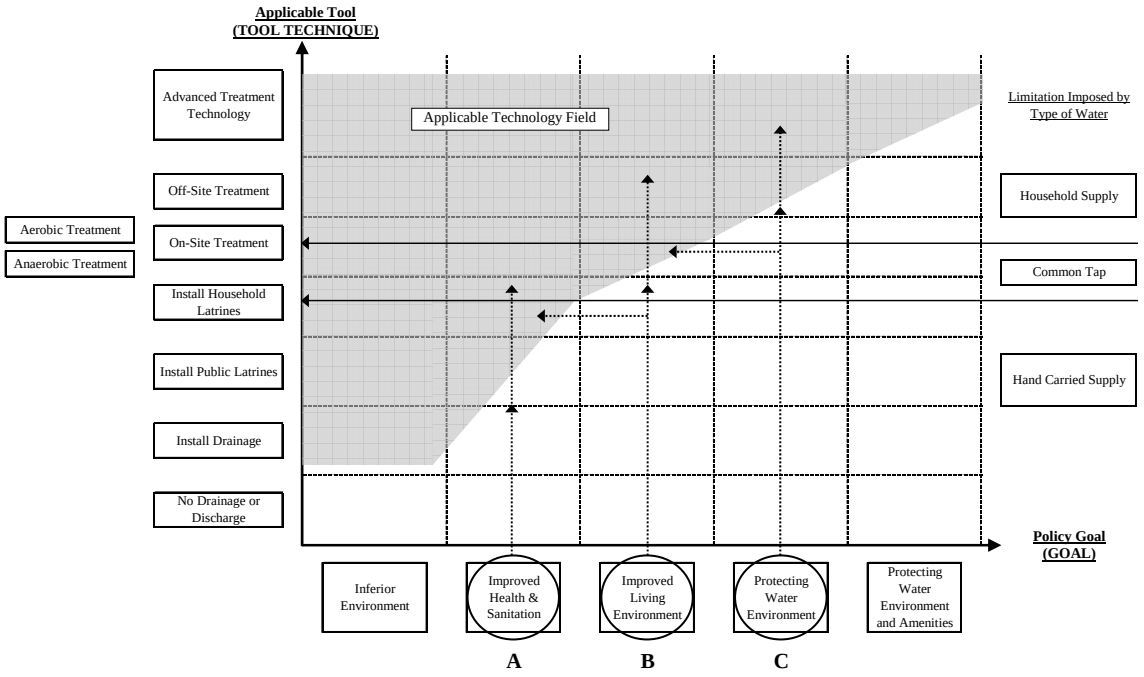


Figure 4.3.2 - How the G/T Matrix is Applied
Source: Guidelines for Management of Sewerage Facilities in Development Countries (Draft) by IDIJ, July 2002

The matrix can be used as follows: if the policy goal is "A" shown in ***Figure 4.3.2***, to improve health and sanitation in an area with cities, look for the applicable technologies shown along the vertical axis. You will find that setting up public latrines would be the minimum level of technology that could be applied. However, if the district in question has a common water tap, the technological limit could be expanded to installing private latrines for each household. In this way, the limitations imposed by the existing type of water supply system can dictate that the level of technology needed to reach the policy goal must be raised.

If the policy goal is to improve the living environment ("B" in the graph), on-site treatment becomes the best applicable technology. However, if the water supply system is hand-carried water, the highest level of technology that can be used will be the installation of private latrines for each household. On the other hand, if a public water supply system delivers water to each household, off-site treatment becomes the level of technology necessary to bring about the desired improvement.

When the policy goal becomes protecting the water environment ("C" in the graph), the upper technological limit becomes off-site treatment, but a piped water supply system would mean technology being limited to on-site wastewater treatment.

In this way, a G/T matrix can be used to select policy goals appropriate to technological limits, and constraints from existing water supply system can be considered.

A G/T matrix can be used as explained above, but policy goals will also be affected and changed by such factors as the level of socio-economic development and special characteristics of each city considered. Such conditions will vary from area to area, even among districts in the same city with the same levels of infrastructure and other facilities. For this reason, it is best to set policy goals for each district of a city. All things considered, final policy goals should be decided for an entire city after examining the economic conditions, level of social development and other characteristics of each district in question. The decision-making process requires

setting provisional goals before final policy goals are set. This is what is meant by a step-wise approach to the formation of policy goals. It involves a step-wise approach to the technologies adopted. (See ***Figure 4.3.3***)

Item \ Area	Type A	Type B	Type B or C		Type C
Protecting Urban Functions and Creating Amenities	Off-Site Treatment	Off-Site Treatment	Off-Site Treatment	Off-Site Treatment	Off-Site Treatment
Protecting Water Environment		Off-Site Treatment or On-Site Treatment	Off-Site Treatment or On-Site Treatment		Off-Site Treatment or On-Site Treatment
Improved Living Environment				On-Site Treatment	On-Site Treatment
Improved Health & Sanitation	Complete Toilet Service	Complete Toilet Service			Complete Toilet Service
	Current Condition	Current Condition	Current Condition	Current Condition	Current Condition

- Population Density -
Type A: above 300 persons/ha
Type B: 100 to 300 person/ha
Type C: below 100 person/ha

Figure 4.3.3 - Step-Wise Technological Approach
Source: Guidelines for Management of Sewerage Facilities in Development Countries (Draft) by IDIJ, July 2002

When the ultimate goal is a sewerage system with off-site wastewater treatment, among other factors, reaching it will depend on the level of social development in the area. First of all, development should be in line with plans for new communities or residential districts. According to the burden to be borne by the developer, sewerage should be build ahead of other facilities, and sludge disposal facilities must be built. (If conversion to a centralized wastewater collection and wastewater treatment plant is planned for the future, securing a site must be the first order of business.) A large sewerage system must be created. It should include the following: a sewer system plus small-scale decentralized-type treatment facilities; and a sludge treatment system with facilities for sludge disposal and treatment. These facilities should be constructed separately, one after the other, according to a plan for ultimately providing the entire city with sewerage.

As the overall plan is implemented, the small-scale decentralized treatment facilities can be shut down in a planned order once the centralized collection and treatment facilities is completed. The overall efficiency of the step-wise approach will depend on the number of years of useful life of the small-scale decentralized treatment facilities. It is essential that these facilities have sufficient useful life for full operation during the required time-period.

The initial assumption regarding the use of the small treatment facilities is that a sewerage system will be constructed. However, it is often the case that the income level of the developing country will make construction of a sewer system for certain cities or even certain city districts impossible.

On the other hand, if a careful eye is kept on the years of useful life of the facilities, even if the method of building each unit of a sewerage system in succession is not adopted, it may be possible to build an absolutely non-continuous system according to a time-series construction method. An added consideration is the fact that, the low prices of products and the often harsh climactic conditions, tropical or otherwise, may work in favour of a step-wise approach because the useful life of public latrines and on-site septic tanks or household wastewater treatment tanks can be very short. This means the years of useful life of such facilities can be fully used before

moving on to construction of a centralized sewerage system. This is another method using a step-wise approach.

The discussion of methodology is illustrated in ***Figure 4.3.4*** below. The point is that different methods must be considered when planning projects to improve water environments in developing countries.

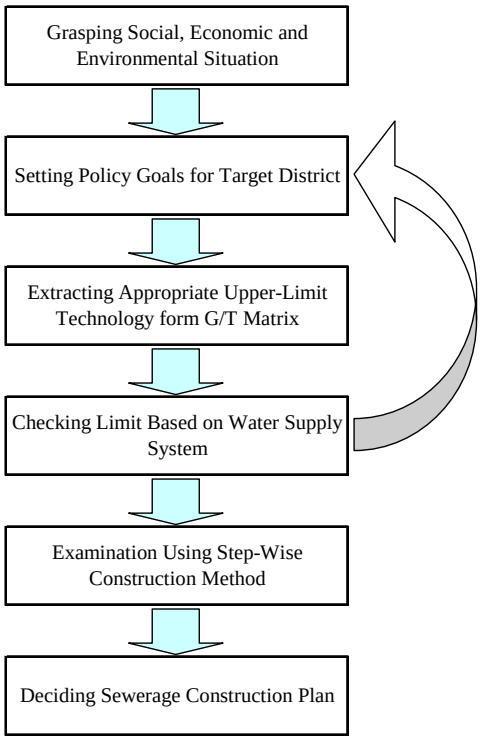


Figure 4.3.4 - Flow of Decision-Making Process
Source: Guidelines for Management of Sewerage Facilities in Development Countries (Draft) by IDIJ, July 2002

(3) Possibility of raising goals according to type of project

Feasible goals must be set, but they can be raised. To what levels goals can be raised will depend on the configuration of the project. The configuration of the project comprises an economic component covering who will bear what share of the construction and O&M costs of the project, and an organizational component covering who will be responsible for what portions of the actual construction and O&M.

An example of what is included in the economic component is for the government (general taxpayers) to bear the cost of improving water quality in public water bodies. Another approach is for service charges to cover the portion of budget allocated to improving household environments.

The organizational component could take the form of the government handling all management of planning, design, construction and O&M, with the actual work consigned to consultants, subcontractors or companies providing operation and maintenance services. Another choice would be to have residents play a very active role in overall management.

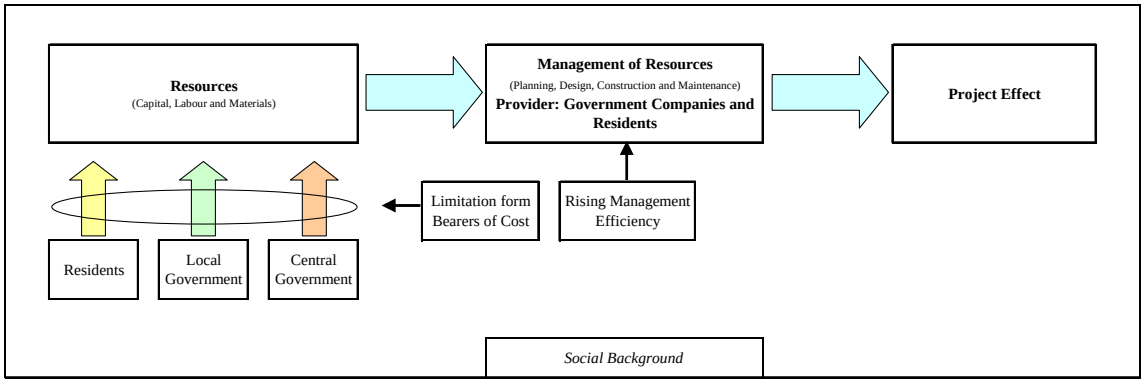


Figure 4.3.5 - Project Configuration Choices
Source: Guidelines for Management of Sewerage Facilities in Development Countries (Draft) by IDIJ, July 2002

No matter what choices are made, to avoid discrepancies and logjams, the ways of thinking in the area in question should be respected to the fullest extent possible. In other words, the history, culture and economic conditions of the country or area should be carefully considered when developing various project styles to come up with the most effective configurations possible.

4.3.2 Establishment of Basic Policy

In establishing basic policy measures for sewerage development, it is advisable to give full consideration to constraints imposed by set target levels and the project management conditions, existing sewerage facilities and sanitary facilities. The following items must be examined:

(1) Types of off-site treatment and on-site treatment and distinguishing between them
(2) sewerage volumes
(3) Treatment process
(4) If possible, recycling of treated water, and sludge

When establishing the basic policy for development of sewerage, the scale of the plan, annual goals, the scope of the objective, the type of collection system, the targeted facilities, and the allocation (location) of facilities must all be considered. You must also closely examine the financial and management aspects of all issues pertaining to establishing the scale, annual goals, the scope of the objective, the allocation of funds for facilities construction, and operation and maintenance costs. Financial and management decisions will result in various limitations on the construction of a facilities.

In conditions where, in the area being planned for, the provision of piped water is limited or almost non-existent, on-site treatment by septic tanks with leaching pits of by pit latrines is effective because of the low cost of technology. As on-site treatment can be done on a single household basis, on a district basis, or by apartment blocks, these conditions must be carefully investigated. The condition of existing stormwater drainage and sanitary facilities must be surveyed and taken into consideration when providing sewers. In urban areas of some developing countries, sewerage systems have been installed that are sewer pipes only with no provision for treatment. In such cases, it is often economical to lead sewerage off from the existing sewer mains by means of intercepting pipes and to create a combined sewer system in which sewerage flows into a wastewater treatment plant. When constructing sewerage in areas where sanitary facilities have become more common, effective use can be made of these while construction new facilities in stages. (See **Section 4.3.1 (2)**, “Step-Wise Approach”)

Regarding treatment methods, it is advisable not to allow building costs to mount. The use of locally made collection systems and the employment of simple treatment methods such as lagoon systems or oxidation ponds are desirable. In regions where water resources are stringent, treated sewerage is a valuable water resource. Therefore recycling should be positively investigated. It can also be a source of income for the sewerage business.

Recycled treated water can be used for variety of purposes: agricultural, industrial, groundwater recharge, afforestaion, water for cultivating scenery, and water for miscellaneous uses. The grade of required treatment will rise according to the use for the recycled treated water. When considering methods of treatment, it is necessary to balance the cost against the amount and quality of water and the income it provides, and compare it with the level required.

4.3.3 Limiting Factors to Consider in Service Management

Management based on sound financing that determines project implementation capability, and a capable organization and staff are among the limiting factors that mast be considered from the service management perspective. Also amortization of construction costs, collection of sewerage charges, and the affordability of the beneficiaries to pay for the costs of the service are all limiting factors that must be considered.

Among the factors imposing constraints or limits on service management aspect, the first indicated is whether the management is in a sound financial condition - in a situation in which income is greater than expenditure. Limiting factors hindering this can be found in the process of billing and collecting service charges. These should be carried out correctly in accordance with fixed rules. Generally, instances in which the billing and collection work is conducted based on fixed rules are extremely rare. As explained in next **Section 4.3.4**, “Implementation of Formulation of Management Structure”, institution building is decisive. A key limiting factor is whether a suitable and effective organization can be set up, and whether staff with the ability to conduct the business can be employed. In cases in which loans have been received to finance construction, their amortization will affect the financial position in no small way. This is another limiting factor. The affordability of beneficiaries to pay is also a limiting factor. It is advisable to carefully study all these limiting factors and to painstakingly develop plans to strengthen and reform administrative organizations, involve the private sector, and enhance resident participation.

4.3.4 Implementation of Formulation of Management Structure

Planning for the creation of implementing organization and project methods is an important factor in establishing sound project management. Approaches of which implementing organization should take according to project size and plan for the necessary personnel and organization have to be considered.

Establishing an organization suitable to the size of the project is an important factor when operating and managing a constructed sewerage facilities. A management organization must create plans for project design, construction, O&M, for sound management. It must also establish policies for future management of finances, financial plans and construction and implement these policies in a rational manner.

In cities that have no sewerage, it is important to study existing water supply systems, stormwater drainage, industrial wastewater, nightsoil disposal measures and sewerage and sanitary related organizations. A proposal should be planned to integrate these organizational

structures or to clarify the share of responsibilities with the new sewerage service organization. In cases where water supply services are already in place and are operating effectively, or in cases where the regional government is operating regional drainage, it is beneficial to effectively utilize the experience and personnel of those organizations in a newly created organization.

4.3.5 Typical Structure

A typical governing structure of sewerage service is depicted in ***Figure 4.3.6***. As shown in this figure, the typical organization and function for sewerage services should be as parts of an organization structure for water supply and sewerage services. This organization manages provincial or city/regency regional total water supply and sewerage services. This governing structure of water supply and sewerage services belong to local government as company and should be called as Regional (Local Government) **Water Supply & Sewerage Service Enterprise (WS&SSE).**

This type of organization has many advantages more than newly established organization as below listed as for example:

Advantage

- Existing organization structure is mostly already existed, and there are not many tangled bureaucratic provisional works for establishing new organization, such as approval for the laws and regulations, and it also can make the time shorten to start operation.
- Water supply and sewerage can be managed in an integrated fashion, means that it can manage the planning, customer database, billing and collection, financial matters, customer services, public communications, and other necessary management works in an integrated.
- Water works and sewerage works can monitor the operation conditions each other easily, and discuss the issues (complains, problems, suggestions etc.) in barrier-free.
- Budgeting for water supply works and sewerage works can be allocated as in a one organization.

Disadvantage

- Existing organization structure has to change their existing systems
- Existing organization may not have enough working area or space for additional organizations.
- Administrative works, financial works, and other logistic works of existing organization structure will be increased.

And Public-Private Partnerships (PPPs) and Resident and Community Participation also can be applied for the part or all of the management works such as design, cost estimates, payroll accounting, bill collection, construction works, rehabilitation works, and so on. Regarding to PPP and Resident and Community Participation are descried in next **Section 4.4** and **Section 4.5**.

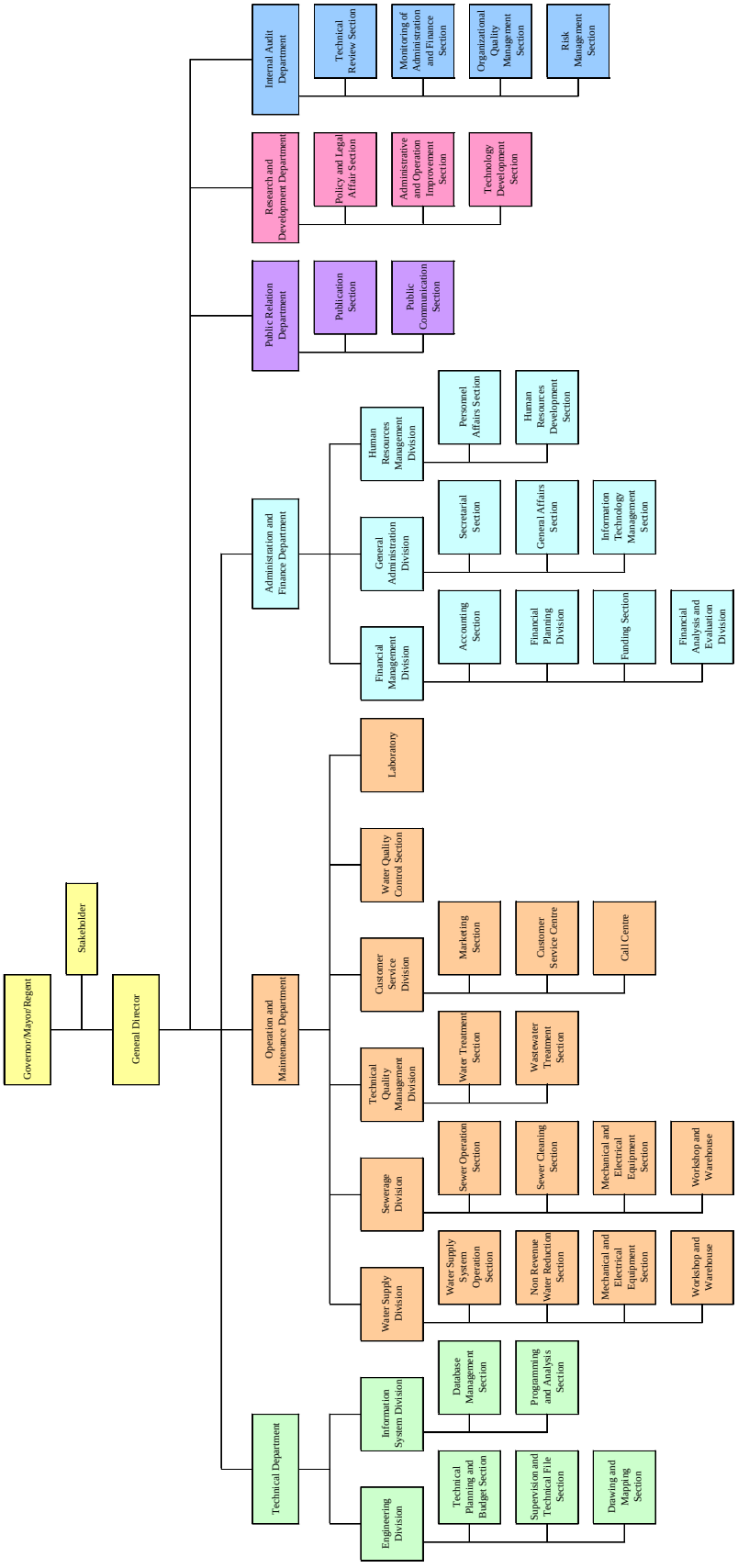


Figure 4.3.6 - Typical Governing Structure of Water Supply & Sewerage Service Enterprise (WS&SSE)

The functions and works on each position are delivered in follow ***Table 4.3.1***:

Table 4.3.1 - Functions and Works of Each Position (1/3)

Position	Function and Work
Governor / Mayor / Regent	The Governor, Mayor or Regent monitors and evaluates the management of the organization, issues and approves the related legislations, takes a total responsibly
Stakeholder	The Stakeholder also monitors and evaluates the management of organization to make it sound and clear. The Stakeholders might be Central, Provincial and Municipal Government, Customers, Relevant Communities and Staff (Employees).
General Director	The General Director of the organization manages the water supply and sanitation service organization directly at the site to make woks efficiently and fairly. All information such as management conditions, strategies, plans, and programmes etc. of organization which consists of Planning and Production Department, Director of Administration Department, Operation and Maintenance Department, Public Relation Department, Research and Development Department and Internal Audit Department comes to him/her. And he/she takes responsible of all works directly.
Planning and Control Department	The Department of Planning and Production consist of three divisions which are Technical Development Division, Quality Management Division and Information System Division.
Technical Development Division	The Technical Development Division controls Technical Planning section, Supervision and Technical Files Section.
Technical Planning and Budget Section	The Technical Planning and Budget Section works for planning of development or Improvement plan, strategy and conduct basic surveys and investigation, and estimates rough cost and budgeting for the plans and works out detailed quantity surveys and cost estimates for construction works.
Supervision and Technical File Section	The Supervision and Technical File Section works for supervising of construction works and, preparation, submission and storage the applications for construction works.
Drawing and Mapping Section	The Drawing and Mapping Section prepares as-built drawings and mapping information for database management system.
Information System Division	The Information System Division manages Database Management Section and Programming & Analysis Section to develop the database.
Database Management Section	The Database Management Section develops and manages the database of customer information such as name, address, contact number, house type, numbers and name of family, condition of connection to water supply and sewerage, records of charged and collected bills, and so on, and asset information such as route of pipelines, location of facilities and equipment, detailed information of installed facilities and equipment (year installed, diameter, type or etc.) using with CAD, GIS and necessary database software. These databases should link each other or merged as one database.
Programming and Analysis Section	The programming and analysis section analyzes the database and develops the required programmes for development of databases.
Operation and Maintenance Department	The Department of Operation and Maintenance consist of three divisions which are Water Supply Division, sewerage Division and Customer Service Division.
Water Supply Division	The Water Supply Division manage Water Supply System Operation Section, Non Revenue Water Reduction Section, Mechanical and Electrical Equipment Section, Workshop and Warehouse to operate and maintain the water supply system.
Water Supply System Operation Section	The Water Supply System Operation Section works for operation and maintenance of water supply systems such as intakes, raw water transmission systems, treated water transmission systems, water distribution systems and so on.
Non Revenue Water Reduction Section	The Non Revenue Water Reduction Section works for detection and repair of water leakages, finding out and disconnection of illegal connections, operation of service reservoirs and valves and so on.

Table 4.3.1 - Functions and Works of Each Position (2/3)

Position	Function and Work
Mechanical and Electrical Equipment Section	The Mechanical and Electrical Equipment Section for water works operates and maintains E&M equipment in the pumping stations, treatment plants or other facilities, and also manage the O&M equipment such as bowsers, dump tracks or excavators and so on.
Workshop and Warehouse	The Workshop and Warehouse should be at one place for repair the equipment, water meters, or to keep materials.
Sewerage Division	The sewerage Division manages Sewer Operation Section, Sewer Cleaning Section, Mechanical and Electrical Equipment Section, Workshop and Warehouse to operate and maintain the sewerage system.
Sewer Operation Section	The Sewer Operation Section operates and maintains sewers.
Sewer Cleaning Section	The Sewer Cleaning Section cleans sewer and manholes, channels, and so on.
Mechanical and Electrical Equipment Section	The Mechanical and Electrical Equipment Section for sewerage works operates and maintains E&M equipment in the pumping stations, treatment plants or other facilities, and also manage the O&M equipment such as bowsers, dump tracks or excavators, water jet tracks, vacuum cars and so on.
Workshop and Warehouse	The Workshop and Warehouse should be at one place for repair the equipment, to keep materials.
Technical Quality Management Division	The Quality Management Division manages the operation of water and wastewater treatment facilities and control of treated water quality to observe the regulations and standards.
Water Treatment Section	The Water Treatment Section manages the water treatment facilities and equipment.
Wastewater Treatment Section	The Wastewater Treatment Section manages the wastewater treatment facilities and equipment.
Customer Service Division	The Customer Service Division manages Customer Service Centres and Call Centres to communicate with customers.
Marketing Section	The Marketing Section works for marketing of the new connection
Customer Service Centre	The Customer Service Centre works for as the place for payment of the bills, registrations, handling of complains, announcement of information and so on.
Call Centre	The Call Centre is for receiving the emergency report from customers for 24 hours.
Administration and Finance Department	The Department of Administration and Finance consist of three divisions which are Financial and Management Division, General Administration Division and Human Resources Management Division.
Financial Management Division	The Financial Management Division manages Accounting Section, Financial Planning Section, Funding Section and Financial Analysis & Evaluation Section. These works are very important for hold sound basis management condition to the organization.
Accounting Section	The Accounting Section works for organizational accounting such as fund administration, holding the purse and so on.
Financial Planning Section	The Financial Planning Section works for organizational financial planning such as financial forecast, account settlement and so on.
Funding Section	The funding section works for organizational funding such as request for subsidies or loans, fund administration and so on.
Financial Analysis and Evaluation Section	The Financial Analysis and Evaluation section analyzes and evaluates organizational financial conditions.
General Administration Division	The General Administration Division manages Secretarial Section, General Affairs Section, and Information Technology Management Section.
Secretarial Section	The Secretarial Section works for secretarial works.
General Affairs Section	General Affairs Section works logistic works for the organization such as business administration, stages internal events, procurements work of office equipment and so on.
Information Technology Management Section	The Information Technology Management Section works for internal computing works such as computer network management, O&M of homepages and so on.

Table 4.3.1 - Functions and Works of Each Position (3/3)

Position	Function and Work
Human Resources Management Division	The Human Resources Management Division manages Personnel Affair Section and Human Resources Development Section to manage human resources efficiently.
Personnel Affairs Section	The Personnel Affairs Section works for personnel affairs such as to recruit, hire and evaluate the personnel, management of health and safety, complaint & trouble handling and so on.
Human Resources Development Section	The Human Resources Development Section manages human resources such as human resources assessment, human resources development (training, seminar, etc.) and so on.
Water Quality Control Section	The Water Quality Control Section monitors and controls water quality at the water treatment facilities and wastewater treatment facilities.
Laboratory	The Laboratory takes samples at several points in the rivers, streams, channels, pipelines, and facilities, and analyzes water quality and, prepares and submits the water quality analysis report to regional environment management agencies. Laboratory section consists of Main Laboratory for total water quality analysis and small scaled Laboratory in the treatment plants for rough water quality analysis.
Public Relation Department	The Public Relation Department manages Publication Section and Public Communication Section
Publication Section	The Publication Section prepares and publishes publications such as organization profiles, journals and so on.
Public Communication Section	The publish communication Section works for public announcement, awareness, education, staging the events and so on.
Research and Development Department	The Research and Development Department manages Policy and Legal Affair Section, Administrative and Operation Improvement Section, Technology Development Section.
Policy and Legal Affair Section	The Policy and Legal Affair Section work for legal works (preparation of documents or advisory works and so on).
Administrative and Operation Improvement Section	The Administrative and Operation Improvement monitors and tries to improve the administrative and operational work in the organization.
Technology Development Section	The Technology Development Section studies, introducing and develops of water supply and sewerage technologies.
Internal Audit Department	Internal Audit Department manages Technical Review Section, Monitoring of Administration and Finance Section, Quality Management Section and Risk Management Section.
Technical Review Section	The Technical Review Section appraises the technical works of water supply and sewerage.
Monitoring of Administration and Finance Section	The Monitoring of Administration and Finance Section monitor condition of administration and finance of organization.
Quality Management Section	The Quality Management Section work for management quality of services of organization. (e.g. ISO 9001. 14001)
Risk Management Section	The Risk Management Section cares of risks on management of services.

4.4 Public-Private Partnership

4.4.1 General

Public-Private Partnerships (PPPs) help in moving a society toward sustainability in many different ways:

(1) **Institutionally:** They allow Governments to attract private sector funding and involvement without incurring the adverse effects of full scale Character of Inf. The Government can, for instance, retain a significant role so that they maintain the essential "Public" character of infrastructure.

(2) **Economically:** They promote efficiency and indirectly economic growth through decentralization of services, corporatism of municipal utilities, cost recovery through user charges, economic efficiency in resource use and allocation.

(3) **Socially:** They meet people's needs by offering better water supply and sanitation services. This helps in raising living standards and in alleviating poverty.

(4) **Environmentally:** They can use environmentally innovative technology and can help in raising environmental controls to national and/or international standards.

4.4.2 Multi Infrastructure Facilities Limited Company

The Government of Indonesia established Multi Infrastructure Facilities Limited Company (PT SMI) on 26 February 2009 with a purpose to accelerate infrastructure development in Indonesia. The formation was based on Government Regulation No. 66/2007 and Government Regulation No. 75/2008 on State Equity Participation in the Establish of an Infrastructure Financing Company. The PT SMI is 100 % owned by Ministry of Finance. And, the PT SMI's vision and mission is to serve as a leading catalyst in the national infrastructure development acceleration programme:

- To become a strategic partner of the Government in promoting and accelerating the infrastructure development growth in Indonesia;
- To establish the synergy with third parties, e.g. private institutions, banking sector, Local Governments, State Owned Enterprises, or multilateral organizations in order to increase the capacity of infrastructure fund.

And roles of PT SMI are listed in ***Table 4.4.1*** as below:

Table 4.4.1 - Unique Roles of Multi Infrastructure Facilities Limited Company of Indonesia

Role	Description
Acceleration of Infrastructure Development	Building strong partnership with private sectors, State Owned Enterprises, Local Government, Central Government, Multilateral Institutions (WB, ADB, IFC, etc.) in the establishment of a financing company in infrastructure sectors
Financing Activities	Conducting financing activities to various infrastructure related sectors in a form of debt financing, equity and mezzanine financing
Promoting PPP	Promoting public-private partnership scheme as an effort to accelerate infrastructure development in Indonesia
Providing Investment Support	Providing any support which may be required to domestic and international investor such as advisory and other related activities to attract new investment and improve appetite in infrastructure sectors in Indonesia
Research, Development & Socialization	Conducting research and development and socialization of infrastructure financing in Indonesia
Fund Management	Managing idle fund through various investment instruments optimize return of the investment portfolio
Other Related Activities	Other activities related to the acceleration of the infrastructure development

Source: PT SMI

The PT SMI will support WS&SSE, when the WS&SSE will commence the PPP.

4.4.3 Introduction of Public-Private Partnership

(1) Key points in public-private partnerships

It is advisable to consider the following key points when introducing public-private partnership.

1) Political stability and Government sponsored support systems
2) Legal compatibility
3) Ensuring service operator responsibility
4) Improvement of resident services
5) Ensuring efficiency and reducing expenses
6) Capacity of private sector company
7) Systems to respond to accidents
8) Subsidies

Important prerequisites for public-private partnership (PPP), no matter what option is actually chosen, include political, social and economic stability as well as Government sponsored support systems such as PT SMI mentioned in **Section 4.4.2**, because of the need for a stable business environment and service operation based on a long-term contract.

In deciding which option to implement for PPP, the first step is to compare and study the strong and weak points of each option. Decisions should be made after considering which management option is most suitable to the sewerage project. PPP options include ownership of assets, fund procurement, responsibilities for capital spending and business operation risk where, depending on the roe of either Government or the private sector, the nature of the partnership can vary dramatically. Accordingly, for efficient operation of a city sewerage service, the most suitable option must be chosen after considering such factors as the size of the city, the water supply and sewerage service coverage rate, the status of infrastructure, and other socio-economic conditions.

There is a large choice of options for a suitable PPP. These include service contracts, management contracts, lease contracts, concession contracts and other options such as Build-Operate-Transfer (BOT) and Build-Own-Operate (BOO).

PPPs are influenced by Government environment and water policies, financial status of water supply and sewerage services and monitoring and authorization systems for public utility works. For this, contracts are a legal base for the implementation of the project and should always include technical conditions to support this. Information needs to collected and the structure of these laws should be ascertained in the initial stags.

For any option chosen, it is rare for the sewerage project to be managed independently. In many cases, as sewerage services have business tip-ups with water supply services, it is necessary to focus on and make decisions while taking into account water service coverage, financial status and especially PPP trends. PPP options are shown in next **Section 4.4.3 (2)**.

1) Political Stability

There must be a stable political, economical and social base so that PPP can create partnerships and work together to provide a continually important public service (water supply and sewerage service), which is necessary for the lifestyle of residents, consistently and for a long period of time. To implement PPP the Government (PT SMI) must create support and maintenance systems through a unified policy.

2) Leal Compatibility

In cases where there are concrete water, economical, and environmental policies, it goes without saying that where there is annual development plan, the plan should not conflict with these policies, but should complement each other. After procedure for PPP has commenced, it is important to avoid the effectiveness of the PPP form being lost. PPP should not conflict the national laws, restrictions of Government of Indonesia (GOI), standards and procedure of other high-level regional organizations. In other words, the laws of Indonesia must not be broken.

3) Ensuring Service Operator Responsibility

It is important to clarify the allocation of responsibilities between the sewerage service operator and the contractor. Outsourcing, which takes on various forms and categories, does not denote passing on final responsibility for operating the sewerage service. Of course, the damage from problems that occur during operations is the responsibility of the contractor, but the overall responsibility of third party monitoring of the sewerage service lies with the organization contracting out the services.

Final responsibility and extent of payment for damages should be according to what is stipulated in the contract. In the case of there being no stipulations, both parties should mediate a solution. In other words, risk portion stipulated in a contract should be adhered to.

4) Resident Services

Private sector Participation, must attain the goals of management efficiency and cost reduction to prevent service charges being increased and even allowing for a lowering of service charges and other benefits to be passed on to users. Through reducing user complaints and raising customer satisfaction, sewerage service operators must strive to increase user confidence in the water supply and sewerage service. Private sector predication should not only have the goals of improved efficiency and profitability but also strive to distribute the benefits of the service to the poor.

Attaining these goals will lead to a clean and comfortable region and also improve public sanitation and life environment and result in such nonmaterial merits as, upgrading the image of the region to such an extent where residents want to live there, have pride in there are and feel content and attached to the community.

5) Ensuring Efficiency and Reducing Expenses

The goal of outsourcing a public service is to improve service to users through a reduction in user complaints, raising user satisfaction and cutting costs. This improvement in user services is achieved through a private-sector corporation being able to attain performance goals according to provisions in a contract.

Even though performance of efficiency and cost reduction can be determined by the following procedures, it is still necessary to estimate performance before introducing private sector participation. From these estimations, the GOI can decide on which private sector participation option to implement, or even whether private section participation itself is a viable option.

The level of technical expertise and reliability of a private-sector corporation can be determinate by evaluating the prequalification documents and technical proposals offered in bids.

Performance can be evaluated through regular and spot checks for discrepancies in the progress of attaining set goals and procedure.

Efficiency and calculations of reductions in operating expenses can be evaluated by comparing performance with cost and invested resources. A separate index of efficiency should be in place.

6) Capacity of Private Sector Corporation

Evaluating private sector participation qualifications enables the GOI to eliminate those applicants that do not have sufficient capacity to fulfil the contract. Generally, evaluation of applications for the tender are conducted and successful applicants are entered into a list to ensure fair and certain fulfilment of a contract. Participants are then chosen from this list. Depending on the type of private sector participation, a number of successful applicants can be nominated for a specific purpose and then partake in designated competitive budding.

Depending on type of contract (to build, to operate, to purchase goods and so on) and amount of money involved, for qualifying private sector participation tenders, requirements such as previous business performance, amount of capital and financial status and scale can be used as qualifying criteria. Applicants should be evaluated on these criteria with the resulting successful applicants listed.

Furthermore, the content of the contract should be clarified in a specification document produced by the government. Private contractors then normally use this as a basis to fulfil the contract. Another approach is proposal based competitive bidding. This is when the government only sets performance standards and applicants offer proposals for treatment methods. In this approach, the proposal is the main means for determining capacity of the applicant.

7) Systems to Respond to Accidents

Systems and countermeasures to respond to emergencies from accidents should be planned in advance to minimize inconveniences (scale, service disruption time and extent of impact) to residents and end users. Advance planning is also necessary to cater for rapid restoration of service.

More details are introduced in "**Chapter 12: Risk Management**".

8) Subsidies

Service and connection charges need to be kept low or it will be difficult for low-income groups to be able to use the sewerage service. If the increase of influent is less than predicted, the wastewater treatment unit price becomes noticeably more expensive. In addition, as a sewerage service is a public service, policies and subsidies benefiting low-income groups are necessary.

Payment of service charges according to the benefits received is a fundamental approach. Benefits from the sewerage service are not limited to users alone. The sewerage service also benefits fishermen, farmers, both district residents and in a broader sense, the entire country. On the other hand, users benefit is mostly from the change to flush latrines. However, there are numerous cases of Pour Flash (PF) latrines being established, and water urns and buckets being placed near the latrine creating a situation where there is regular access to water. In these cases, benefits to sewerage service users are limited. Although evaluating benefits is a difficult task, the Central and Local Governments should pay for this service.

(2) Consideration when selecting options for public-private partnership

Once criteria for private sector participation have been met, the question becomes how the public-private entity should be configured. Should it have a vertical (top-to-bottom) structure, or should it be organized area by area? Other options will pertain to such matters as project life, allocation of responsibility, risk management, incentives for private contractors, ensuring stable operations, and supervisory systems.

1) Service contracts
2) Management contracts
3) Leasing
4) Concessions
5) BOT (including BOO)
6) Limited BOT
7) Joint ownership
8) Complete sale
9) Others

It will be necessary to decide which division or type of project organization will supervise the work of the public-private joint undertaking, and personnel requirements will also have to be determined and met. (Depending on the scale of the organization or consignment, a project team or a task force may have to be established.) The organization in charge will be responsible for planning, execution and evaluation of the work. When it is deemed necessary, consultants and others will have to be hired to provide advisory services in fields where experts with appropriate experience and know-how are required. Along with shouldering its own designated responsibilities, the management organization will have to coordinate, supervise and to some extent evaluate the efforts of groups that should continue to handle specific areas of work. It will also have to decide on the apportioning of roles after contracting out the work.

How to View Risks Involved in Public-Private Partnerships

As described in "**Chapter 12: Risk Management**", all projects entail a variety of risks. When deciding on the configuration of the PPP, full consideration has to be given to the categories and extent of risks involved in the project, and how to avoid them. Along with this, it should be decided how risk exposure should be spread among the partners involved and how responsibility will be met should risks materialize. Rational apportionment of risk is a key to the success of failure the PPP. It is very important to establish a legal framework for risk management and apportionment of risk exposure.

Careful coordination between the public and the private sectors is needed to minimize overall risk. Despite best efforts, however, some risks pertaining to the specific nature of the project will remain, and in some cases, conflicts of interest between the public and private sectors cannot be reconciled.

There are two principals regarding apportionment of risk:

A. Established levels of compensation will have to be paid if risks materialize. (On the other hand, the parties involved will profit from bearing risks: financial rewards in the case of the private sector and socio-economic benefits for the public sector.)
B. Risk management responsibilities for each type of risk must be apportioned among the project partners.

Advantages and Common Objectives of Cooperation between the Public and Private Sectors
It can be said for the benefits to public sector and private sector are:

Public Benefit: Improvement of the quality of water and sewerage service
Private Benefit: Appropriate compensation for capital investment and management service

Although the benefit (profit) realized by the two partners differ, they share the objective of satisfying users. With this common objective as a basic premise, the risks inherent in the project can be fairly and appropriately apportioned and borne.

A. Concepts involved in risks borne by the public sector
The private sector partner does not necessarily fulfil its responsibilities to adhere to the basic rules for providing a very important sustainable, suitable, and fair public service. This type of risk may occur as project is being implemented.

During the contract period, it is always possible that the private sector partner could lower the level of services, discontinue providing services, or fail to perform within the budget. (This could include a failure to meet obligations, a delay in meeting obligations, or delivering incomplete services.) In the event such risks materialize, the public sector partner would have to take steps to bring about a recovery of proper operations. This might involve having to intervene in project operations to ensure service continues. This or other measures would mean a greater financial burden.

On the other hand, the private sector partner faces the risk of a drop in demand, which could mean a lower level of compensation and failure to recover invested capital.

Faced with these differing risk situations, the two sides must harmonize their efforts and closely cooperate to minimize risks and work to ensure that the project is successful and that all stakeholders benefit.

B. Apportionment of remaining risk
The public sector partner must plan ways to transfer risks to the private sector-risks that the private sector can readily handle. Examples of such appropriately transferable risks or risks that can be shared within fair limits include the followings:

a. Financial risks and those related to basic technologies.
b. The risk of demand falling short of projections and risks related to revenue from service charges and levels of profit.
c. Environmental risks, which the private sector partner cannot reasonably be expected to bear, should be covered with the support of the public sector and through the service of guaranty institutions.

More details are introduced in “Chapter 12: Risk Management”.

1) Service Contract (public sector is provider of service)
The simplest PPP option is a system in which the public sector owns the water and sewerage utilities and assumes complete responsibility for O&M, but entrusts work in specialized fields and limited operations to an outside entity or outsourcing services to an outside provider. Such services could include design, estimation, payroll calculation, providing human resources, collecting service charges (reading meters, billing, collecting, dealing with defaulters), supplementary construction, and prevention of water leakage and blockage of sewers.

Contract periods are usually 1 to 2 years, and extension is possible.

One type of service contract is the contracting out of specified office work or business functions, which includes doing the actual work involved. Other types include the transfer of completed goods (or an existing operation) to a party who performs designate tasks or an arrangement in which an agency provides employees who will work under the supervision of project management (or the public utility management). Other service contracts could be hybrid arrangements for consigned tasks under a contract that does not fall under a typical category.

The types of service contracts outlined above are fundamentally different from and should not be confused with subcontracting arrangements in which the provider of the services contracted will hire and supervise workers needed to perform the assigned tasks. Also direct employment enters the province of the labour and employment policy of the Indonesia in question, and problems to which the country's labour ordinances are applicable arise, so they are not dealt with under this category of contract.

2) Management Contract

Compared to service contracts, management contract, management contacts are more comprehensive, transferring government-owned facilities to the private sector the responsibility for O&M in whole or in part. Under this type of contract, the entrusted party (private contractor) carries out the management of routine operations while bearing limited risk. The contractor has no direct relationship with the customers/. The other party to the contract is the Government, on behalf of which the contractor acts at all times for the management service. These contracts are generally for three to five years and are renewable.

Management contracts, which could be a first step toward full-fledged privatization, are used to improve service performance and lower costs. They are also useful as a means of giving private-sector management service providers an opportunity to gain experience before a possible next step-toward a more complex lease or concession contract.

An important means of providing incentive for greater efficiency and improved performance is to tie management fees to targets within actual parameters such as a targeted increase in sewerage or water distributed an increased rate of service charge collection, or a decrease in complaints from users.

3) Lease Contract

Under a lease contract, a private firm leases water supply and sewerage facilities from the Government and takes on the responsibility of operating and managing them for a set period. The government collects lease fees from the private firm and recovers funds invested in the services during the term of the lease. The lessee (lease contractor) pays rent to the utility owner (the Government) and becomes responsible for all operating activity, including the use of all equipment and vehicles, the replacement of parts and any upgrading or renewal of the facilities. In addition, the lessee is responsible for billing and collecting service charges and for procuring operating capital.

4) Concession Contract

Under a concession arrangement, the public sector enters into a contract to grant a license (management rights) to a private firm, which will be responsible for full implementation of services. The concessionaire will operate the water supply and sewerage facilities, will take over all operation and maintenance, and will make all investments for future expansion

of services.

Concessions, which generally cover a period of 20 to 30 years, give the concessionaire exclusive management rights. When a concession ends, all facilities, equipment and materials of the utility are returned to the owner, the Government. The Government is compensated for any assets that have not been fully paid for. The distribution of any surpluses when accounts are settled is stipulated in the terms of the concession contract, but unless stipulated otherwise, losses are borne by the concessionaire.

5) Build-Own-Transfer (BOT) Contract

In cases where the public sector plans to establish and purchase new facilities and infrastructure with the intention of operating and maintaining them in the future, the opinion exists for the private sector (including consortiums) to procure funds and build the infrastructure. After completion, the private sector can own and operate the infrastructure for a predetermined period. After a set period, the facilities and infrastructure can be transferred to the public sector. This process of building, owning, operation and transferring is known as BOT. This process is based on the approach that it is rational to enlist the private sector to operate the entire project when compared to projects directly operated by the public sector.

This approach has been increasingly adopted in cases where the public sector, needing to prioritize projects and enlist private sector cooperation, attempts to procure large amounts of funds to establish and purchase facilities and infrastructure within tight budget restraints.

In this event, the responsibility placed on the private sector and the scope of autonomy is sizeable. This allows for initiatives and improvements during the implementation of the project but the financial risk is large. From BOT contracts a Build-Own-Operate (BOO) contract was derived.

When the private sector hesitates to respond to BOT opportunities to reduce private sector risk, a Build-Transfer-Operate (BTO) option that involves the private sector transferring ownership to the public sector immediately after construction, but continuing to operate the project, can be implemented.

6) Conditional Build-Own-Transfer (BOT) Contract

Private sector corporations either show little enthusiasm for bidding for bids, or quote high in cases that have high economical and political risk. An option, other than a lease contract, that reduces risk is for the public sector to procure construction funds and, after construction, offer it on loan to the private sector which would operate the project long-term.

This approach has the benefit of the private sector gaining ownership after a period of paying a commission that covers the principal and interest of the public sector investment cost. This method, having less risk than a BOT contract, is called a reversed BOT.

7) Joint Ownership

When considering initial investment risk, there is a low possibility of successful implementation of a project that transfers the entire responsibility of ownership and operation of facilities to the private sector because the risk is too high. The joint ownership approach is where both the public and private sectors own an equal share based on commercial law (corporate law) and are joint investing partners and operators of the project (in some cases the public sector will own a golden share for a predetermined period).

In this case, both parties conclude a detailed agreement that confirms rights and obligations as well as methods for profit allocation.

8) Full-Fledged Privatization

This approach involves not only the complete transfer and purchase of water supply and sewerage systems from the public sector to the private sector, but also release of the public sector from any responsibility of implementing the service. The public sector reduces the future financial burden of the service by cutting expenditure on subsidies. Although temporary, the non-tax income from selling the service can lead to stabilizing the public sector finances.

After privatization, the water company is no different from any other company in that the motivation for improving performance and operation efficiency will be in the form of pressure to address user complaints and gaining a favourable position in the financial markets for procuring funds.

9) Others

There should be a licensing (patent) process conducted by a regulating authority (government department) to commence or operate a project, since water supply and sewerage services are public services that are deeply related to the well-being, lifestyle and sanitary life environment of residents. Project licensing in a predetermined area has the capability of guarding against the deterioration of residential services resulting from a lack of competition created by monopolies. The regulatory authority also protects the interests of resident's sets service charges (monopoly prices), monitors water quality and imposes various restrictions to promote a universal service. Other than government departments, depending on the type of restriction, there are cases where various regulatory authorities may be set up to monitor restrictions. The government departments that are responsible for licensing projects may allow specialist organizations to perform some administrative duties, such as supervising and monitoring.

(3) Preparatory Work for Private Sector Participation

The following tasks and activities are involved in preparing for private sector participation:

1) Selection of the areas of business to be consigned to the private sector
2) Selection of the form of private sector participation
3) Confirmation of the private sector partner's qualifications and examination of the capabilities of the private company in the following areas:

   - Work processes and operating functions
   - Equipment and materials at hand
   - Financial condition
   - Labour-management relations

4) Preparation of preliminary estimate of payments to private sector partner
5) Creation of plan for the involvement process and schedule; deciding on duration of private sector involvement
6) Establishment of long-term and middle-term policies based on review of supply-demand conditions, facilities construction plan, financial plan and plan for employment of personnel
7) Development of plan to improve management performance, particularly for the operations to be consigned
8) Establishment of targets for effectiveness of Public-Private Partnership (PPP)
9) Evaluation of how private sector participation will affect overall management in following areas:

   - Organization
   - Personnel requirements
   - Finance
   - Technology
   - Plant and equipment
   - Relations with customers
   - Labour-management relations

10) Creation of supervisory system

Through preparation and planning is a must when consigning areas of operation to private sector partner. Failure to do this will result in various unexpected bottlenecks and delays, postponement of plan implementation and costly adjustments. The details of consigning areas of operations to the private sector, discussed below, require thorough preparation to ensure that the plan proceeds smoothly. A schedule of preparatory steps should be organized and faithfully followed to avoid problems.

1) Selection of the areas of business to be consigned to the private sector

It should be selected the area of sewerage operations that could be handled best by a private sector partner. Should each area of consigned work be organized as a separate operation handled by a private sector partner? If so, what adjustment will be needed to manage the interrelationships with other previously consigned areas of work? An alternative approach would be to group pertinent areas of work together and develop a comprehensive plan for consignment of operations to a single private company.

What will be the future handling of work not directly related to consigned sewerage operations? A second set of questions that have to be considered would include the followings:

- What measures will be needed when changes in the business environment lead to closing the consignment of operations?
- Will there be a return to direct government management, or will another method be adopted?

2) Selection of form of private sector participation

Forms of private sector participation include service contracts consigning a single work process to a company, a comprehensive management contract, a lease contract, a full concession, or others, including hybrid arrangements. When it is considered of the form of private sector participation, keep in mind that the from selected should be the one that best fits in with the overall plan for the area of business consigned, including any plans for future business expansion (such a expanding service area). There are many options to combine the configuration of private sector involvement to fit the types of operation to be consigned, the special characteristics of the work, and the duration of the consignment.

3) Confirmation of the private sector partner's qualifications

To ensure that the work of operation to be consigned will be properly, reliably and positively performed, the consignee should be fully prepared in the following areas:

- Technology required to do the work
- Requisite qualified personnel
- Requisite equipment, materials and facilities
- Financial strength (funds needed to meet to contractual obligations)
- Stable labour-management relations

For the most part, these qualities overlap with qualifications and standards used in the contract bidding process in which the consignee was selected. They mainly have to do with the private company's ability to meet the terms of the contract and do the actual work required. What must be decided is the level of ability and organizational strength required in areas just described.

4) Preparation of preliminary estimate of payments to private sector partner

There are no unified standards for calculating payments to the consignee. The calculation, which is up to the party issuing the order, can be made according to conventional methods. However, consideration should be given to data on how many other sewerage service providers have calculated fees and payments. (Database on this is available.) These will show how payments can be tied to fluctuations in price levels and related to other economic factors.

5) Creation of plan for involvement process and schedule; deciding on duration of private sector involvement

Plans must be drawn up for the start of consigned operations and annual schedules must be made to guide the management of all consigned work processes throughout the duration of the contract. The medium-term and long-term plans must be in conformity with other plans. Flexibility and leeway are necessary in planning because various constraints will be faced daily management activity.

6) Establishment of medium-term plan and long-term policies based on review of supply-demand conditions. Facilities construction plan, financial plan and plan for employment of personnel

A. Demand Projection

Projections of supply, demand and the future scale of services planning of facilities construction and developing forecasts of service charges and revenue will also be required. There are two aspects of demand for sewerage services. One is based on overall demand and projected demand, including the numbers of users and future users seeking coverage in there area. The other is demand that can realistically be met (sewerage that can be handled) with sewers and treatment the latter sense. Generally, urban sewerage (not including stormwater) can be linked to demand for water supply, including pumped groundwater. Therefore, water supply demand is important resource data.

B. Planning for Construction of New Facilities

Viewed from the standpoint of overall management, sewerage services consist of sewer pipes, pumps, treatment plants and other facilities. Annual plans for construction of new facilities have to be prepared as part of planning to respond to projected increases in demand. Long-term construction plans will have a direct bearing on wastewater treatment capacity, allocation of personnel and management systems, and O&M budgets.

C. Financial Plan

Sewerage system financial plans must cover all revenues and expenditures and indicate how financial resources will be utilized for a fixed accounting period. The financial plan must support and enhance decision-making in such areas as budget control and investments planning, serve as a tool for internal management and the preparation of outside reports, and provide a basis for the setting of service charges.

D. Personnel Requirements

Plans for the use of personnel should identify the number of personnel (broken down by job categories and qualifications) that will be needed for direct operation and management of facilities. They should also include projections of needs for increases or decreases in personnel and a breakdown of personnel allocation.

7) Development of plan to improve management performance, particularly for the operations to be consigned

Setting targets for upgrading efficiency (reducing operating expenses and rationalization) is a key part of creating plans to strengthen management capabilities. Other important aspects of this type of planning include finding ways to ensure stable operations, planning for further development and expansion of services, and to ensure that the utility's social responsibilities and users' needs are met. Particularly when faced with competitive pressures and the need for administrative reform, it is absolutely essential that water and sewerage service management make untiring daily efforts to improve and reform work processes and to raise overall operating efficiency.

8) Effectiveness of private sector participation

Cost analysis of the entire project should be as introduced in **Section 7.3.1 (2)**. The following points are expected effects from private sector participation and should be considered when conducting cost-benefit analysis.

A. Cost Reduction

By introducing private sector contractors that utilize innovative ideas for flexible resource management and know-how, it is possible for the public sector to attain similar or improved performance for less cost when comparing personnel and property costs in the case of direct operation of a project.

B. Rapid and Efficient Business Procedure

By enlisting private corporations, which are well grounded in a specialized field, it is possible for business operations to be efficient when compared to projects directly operated by the public sector. In addition, private corporations can flexibly take on irregular and temporary business and are able to be flexible even when changes of work load occur.

9) Evaluation of how private sector participation will be affected

A. Organizationally

The number of sections and departments required to handle the work should be reduced. This will include the elimination of some units. Direction, supervision and liaison support will have to be given for this effort.

B. Personnel Requirements

Some of the personnel assigned to work that will be consigned will no longer be needed. On the other hand, new assignments of personnel will have to be made to take care of the need to direct and supervise consign work and provide liaison. Choices will have to be made about reassigning personnel. Where positions have been eliminated, should personnel be reassigned to other departments in the government body? Should they be asked to continue to do the same work, but for the private company? Or should they be asked to leave or look for other work? Regarding the treatment of personnel asked to continue doing the same type of work for the consignee, the personnel involved should be told exactly how their treatment and work conditions will change so that they can make informed choices about whether they want to make the change. Changes in working conditions can be negotiated with the employee unions involved. Keep in mind that delays working conditions can be negotiated with the employee unions involved. Keep in mind that delays and adjustments in project consign plans may result this form of negotiation.

C. Finance

The expenditures that had been made and recorded in accounts to cover consigned work, including personnel expenses, will no longer are necessary. In place of this, it will be necessary to record the costs involved in consigning the work.

D. Technology

The full technological capability must be transferred, and technical improvements and the introduction of new technologies can be expected.

E. Facilities

Although it would seem convenient to use those set up and used by the existing sewerage facilities, unless a special agreement has been made otherwise, the private company should use its own machinery, equipment, and materials.

10) Creation of supervisory system

Regular detailed inspections must be made and reports submitted on the handling of the consigned work (on the basis of daily, weekly, monthly, and random checks). Gaps

between plans and actual results should be carefully examined. Reports should be requested on problems related to handling the work and on areas where improvements could be made. The overall purpose of such inspections and reports is to gain greater cost effectiveness (quantitative effects) and to upgrade the specific characteristics of the services (qualitative effects).

In particular, evaluation of qualitative effects should involve both quantitative and qualitative examination of as many aspects of each type of service as possible.

4.5 Resident and Community Participation

4.5.1 General

Central Governments and aid organizations have planned and implemented most of the development projects without the participation of the actual beneficiaries, the Local Community. As a result, inappropriate facilities have been constructed without consultation of the community. After construction, facilities are no operated and maintained undermining project objectives and effectiveness. There are also cases where collection of service charges is impeded by lack of community awareness. Reflecting on this, more projects promoting community participation are being implemented to improve the overall quality of assistance and raise development efficiency from technology, economic and fiscal perspectives.

This resident and community participation may be applied to SANIMAS or small scale sewerage projects.

4.5.2 Definition, Forms and Goals of Resident and Community Participation

(1) Goals of Community Participation

The main objective of community participation is to raise project effectiveness and sustainability through resident/community participation. Other goals include raising project efficiency, improvements in resident capacities and cutting operating costs. In Indonesia, women shoulder the burden of family hygiene and healthcare and use water for domestic chores. It is therefore important to create an environment that promotes the full participation of women.

(2) Definition of Community Participation

When a community of the local region, which is a party to development, participates in some form in a development project and this intention of residents to participate is reflected on the project.

(3) Forms of Community Participation

There are many forms of participation, which vary according to the sector and local conditions. At the planning stage of proposing a project, communities can participate in hearings, the results of which can be utilized in project plans. From this, it is possible for communities to participate in each stage of the project in various ways, such as forming organization to operate and maintain facilities and collect service charges.

A summary of the definition, forms and goals of resident and community participation is shown in below ***Table 4.5.1***.

Table 4.5.1 - Summary of the Definition, Forms and Goals of Resident and Community Participation

Item	Description
Goals	To implement a development project that meets the needs of the beneficiaries. To improve project sustainability and effectiveness.
Definition	When beneficiaries themselves consider; 1) Service level and; 2) cost level and decide on a project themselves.
Form	➢ After beneficiaries confirm improvement needs, several alternative plans for improvement are proposed and examined with one plan finally being approved. ➢ Beneficiaries ➢ Offer labour and materials during construction ➢ Operate and maintain the facilities after completion

Source: Guidelines for Management of Sewerage Facilities in Development Countries (Draft) by IDIJ, July 2002

(4) Implementation of Community Participant Project

Implementation of community participant projects is based on the following stages:

1) **Preliminary Stage:** In the preliminary stage, the first step is to assess characteristics of the local community, which is the beneficiary of the project. From the viewpoint of ensuring independent development and creating an operation and maintenance system, it is important to thoroughly examine regional characteristics. For example, in surveyed districts where there are already resident organizations active in the community, it is important to make contact with the representative of the organization and to grasp the situation of residents that will play a major role in participation, so that the risks and potential of independent development can be thoroughly examined. It is recommended that NGOs and experts in social affairs and community participation be involved at this stage.
2) **Social Study Implementation:** Based on results from resident surveys, hearing and local investigation, programmes for community participation at the implementation stage that educate the community on sanitation, life environment and the natural environment can be established.
3) **Detailed Design Stage:** After implementing the programmes stated above, awareness of community participation can be raised and capacity improved.
4) **Construction Stage:** It is important to continue the above programmes while creating operation and maintenance systems for the implementing organizations and community participant organizations and to clarify this relationship.
5) **After Transferring the Project:** It is important to implement follow-up programmes when necessary.

Especially in the planning stages of sewerage services where residents will bear the some cost in the future, such as service charges, it is necessary to gain understanding from residents when requesting community participation. In this point, it is important to communicate with a community representative. The representative can then in turn explain the complete project to all of the residents and gain their understanding. Cooperation can be requested after the completed community agrees to bear the costs. It is best to create community organizations where none exist. In this process, third party NGOs can play a key role in creating these organizations, more so, in many cases, than the implementing organizations. There are examples where a government department heading the sewerage project may take direct action, but in most cases NGOs have more success coordinating community organizations. In conferences of construction and facilities planning, it is best to improve NGOs and technical consultants in addition to the government department.

Several points listed below are to consider when applying these processes:

- Explanations of plan goals and service content should be transparent. (It is very difficult to regain the trust of the community once lost because the original plans differ from reality.)
- All communication should be conducted fairly
- An understanding that the entire region is the beneficiary should be promoted. (A community project for the community.)

4.6 Implementation Methodology

The recommended type of sewerage management organization structure is already applied in existing cities in Indonesia such as in Banjarmasin, Cirebon, Bandung, Balikpapan, Surakarta (Solo), and Medan (including Prapat), and BLUPAL (Denpasar) will be merged into existing PDAMs in Denpasar and Badung in future.

And, there are many advantages as delivered in previous **Section 4.3.5**. For diffusion of sewerage systems managed by the sewerage service providers by 2014 to meet the MDGs and National Policies & Strategies, it should be hastened to establish the sewerage service organization. The water supply enterprises are already providing the services; therefore, this is the big reason for this recommendation of reorganization as Water Supply & sewerage Service Enterprise (WS&SSE) that it can be shorten the time for establishing the new sewerage service organization by reorganizing of existing water supply enterprises as WS&SSE.

A typical process for reorganization as WS&SSE is shown in ***Figure 4.4.1***.

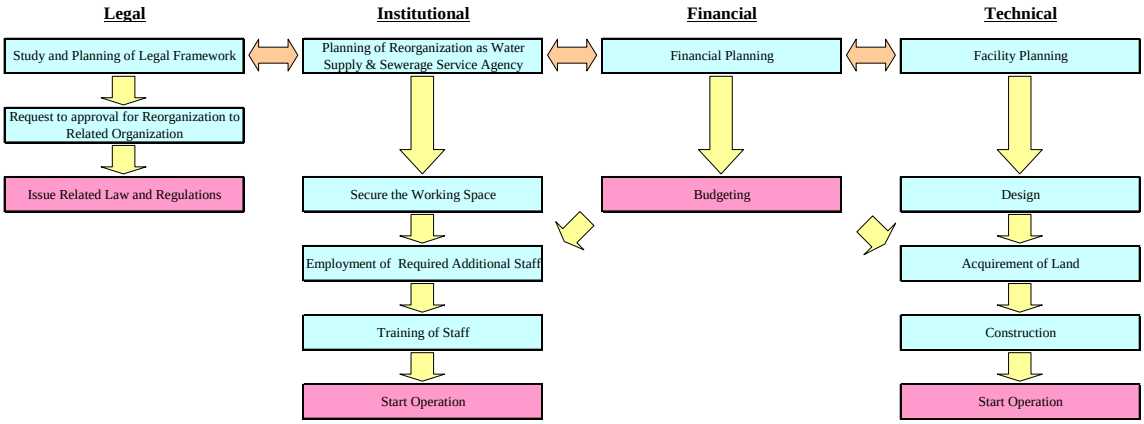


Figure 4.4.1 - A Typical Process for Reorganization as WS&SSE

4.7 Case Studies

Table 4.7.1 shows the structures of sewerage works in the three service providers

Table 4.7.1 - Structure of Sewerage Works in 3 Areas

City	Jakarta	Bandung	Denpasar
Structure	PD PAL	PDAM	BLU PAL
	Public Enterprise in Sewerage Works	Public Enterprise in Water Works	Public Agency in Sewerage Works

In Jakarta, PD PAL which is public enterprise in sewerage works is adopted. In Bandung, sewerage works is implemented under PDAM which is public enterprise in water works. In Denpasar, sewerage works is carried out under BUL PAL which belongs to public organization. Advantages, disadvantages and particularities of those structures are mentioned in ***Table 4.7.2***.

Table 4.7.2 - Characteristics of PD PAL, PDAM and BLUPAL

	PD PAL Jakarta	PDAM Bandung	BLUPAL Denpasar
Advantages	Sewerage works can be developed independently.	Experienced water works engineers can be dispatched to sewerage works easily. Existing service charge collection system and customer database can be applied.	Not only for designing and construction but also for O&M, BLUPAL can receive national and provincial subsidies.
Disadvantages	Sewerage works can not use service charge collection system of water works.	Sewerage works can not be implemented independently. Accomplishment of sewerage works is affected by that of water works.	Still not clear.
Particularities	PD PAL is the public enterprise only in sewerage works. PD PAL Jakarta has been managed well; however it is because most of the customers are large commercial buildings. Therefore when other municipalities adopt this structure, financial issues have to be considered.	PDAM is public enterprise of water works and sewerage works is managed together with water works. Not only Bandung but also other municipalities like Banjarmasin and Cirebon use this structure.	Because BLUPAL has only a few years history, it is premature to evaluate the structure.

When financial condition of service provider is solid and number of customer is limited like in PD PAL Jakarta, independent management of sewerage works might be proper. However when financial condition is fragile, independent management may cause instability of sewerage works. In such case combined structure with water works is recommended because sewerage works can use service charge collection system and experienced engineers in water works. BLUPAL is suitable to be adopted at the initial stage of service providers because that type of organization can accept central government subsidy not only for construction of sewerage facilities but also for O&M.

CHAPTER 5

DATA MANAGEMENT

CHAPTER 5 DATA MANAGEMENT

5.1 General

Innumerable information is involved in sewerage works but inventories, reporting data and customer inventory are the most significant one. Inventories and reporting data are used not only for appropriate management of facilities but also for rehabilitation of facilities in the future. Customer inventory is useful for measure against customer complaint and reduction of non-revenue water, water and wastewater quality etc.

5.2 Sewerage Inventory

The following inventories are the basic data for sewerage management and must be filed properly.

(1) Sewers Inventory
(2) Factories Inventory
(3) House Connection Inventory
(4) Equipment Inventory
(5) Installation Inventory
(6) Oil Inventory
(7) Building and Land Inventory
(8) Pumping Stations Inventory
(9) Treatment Plants Inventory

(1) Sewers Inventory

Sewers Inventory is significant not only for basic data of O&M, but also measure for complaints by residents, talks with other organizations which use underground space and measure for disasters. Therefore the inventory should always be updated and be accessible for anyone who wants to refer to. It is recommended to adopt Geographic Information System (GIS) system for custody of inventories in order to make its retrieval and revise easily.

(2) Factories Inventory

In case when sewerage system accepts sewerage of factories, used raw materials, discharging condition, pre-treatment facilities, wastewater quality and quantity etc. have to be described in factories inventory. It is used for factory inspection and water quality check etc. as the basic information.

(3) House Connection Inventory

In order to recognize users and facilitate service charge collection, house connection inventory has to be filed. Owner of the connection, superintendent, users, and outline of the connection etc. should be filled in.

(4) Equipment Inventory

In order to manage the office, mechanical and electrical, and laboratory equipment used in sewerage works properly, equipment inventory has to be prepared.

(5) Installation Inventory

Mechanical and electrical installations in wastewater treatment plants and pumping stations have to be registered and filed in installation inventory in which manufacturer, specification,

record of maintenance and repair of each installation is filed. The inventory is a basic data for periodic maintenance and renovation.

(6) Oil Inventory

In order to maintain proper function of the sewerage facilities, periodic greasing and refuelling for machinery is indispensable. Because grease and oil used for each machine might be different, oil inventory has to be filed for proper stock and financial management.

(7) Building and Land Inventory

In order to confirm the registration of assets, manage and account the assets, inventories of buildings and lands which are in the sewerage system such as pumping station or wastewater treatment plant has to be prepared with detailed drawings.

(8) Pumping Stations Inventory

The inventory for Pumping Stations shall be prepared as combined inventory of equipment inventory, installation inventory, oil inventory and building & land inventory and shall be linked with those inventories.

(9) Treatment Plants Inventory

The inventory for Treatment Plants shall be prepared as combined inventory of equipment inventory, installation inventory, oil inventory and building & land inventory and shall be linked with those inventories.

5.3 Daily and Monthly Report

In order to maintain the appropriate function of sewerage facilities, confirmation of daily operational condition and implementation of periodic inspection and diagnosis is indispensable. The following reports are usually prepared, analyzed and filed.

(1) Operational Program
(2) Operational Record
(3) Maintenance Record
(4) Water Quality Record
(5) Training Record
(6) Obstacles and Countermeasure / Handling Method Record

(1) Operational Program

Table of operational condition of main installations is prepared and shown to operators. It has to be prepared whenever operational condition is modified.

(2) Operational Record

Operational record is vital information for implementing operation and maintenance programme. Therefore daily, monthly and annual report has to be prepared. Daily report usually includes influent quantity, consumed power supply and chemicals, observance of law and regulation and operational condition of main equipments and facilities. Daily report is summarized to monthly report and monthly report is summarized to annual report which will be used for improvement project of facilities.

(3) Maintenance Record

Maintenance of sewer pipes consists of periodic inspection and extra inspection in case of pipe obstruction. Periodic inspection is useful for reduce pipe obstruction. Maintenance record is prepared for each inspection and required data are saved in sewer pipes inventory.

Maintenance in pumping stations and wastewater treatment plants consists of daily inspection and periodic inspection. Mechanical and electrical installations under operation are inspected in daily inspection. On the contrary inside of installations under halt condition are inspected in periodic maintenance. Daily and periodic inspection parameters have to include those which are entered in installation inventory.

(4) Water Quality Record

Water quality has to be recorded in order to settle operational condition. Daily fluctuation of water quality is piled up to monthly report and monthly fluctuation is piled up to annual report. Monthly and annual report is used for estimation of annual budget.

Obligatory records of effluent quality which are reported to supervising institutions like environmental division of regional government also have to be filed for required period.

(5) Training Record

Records of training, which are implemented in organization, have to be filed. It is useful for administration of personnel capacity assessment as well as planning of training.

(6) Obstacles and Countermeasure / Handling Method Record

In the operation of sewerage system, unexpected obstacles sometimes will be occurred. After handling with the obstacles, the handling method record which shows: 1) what kind of obstacles was occurred; 2) where it was occurred; 3) when it was occurred; 4) who handled it; 5) how it was handled; should be recorded. Besides, countermeasure methods for prevention or minimize the risk of occasion of same obstacles has to be prepared and implemented.

5.4 Customer Inventory

Customer inventory is basic information for customer service and service charge collection. Appropriately arranged customer inventory is useful for;

(1) Measure against customer complaints,
(2) Reduction of non-revenue sewerage quantity.
(3) Data collection for increasing house connection of wastewater collection

Customer relationship management software on sale can be used.

(1) Customer complaints usually occur by stench from sewer pipes and wastewater treatment plant, and clogging of household connection. Quick measure against complaint can be achieved by referring to customer inventory.
(2) Illegal discharge or non-revenue discharge can be monitored by referring to the inventory which in turn can be reduced.
(3) In order to increase the number of connection to the wastewater collection service, the further data collection in existing water supply service area is recommended.

5.5 Periodical Renovation Programme

Haphazard renovation of installation or equipments may cause waste of budget. Therefore periodical renovation program has to be prepared by using the records of installation and equipment inventories.

Records of maintenance and repair which are registered in inventories are used for deciding a moment for renovation of installation or equipment in wastewater treatment plant or pumping station. Service providers have to prepare periodical renovation programme in order to carry out economical and efficient renovation. When subsidy from central government or provincial government is used for renovation of installation, the governments has to check the inventory whether the installation concerned has been maintained properly and is appropriate for renovation.

5.6 Case Studies

Table 5.5.1 shows the preparation condition of various inventories in the three service providers surveyed. Sewer and customer inventory is used for customer service and appropriate collection of service charge while installation and equipment inventory is used for efficient periodical maintenance, repair and renovation. Sewer and customer inventory is already completed in PD PAL Jakarta mainly because the service area and number of customers is quite small. On the other hand both sewer and customer inventory is insufficient in PDAM Bandung. In case of BLUPAL Denpasar, all inventories except customer inventory were prepared in DSDP Phase I.

Table 5.5.1 - Preparation Condition of Inventories in the Three Service Providers

<table>
<tr><th></th><th>PD PAL Jakarta</th><th>PDAM Bandung</th><th>BLUPAL Denpasar</th></tr>
<tr><td>Sewer</td><td>Completed</td><td>Around 30% is completed.</td><td rowspan="5">Completed in the Denpasar sewerage Development Project Phase I.</td></tr>
<tr><td>Installation</td><td rowspan="4">A part of the data was lost when the sewerage works was transferred from Jakarta province to PD PAL.</td><td rowspan="4">Completed</td></tr>
<tr><td>Equipment</td></tr>
<tr><td>Oil</td></tr>
<tr><td>Chemical</td></tr>
<tr><td>Customer</td><td>Completed</td><td>Around 20% is completed.</td><td>Around 58 % is completed.</td></tr>
<tr><td>Factory</td><td>A small domestic factory is connected to sewerage system</td><td>Because industrial wastewater is not accepted to sewerage system, no factory inventory is prepared. Inventories of hotel, restaurant and hospital are completed. In case of hospital, wastewater which might contain toxic substances is not accepted.</td><td>Because industrial wastewater is not accepted, no factory inventory is prepared.</td></tr>
</table>

CHAPTER 6

OPERATION AND MAINTENANCE

CHAPTER 6 OPERATION AND MAINTENANCE

6.1 General

The objective of operation and maintenance of sewerage facilities are systematic utilization of the sewerage facilities such as the sewers, pumping stations, wastewater treatment plants to meet its intended use, collection of sewerage without delay, proper treatment of sewerage, and to keep effluent in regulated good quality. To perform the proper operation and maintenance works, the development of organization, human resources and facilities is required.

6.2 Establishment of Operation and Maintenance Plans

When establishing operation and maintenance plans, the following points shall be considered.

(1) Management of installation of facilities and equipment
(2) Management of operation and management of installed facilities and equipment
(3) Financial and accounting management
(4) Personnel management
(5) Water quality management

To offer fully functioning sewerage facilities to meet the sewerage service expectations of residents, the O&M conducted by the management structure of the government department supervising the service is essential. It is necessary to establish a rational O&M system. For this, a department that supervises O&M must be set up to oversee facilities operation, management and repairs efficiently. Another department supervising the finances of management structure and personnel needs to be set up to oversee account and personnel management.

For creating appropriate departments, it is important to position the necessary personnel for operations, repair, cleaning, and supervision of facilities after grasping the structure and scale of treatment plants, number of pump stations and length of pipe laid.

Additionally, personnel management needs to be in place to manage the working situation of employees and to manage daily account revenue and expenditure and budget.

The problem faced after commencement of a service is often of a financial nature. In developing countries, it is often the case that revenue from service charges does not reach expectations causing the service to record a loss. Key points to combat this and improve management and establishing plans include raising service charges, improve earning through complete, certain collection of service charges and the exercise of restraint in expenditure on personnel, electricity and so on. As there is often resistance to sudden changes, they must be implemented gradually and in a planned manner with the understanding of the parties concerned with policies to improve management.

Water quality plays a major role in the realizing of suitable O&M plans. Results of water quality management have to be used for determining target quality of discharging effluent with questing for cost saving and operation efficiency.

6.3 Operation and Maintenance of Stormwater Drainage

Stormwater drain is the essential facilities for discharging stormwater swiftly and preventing inundation in urban area. It has close affinity with daily lives of citizen especially in rainy season therefore it has to be maintained appropriately. Maintenance of stormwater drain includes the following works.

(1) Inspection, cleaning and dredging
(2) Repair and improvement
(3) Provision against disasters and accidents

(1) Like sewer pipe, stormwater drain requires periodic and extra inspection, cleaning and dredging. Extra one is performed in case of trouble. Inspection and cleaning of stormwater drain is carried out not only for drain itself but also for inlets usually set up beside pavement and outlet set up at rivers or public water bodies. Litter and fallen leaves on the roads may close inlet of stormwater drain and cause inundation in the area. Therefore cleaning of road especially in rainy season is important. Outlet of drain also has to be inspected and cleaned because it may be clogged by large garbage. Record of inspection, cleaning and dredging has to be filed in sewer inventory. The records are useful to distinguish drains apt to have trouble. After consideration of profit and loss, cleaning and dredging of stormwater drains can be outsourced to private sectors.

(2) After inspection damages of sewer pipes are classified. Three categories i.e. serious, medium and slight damage are useful. Provision for each category has to be determined such as serious damage is repaired immediately, medium damage is repaired within 5 years and slight damage is repaired beyond 5 years.

(3) When serious damage is found by the inspection, it should be repaired without delay in order to prevent accidents. Collapse of underground stormwater drains may cause sudden subsidence. If urgent repair is not necessary, it should be taken place on dry season to prevent collateral accidents.

6.4 Operation and Maintenance of Sewerage Facilities and Equipments

Operation and maintenance of sewerage works is divided into (1) maintenance of sewer pipes and pumping station and (2) operation and maintenance of wastewater treatment plant. ***Table 6.4.1*** shows contents of operation maintenance of sewerage works.

Table 6.4.1 - Contents of Operation and Maintenance of Sewerage Works

Management	Contents
Maintenance of Sewer Pipes and Pumping Station	➢ Inspection and operation ➢ Cleaning and dredging ➢ Repair and improvement ➢ Asset management ➢ Maintenance of mechanical and electrical installation
Operation and Maintenance of Wastewater Treatment Plant	➢ Operation and maintenance of treatment facilities ➢ Maintenance of mechanical and electrical installation ➢ Water quality control ➢ Asset management

Besides conventional operation and maintenance of sewer pipes, wastewater treatment plant and laboratory, probabilities of outsourcing and joint operation and maintenance with other organization are mentioned. Usage of common material and equipment is also mentioned.

6.4.1 Maintenance of Sewer Pipes

Sewer pipes are the essential facilities of sewerage works. They have close affinity with daily lives of citizen therefore they have to be maintained appropriately. Maintenance of sewer pipes includes the following works.

(1) Inspection, cleaning and dredging of pipes
(2) Repair and improvement
(3) Provision against disasters and accidents
(4) Management of industrial and commercial pre-treatment facilities
(5) Management of house connections
(6) Management of as-built drawing files

(1) Periodic and extra inspection, cleaning and dredging is carried out. Extra one is performed in case when sewer pipe has trouble such as clogging. Record of inspection, cleaning and dredging has to be filed in sewer inventory and also dotted on network plan. The records are useful to distinguish sewer pipes which are apt to be clogged. In consideration of profit and loss, cleaning and dredging can be outsourced to private companies.

(2) After inspection damages of sewer pipes are classified. Three categories i.e. serious, medium and slight damage are useful. Provision for each category has to be determined such as serious damage is repaired immediately, medium damage is repaired within 5 years and slight damage is repaired beyond 5 years.

(3) In case when serious damage is found, it should be repaired without delay in order to prevent accidents. Collapse of sewer pipe might cause land subsidence. In Japan land subsidence by collapse of pipe increases when pipe has been laid more than 25 years. Record of repair has to be filed in sewer pipes inventory.

(4) Acidic industrial wastewater for instance might cause corrosion of concrete pipes and grease in restaurant wastewater might cause clogging of pipes. Therefore industrial and commercial wastewater has to be monitored whether it meets the effluent standard. When factory installs pre-treatment facilities and restaurant installs grease trap, it has to be inspected periodically whether it works effectively. Record of inspection has to be filed in factories inventory.

(5) Basically house connection has to be managed by house owner however appropriate counsel by service provider should be carried out when stench occurs for instance due to mal-connection.

(6) The as-built drawings should be utilized for preparing of more efficient and integrated plans and implementation of maintenance works of sewer pipes.

6.4.2 Operation and Maintenance of Pumping Station

Functions of pumping station are to prevent inundation of urban area and decay of sewerage by immediate pumping out of sewerage. However, the pumps has capacities and do not transmit wastewater in over capacity. Therefore appropriate operation and maintenance is indispensable.

Small scale and submerged pump facilities are usually maintained by periodic patrol and large scale pumping facilities are maintained by stationed staff.

Figure 6.4.1 shows an example of operation and maintenance works in Pumping Station (PS). Some of the works such as gardening can be outsourced. When repair of machinery is entrusted to contractor, mechanical staff in the PS has to supervise repairing process and quality.

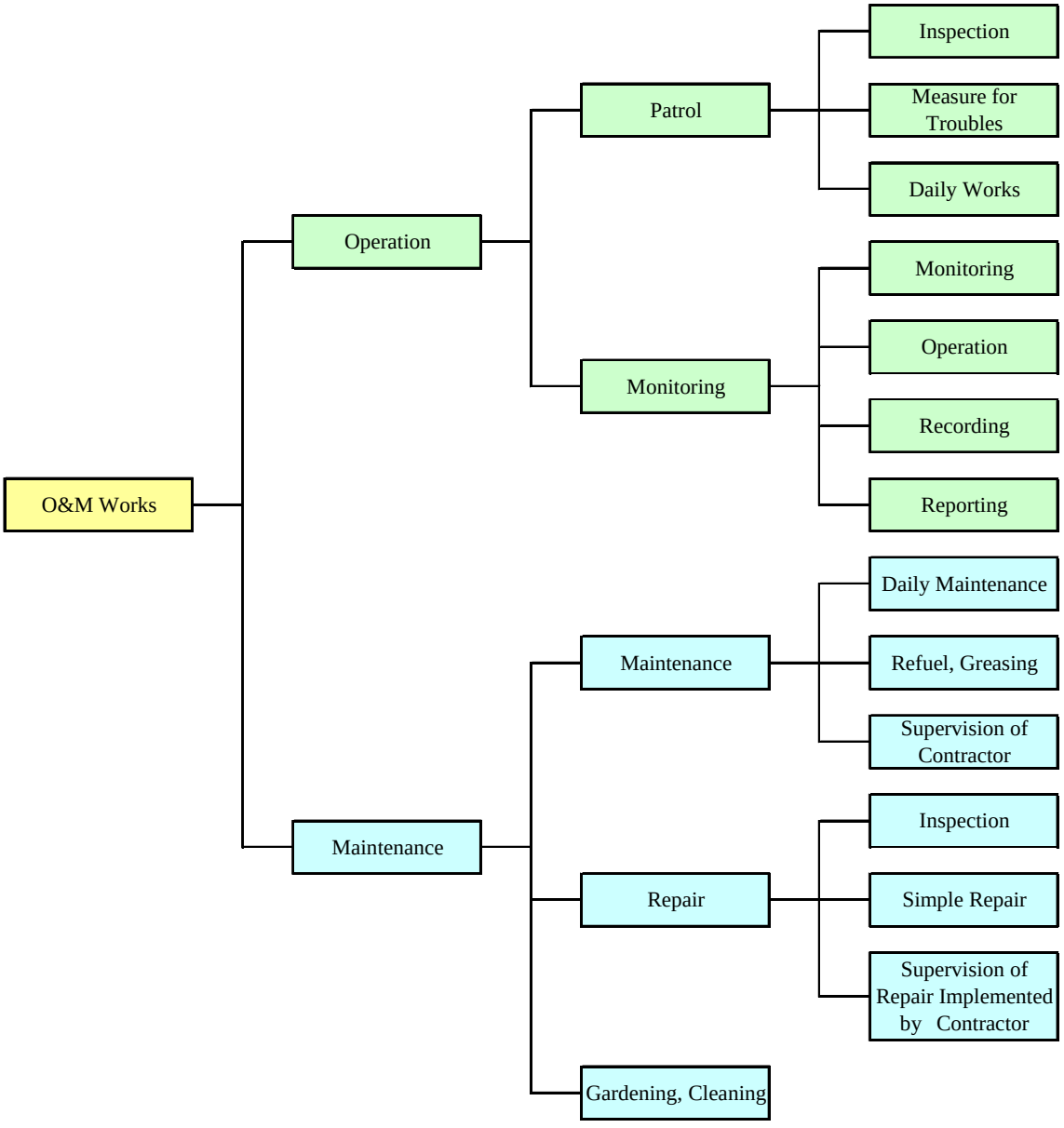


Figure 6.4.1 - Example of Operation and Maintenance Works in Pumping Station

6.4.3 Operation and Maintenance of Wastewater Treatment Plant

Wastewater treatment plant has to treat wastewater whole day long, all the year around, and treated wastewater quality has to meet the effluent standard. Therefore operation and maintenance of wastewater treatment plant has to be implemented deliberately. In order to implement appropriate operation and maintenance, the following respects are important.

(1) Step-by-step staffing
(2) Continuous training of staff
(3) Safety management
(4) Energy conservation
(5) Application of Standard Operating Procedures (SOP)

(1) Right after the commencement of operation, influent wastewater quality is small i.e. idling ratio is high and some equipment are not yet installed. Generally equipments are installed in proportion to expansion of service area and increase of influent quantity. Therefore staff in Wastewater Treatment Plant (WWTP) also should be assigned step-by-step.

(2) Operation and maintenance of WWTP consists of various kinds of technologies such as mechanic, electric, civil, sanitary, chemistry and biology. Therefore it is recommended that the plant secures staff of all those technologies, however due to shortage of budget and human resources it is not easy to assign them. In order to complement shortage of staff, promote reciprocal cooperation with staff and encourage capacity development, continuous training has to be taken place.

(3) There are many spots where accidents or incidents such as shortage of oxygen, generation of hydrogen sulphide and short circuit, are apt to occur in WWTP. Moreover wastewater contains harmful bacteria, virus and parasite. Therefore attention against occurrence of accident and/or incident has to be paid. Safety management committee has to be established and periodical site inspection and safety training has to be implemented.

(4) Generally main power consumption in sewerage works is used in WWTP. Therefore energy conservation in the plant is the most effective. When influent wastewater quality is small, a part of treatment facilities and/or some equipment has to be halt for energy conservation.

(5) Standard Operating Procedure (SOP) is a set of written instructions that document a routine or repetitive activity followed by an organization. The development and use of SOPs are an integral part of a successful quality system as it provides individuals with the information to perform a job properly, and facilitates consistency in the quality and integrity of a product or end-result. Standard Operating Procedures (SOPs) should be used in every wastewater treatment plant and pumping stations. (e.g. in the laboratory, these are instructions on how to perform a variety of tasks including, but certainly not limited to, procedures for analytical analyses, sample collection, reporting and data transfer, the testing frequency of quality control samples, and equipment calibration and maintenance.)

Figure 6.4.2 shows example of organization structure of WWTP.

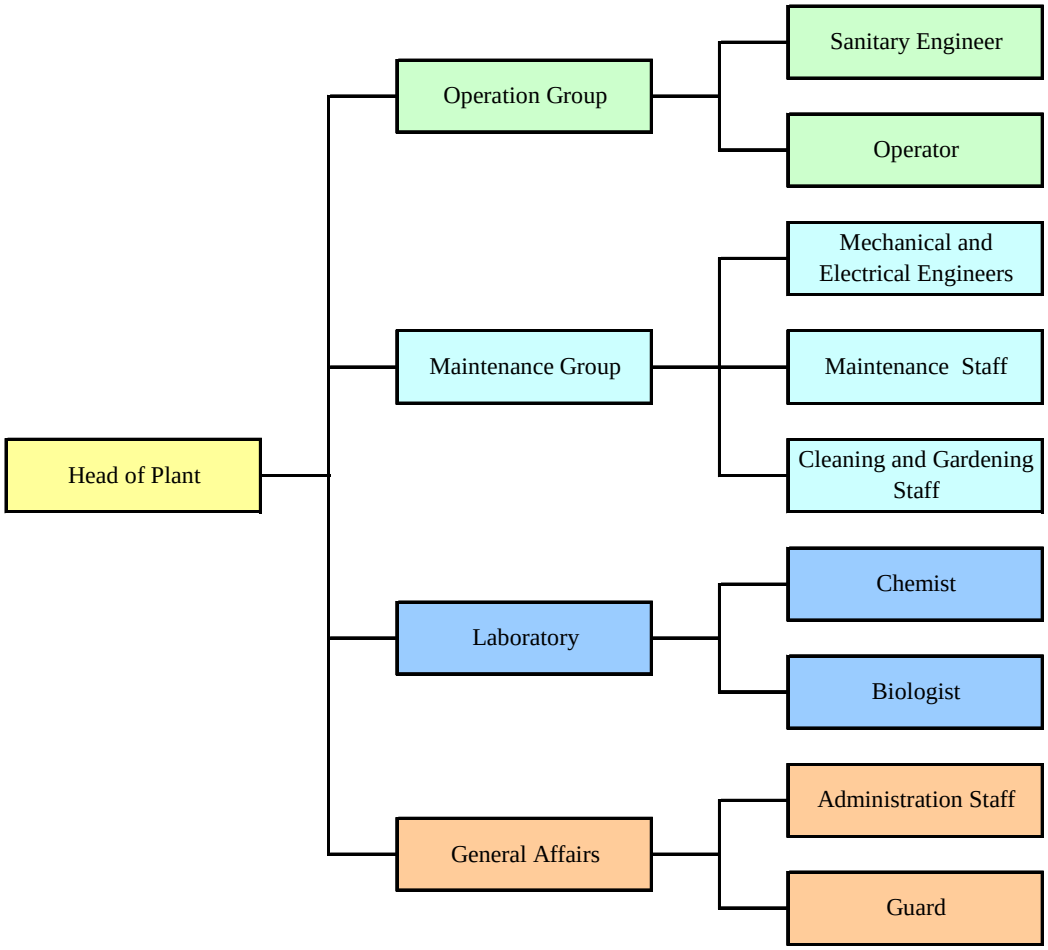


Figure 6.4.2 - Example of Organization Structure of Wastewater Treatment Plant

And, ***Figure 6.4.3*** shows example of operation and maintenance works in WWTP

Some of the works such as gardening can be outsourced.

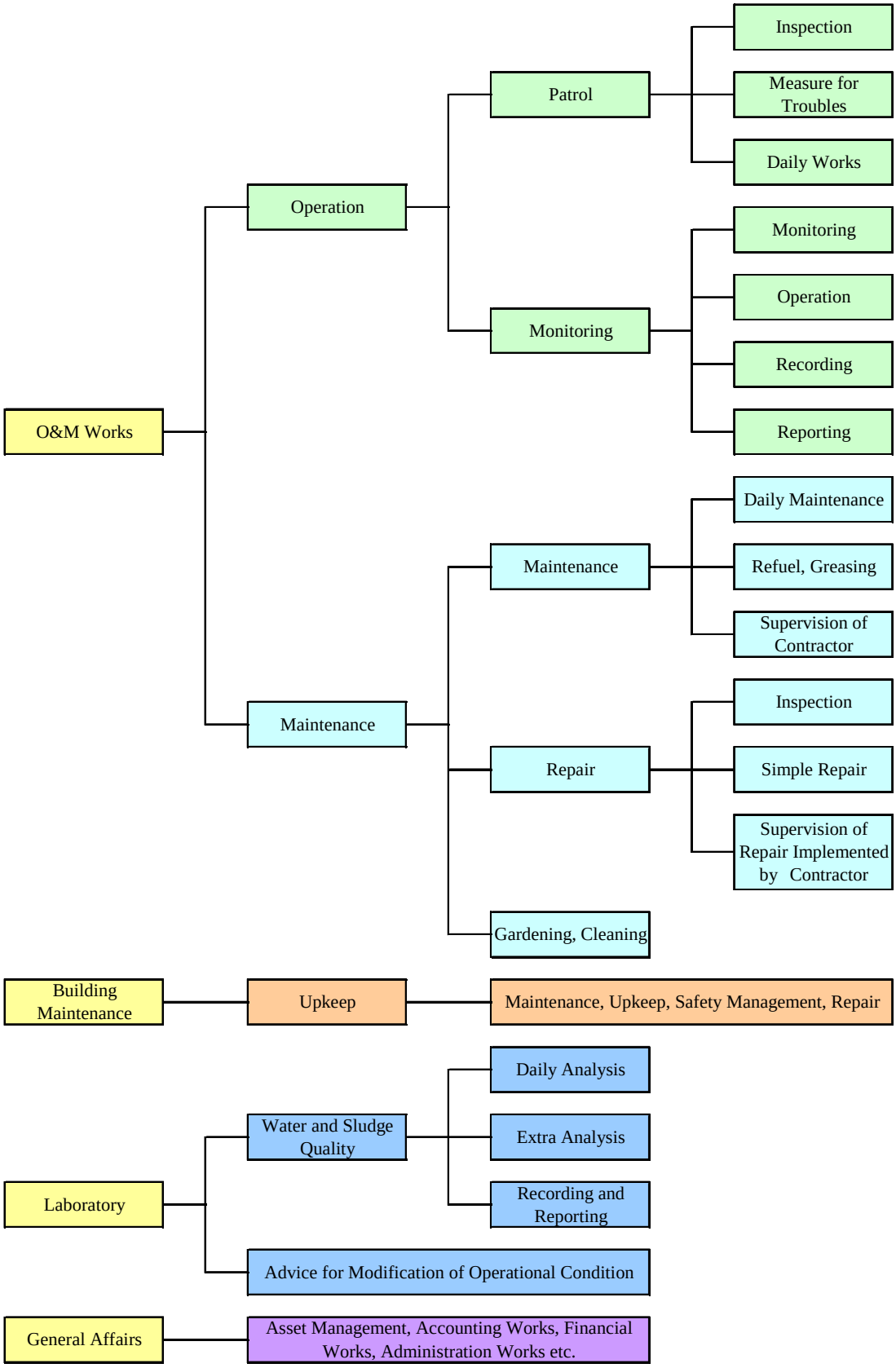


Figure 6.4.3 - Example of Operation and Maintenance Works in Wastewater Treatment Plant
Source: Guide in Commencement of Wastewater Treatment Plant, JSWA, 2006

6.5 Laboratory Management

Wastewater quality analysis is divided into the following four categories of analysis;

(1) Operation of wastewater treatment plant
(2) Reporting
(3) Inspection of factories and discharging water body
(4) Extra

Analyzing parameters and samples depend on requirement and scale of laboratory. High-priced equipments are necessary for analyzing heavy metals or organic solvent for instance, therefore analysis on commission to central laboratory, universities and private laboratories is highly recommended.

All chemicals and equipments used in laboratory have to be registered in inventory and managed. In order to keep accuracy and precision of analysis, internal and external accuracy control has to be carried out.

6.6 Water Quality Monitoring System

Water quality monitoring system consists of the following two;

(1) Internal Monitoring
(2) External Monitoring

Internal monitoring is carried out by service providers, which include analysis on commission to external laboratory. This monitoring is taken place in order to investigate treatment efficiency and comply with effluent standards.

External monitoring is usually carried out by provincial environment division for inspecting whether effluent quality meets the standard.

(1) Internal Monitoring

Wastewater quality monitoring is divided into the following four;

1) Monitoring for operation of wastewater treatment plant
2) Monitoring for reporting
3) Monitoring of factories and discharging water body
4) Extra monitoring

Monitoring samples should be at least influent and effluent of treatment plant, and if possible inlet and outlet of each treatment process are recommended to be monitored for obtaining treatment efficiency.

Monitoring frequency depends on capacity of laboratory however monitoring of effluent should be implemented at least twice a week against sudden fluctuation of quality.
Analyzing parameters and samples depend on requirement and scale of laboratory. High-priced equipments are necessary for analyzing heavy metals or organic solvent for instance, therefore analysis on commission to central laboratory, universities and private laboratories is highly recommended.

All chemicals and equipments used in laboratory have to be registered in inventory and managed. In order to keep accuracy and precision of analysis, internal and external accuracy control has to be carried out.

(2) External Monitoring

External monitoring is usually implemented by provincial environment division in Indonesia. Sample which is analyzed in provincial environment division has to be cross-checked in the laboratory of service providers in order to prevent one-way improvement direction.

6.7 Violation of Effluent Standard

In case of violation of effluent standard, service provider has to prepare provision against the direction by the province.

First of all the provider has to recognize the cause of the violation. If it is caused by failure of operation like shortage of air supply in case of activated sludge process, it should be modifies in order to get back proper effluent quality. However if it is caused by functional problem of treatment process, improvement of treatment process has to be considered.

In case of usage of primary treatment process like oxidation pond, effluent quality is usually inferior to effluent quality of secondary or advanced treatment process. Therefore it should be considered whether fixed effluent standard is appropriate for the treatment process or not.

6.8 Outsourcing of Operation and Maintenance Works

Sewerage works usually originates a lot of employment. Generally, the utilization of outsourcing for operation and maintenance works is recommended, in order to reduce the O&M costs. However financial merit of direct management and outsourcing for each work in the plant has to be compared and evaluated before employing staff in order to pursue efficient management of sewerage works.

The following works are suitable for outsourcing;

(1) Operation of treatment plant and pumping station
(2) Cleaning of treatment plant and pumping station
(3) Gardening of treatment plant and pumping station

6.9 Joint O&M and Use of Common Materials and Equipments

Area-wide joint operation and maintenance is effective to reduce cost and contribute to solid management of sewerage works. When a sewerage district is newly designed near existing sewered area, joint operation and maintenance has to be considered for obtaining benefit from economies of scale.

Use of common materials and equipments is effective for reducing maintenance cost. It reduces stocks of materials and equipments such as belt for motor, submerged pump and relay for instance.

6.10 Case Studies

Table 6.10.1 shows the implementation condition of important respects for O&M of sewerage works in the three service providers surveyed.

Regarding the staffing, the three providers will have to increase their staff. PD PAL will increase staff in order to promote maintenance business of septic tank starting in 2010. PDAM Bandung has to increase staff when west area of Bandung city is connected to service area and BLUPAL Denpasar will increase staff when service charge collection is commenced. These mean that the three providers adopt step-by-step staffing in proportion to increase of their works.

None of the three service providers carries out continuous training for staff. Implementation of safety, technical, skill and management trainings which are mentioned in **Section 8.2.5** is strongly recommended. Especially periodical safety training must be implemented for the staff of providers in order to prevent unexpected accidents because there are many spots in treatment plant or pumping station where accident might occur.

Safety management which may be included in risk management is not specially carried out in the three service providers. However accident like corruption of sewer pipe under a road or generation of hydrogen sulphide gas in wastewater treatment plant will cause serious results. Thus safety management is quite important for protecting organization of service providers.

Table 6.10.1 - Implementation Condition of Important Respects for O&M of Sewerage Works

		PD PAL Jakarta	PDAM Bandung	BLUPAL Denpasar
O&M of WWTP	Step-by-step Staffing	Will increase for maintenance business of septic tank	Will increase when west side of the city is connected to the service area,	Will increase for service charge collection
	Continuous Training	No	No	No
	Safety Management	No	No	No
	Energy Conservation	No	No	Reduction of operation of aerators
Outsourcing		For sewer pipes maintenance	For sewer pipes maintenance	For sewer pipes maintenance
Laboratory Management		Minimal analyzing parameters	Minimal analyzing parameters	Minimal analyzing parameters

Implementation of energy conservation may depend on wastewater treatment process. In case of aerated lagoon process like BLUPAL Denpasar and PD PAL Jakarta, installed aerators consume most of energy used in the treatment plant. Therefore operational condition of aerators is a good measure for energy conservation. Especially when the idling rate in wastewater treatment plant is high like in BLUPAL Denpasar, number of aerators under operation should be reduced. On the other hand oxidation pond process which is used in PDAM Bandung may have no energy conservation measure because the process is quite simple and uses almost no energy.
The three service providers have adopted outsourcing of their works. Mainly maintenance of sewer pipes is outsourced while works in wastewater treatment plant and pumping station are carried out by staff. Currently cleaning and gardening of treatment plant are carried out by staff therefore the cost and efficiency comparison between works by outsourcing and that by staff is recommended to be implemented.

It is quite a desirable matter that water quality parameters analyzed in the laboratories in the three service providers are minimal. Because analysis of heavy metals, pesticides or volatile

organic substances usually requires expensive equipments therefore such parameters should be analyzed in centralized laboratory like the laboratory in the provincial environmental division.

All of the treatment plants in the three service providers are regulated by the provincial effluent standard. However, even if the plant violates the standard, no specific penalty is imposed right now. For preservation of Indonesian environment, public facilities like wastewater treatment plant must keep the standard.

CHAPTER 7

FINANCIAL MANAGEMENT

CHAPTER 7 FINANCIAL MANAGEMENT

7.1 General

Financial projections are an important part of sewerage project planning. Forecasts of the financial situation for each stage of the project have to be made based on project costs and financial resource. The forecasts for each period will be of surpluses or shortfalls of funds, changes in the scale of the assets involved, and other financial factors. The following sources of funds should be examined:

(A) Sewerage service charges
(B) Advances from the central government (including assistance from foreign government agencies and private financial institutions), subsidies, bond issuance
(C) Funds carried forward from general accounts of the municipality, etc.

Statements of cash flows, statements showing advances and repayments, profit-and-loss statements and balance sheets are among the information that should be prepared to provide summaries of the financial conditions of projects.

Users of sewerage services, local governments and the central government must provide funds needed for construction and O&M costs. Normally all, or almost all, of the funds required for construction must come from long-term loans that will be amortized under an annualized repayment plan. These annual repayment expenses will be treated as a long term expense spread out over the project life. The financial plan, which will cover the entire project cycle, must include forecasts of loan repayments and other expenses, along with a breakdown of sources of revenue that will show which source will cover what percentage of project expenses The project organizers must create a financial plan before the start of the project.

In many cases, it can be expected that (A) sewerage service charges collected from beneficiaries will cover annual expenditures once the O&M stage of the project is reached. As discussed in **Section 7.3.2** later, sewerage service charges must be appropriately set, based on the users' affordability to pay.

However, in the first several years after the start of operations, revenue from service charges cannot be expected to cover either the cost of construction amortization expenses or even O&M expenses. In addition, depending on the scale and content of the project, in many cases revenue from service charges will not cover the cost of construction amortization expenses even in the latter half of the project cycle. The main point here is that revenue from service charges often will not be sufficient to cover all project expenditures. In other words, the project coverage ratio will be less than 1.0 (Refer to "Repayment of Principal Coverage Ratio" in later of this Section). The remaining financing must come from the recipient country, local areas and entire society benefiting from the project, such as shown in **Section 7.3.1 (2)** discussed later. This will take the form of (B) subsidies and loans from the central government or advances from foreign government agencies providing assistance, or from bond issuance, (C) an additional source of financing could be funds carried forward from general accounts of municipalities.

Financial planning will essentially be the same as described above even when privatization or private sector participation is planned. It must be kept in mind that, if private sector

investment becomes a source of funds, the interest expenses portion of the repayment obligations will be greater than that incurred by the use of public funds. Creation of a financial plan should be in the order outlined below.

(1) Establish the life of the project

The duration or life of the project should be established based on the types of facilities that will be constructed and operated. If the project life is long, revenue from service charges can be expected to increase. It becomes likely that this increase can be treated as profit. On the other hand, if the project life is short, it can be assumed that costs can be safely recovered. There are past examples of using a weighted average throughout the project life to budget for recovery costs of such equipment and facilities as sewer pipes, construction of pumping stations and treatment plants, machinery and electrical equipment, etc. However, experience indicates that, generally, the useful life of principal equipment and facilities is about 30 years and that this should be the project life.

(2) Develop estimates of construction and O&M costs

Disbursement schedule conforming to debt repayment condition will be prepared for respective type and capacity of the facilities based on past record or consultants' estimation of construction and operation/maintenance costs.

(3) Set service charges

Although no defined method has been established for setting service charges, the "affordable-to-pay" method discussed in **Section 7.3.2** can be considered as a way to set appropriate charges. In addition to user charges, various financing measures will have to be taken to procure funds to cover the shortfall. These include bond issuance (local bonds, etc.); direct borrowings from the central government or from foreign countries, subsidies, and funds carried forward from general accounts.

(4) Estimate burden of expenses to be borne by sewerage users (bond issuance must be factored in to spread the financial burden over the life of the project)

When the rate of inflow is low in the early stage of the project after the start of operations, expenditures will greatly exceed income. Since an excessive cost burden cannot be placed on users at this stage, various financing measures will have to be taken to procure funds to cover the shortfall. These include bond issuance (local bonds, etc.); direct borrowings from the central government or from foreign countries, subsidies, and funds carried forward from general account.

In the latter half of the project life, it normally can be expected revenue from service charges to exceed that needed to cover O&M expenses (including interest payments). The surplus can be used toward repayment of obligations incurred during the first half of the project life. In other words, the surplus can be appropriated to cover the balance needed to deal with revenue shortfalls in the first half of the project life. Then any remaining surplus can be used to pay for a portion - at fixed annual rate - of the debt incurred to cover construction costs.

Surpluses earned in the later half of the project's life can be used to cover O&M expenses, including interest payments. These amounts, which could be borrowed by another entity, can be viewed as the amount of the expense burden that should be covered by service charges.

Project organizers in charge of investment should create a financial plan based on the concepts discussed above. They are also responsible for managing bond issuance and budgeting. A key part of this work is to logically spread the financial burden shouldered by sewerage users over the project life.

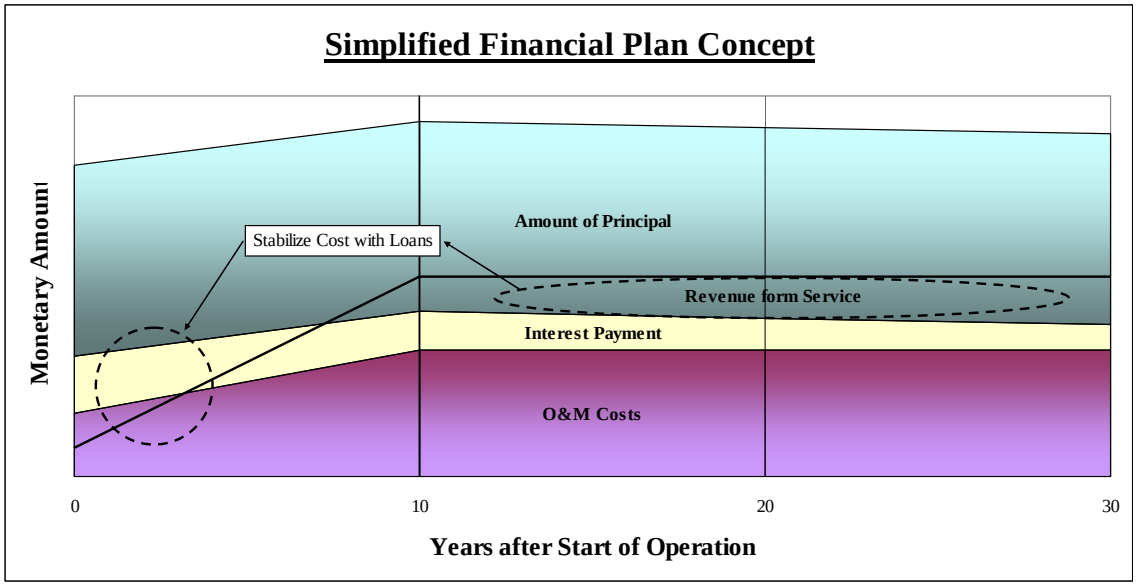


Figure 7.1.1 - Simplified Financial Plan Concept
Source: Guidelines for Management of Sewerage Facilities in Development Countries (Draft) by IDIJ, July 2002

(The ***Figure 7.1.1*** shows the connection rate would reach 100 % after 10 years of start of operation, meanwhile O&M costs and income from service charges would increase linearly, and then become stable. The project period is defined as 30 years, and a fixed amount of principal is amortized during the period.)

(5) Burden of expenses borne by local and central governments

Benefits of sewerage system are not limited to users. Sanitary condition in periphery of urban area and downstream basin area is significantly improved by sewerage works which in turn may enhance tourism and fishery. The benefits extend even further. Sewerage systems are essential to the creation of modern cities, and synergetic effects of sewerage construction in major cities will bring further benefits that are national in scale.

Project organizers should seek to have local and central governments assume the burden of (or the burden of debt required for) expenses that cannot be covered by service charges, that share that exceeds the portion that can be covered by imposing a reasonable burden on users. This government burden can be thought in proportion to the overall benefits received from the project. Tax revenue, budget rations and the allocation of roles to be performed by local and national governments are among the other factors influencing financial burden allocation. How this burden allocation is a policy decision to be made by the central government.

As a tool to help with decision-making, a useful concept is to balance the allocation of the financial burdens among stakeholders with the benefits each receives. Concretely, the current benefits received by users, local governments and the central government can be calculated at current values, then the portion of current costs that should be borne by each part can be adjusted in proportion to the economic benefits they receive. In this way, burden-sharing can be balanced with the EIRR each stakeholder obtains.

(6) Creating financial statements

The plan for the disbursement of funds for necessary payments to cover construction and O&M costs should be drafted in the form of a set of financial statements, including a statement of cash flows, a statement of advances and repayments, a balance sheet and a profit-and-loss statement.

(7) Verifications using Financial Internal Rate of Return (FIRR)

It should be verified that the overall Financial Internal Rate of Return (FIRR) of a given project is greater than the cost of funds that can be procured. Inability to confirm this is a clear sign that trouble will occur in the introduction of borrowed funds, or with repayments and interest payments. Refer to **Section 7.3.1** "Economic and Financial Evaluation" for further explanation of uses of FIRR.

(8) More concrete verifications

Along with using more detailed financial indices for verification, it should be conducted concrete checks to ensure that, as much as possible, revenue will cover risks. In other words, it is advisable to use such indices as the principal repayment coverage ratio to check whether project revenue will be sufficient to cover debt repayments. Cash flow sufficiency is another significant measure.

Debt Service Coverage Ratio (DSCR)

After the profitability of the project has been confirmed by FIRR analysis, and the Debt Service Coverage Ratio (DSCR) indicates that the project has the capability to repay debt, the next step is to verify that the project will have sufficient reserves to handle various risks.

The DSCR is used to indicate the relationship between the total current values of after-tax profit before payment of debt has been made for a given period and the total current value of debt that must be repaid. (See ***Figure 7.1.2***) A profit figure that is less than 1.0 times tie value of the total debt is an indication that the project will have difficulties with debt repayment. Countermeasures include reducing the scale of loans and reinforcing the budget. On the other hand, a high DCSR indicates that the project has sufficient operating reserves.

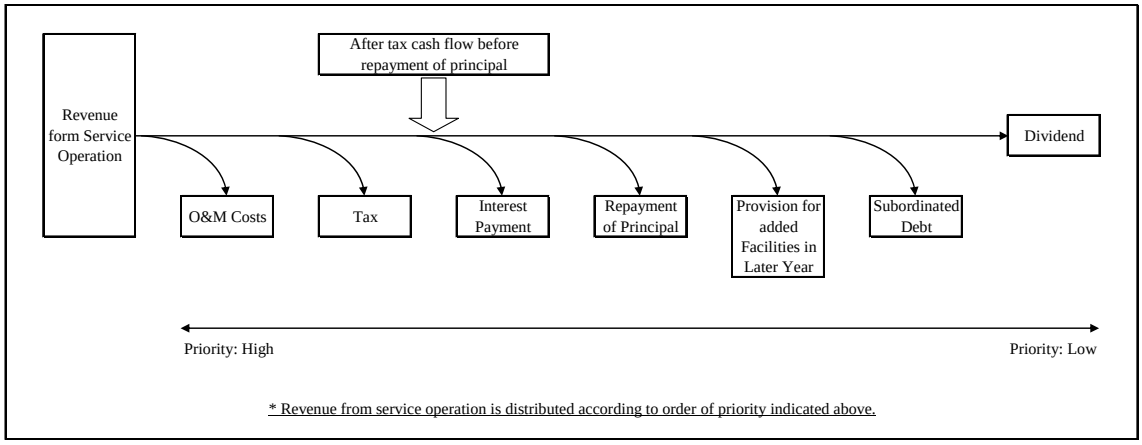


Figure 7.1.2 - Order of Allocation of Project Revenue
Source: Guidelines for Management of Sewerage Facilities in Development Countries (Draft) by IDIJ, July 2002

Three representative periods used for this analysis are described below.

(A) Project Life Coverage Ratio (PLCR)

$$= \frac{Current\ value\ of\ total\ cash\ flow\ before\ debt\ repayment\ during\ project\ life}{Principal\ to\ be\ repaid}$$

The above ratio is used to indicate debt repayment capability through the project life (years of

useful life of project). If the ratio is less than 1.0, such countermeasures as reducing the scale of loans and reinforcing the budget will have to be taken.

(B) Loan Life Coverage Ratio (LLCR)

$$= \frac{Current\ value\ of\ total\ cash\ flow\ before\ debt\ repayment\ during\ loan\ period}{Principal\ to\ be\ repaid}$$

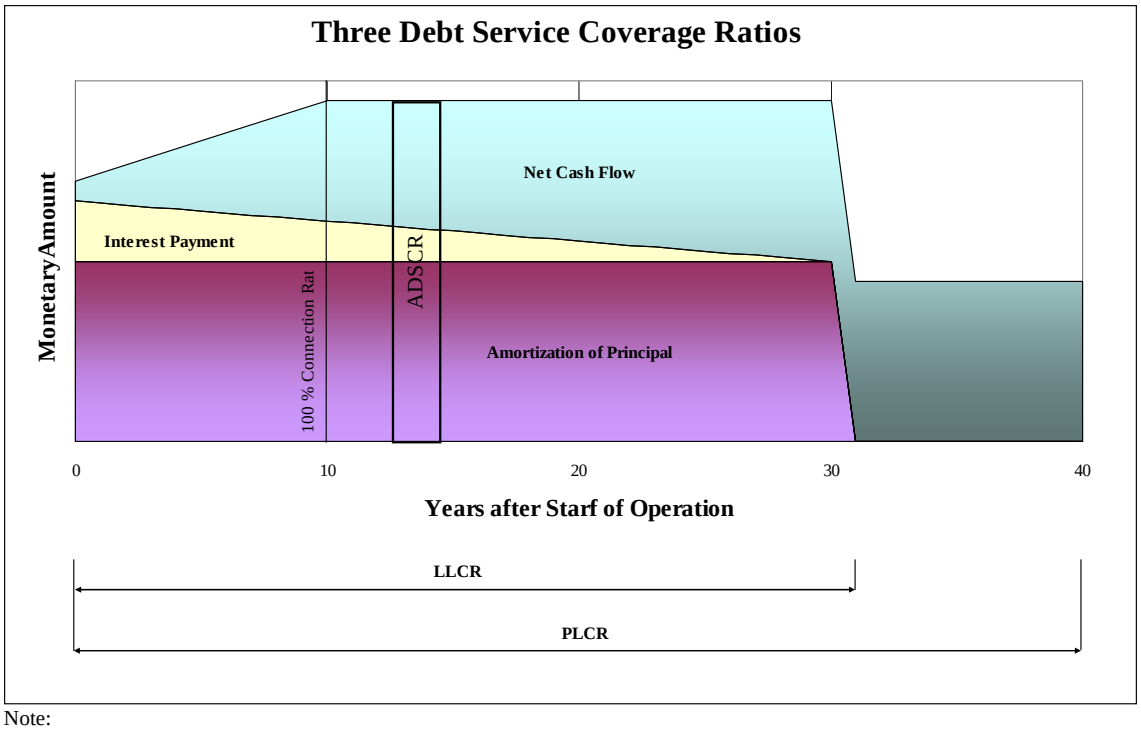
The above ratio is used to indicate debt repayment capability through the life of a loan (repayment period). If the ratio is less than 1.0 such countermeasure as lengthening the repayment period, reducing the scale of the loan and reinforcing the budget must be taken. If the project is managed by a private entity, lenders will generally seek an LLCR of 1.4 to 2.0.

There are also cases in which the above numerator is placed over the interest to obtain a ratio used to verify interest payment capability.

(C) Annual Debt Service Coverage Ratio (ADSCR)

$$= \frac{Cash\ flow\ before\ debt\ repayment\ during\ year\ reviewed}{Principal\ to\ be\ repaid\ during\ year}$$

Here the DSCR is calculated for each year. It is important to analyze the financial condition of a sewerage project in which expenditure will greatly exceed revenue from service charges in the initial start-up period.



Note:

I. The ***Figure 7.1.3*** shows what10 years after start of operations, the percentage of population connected to sewerage had reached 100 %. During that period, the portion of O&M costs covered by revenue from service charges increased linearly. This became the fixed pattern and cash flow and debt servicing was simplified. The project life was 40 years, and the principal was repaid in fixed amounts over the 30-year repayment.

II. Net cash flow = (Revenue from Service Charge + Subsidies + Cash Received form Issuance of Stocks) - (O&M Costs)

Figure 7.1.3 - Three Debt Service Coverage Rations

Source: Guidelines for Management of Sewerage Facilities in Development Countries (Draft) by IDIJ, July 2002

7.2 Operation and Maintenance Costs

O&M cost for sewerage works consists of the following respects:

7.2.1 Costs for sewers
7.2.2 Costs for pumping stations
7.2.3 Costs for wastewater treatment plants
7.2.4 Costs for others

7.2.1 Costs for Sewers

O&M costs for sewer pipes consist of the following costs as respects:

(1) Personnel
(2) Repair
(3) Materials
(4) Maintenance by contract

(1) Personnel who are engaged in management, planning and supervision of sewer construction, inspection, dredge, cleaning and customer service are embraced.
(2) Repair of dredging and cleaning machines, vehicles and equipments are embraced.
(3) Materials such as cover of manhole, expendables of machines and tools are included.
(4) Dredging and cleaning of sewer pipes are not always carried out by service providers directly and are contracted with professional companies. In such case, the costs for contract are included in this cost category.

Figure 7.2.1 shows O&M cost for sewers.

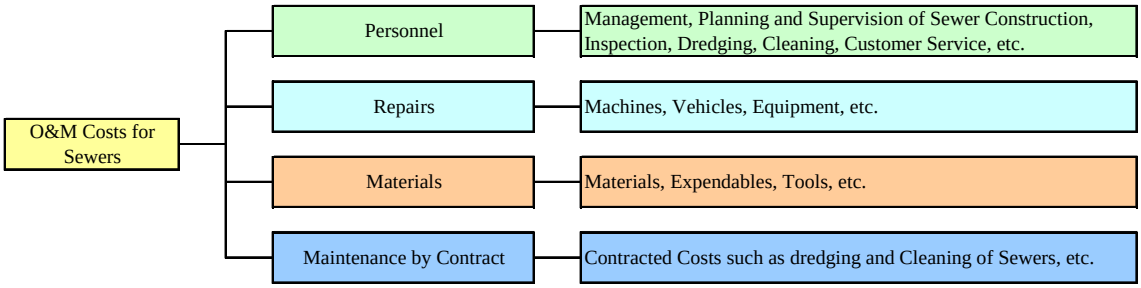


Figure 7.2.1 - O&M Cost for Sewers

7.2.2 Cost for Pumping Stations

O&M costs for pumping stations consist of the following costs as respects:

(1) Personnel
(2) Utilities
(3) Repair
(4) Materials
(5) Maintenance by contract

(1) Personnel who are engaged in management and O&M are embraced.
(2) Electrical power and heavy oil for generators are included in this cost.
(3) Repair of pumps, motors and screens etc. is embraced.
(4) Materials such as expendables of pumps and motors, oils, greases and light bulbs etc. are included.
(5) When some O&M works such as grit collection and disposal of screenings are outsourced, required costs for maintenance by contract are included in this category.

Figure 7.2.2 depicts O&M cost for pumping station.

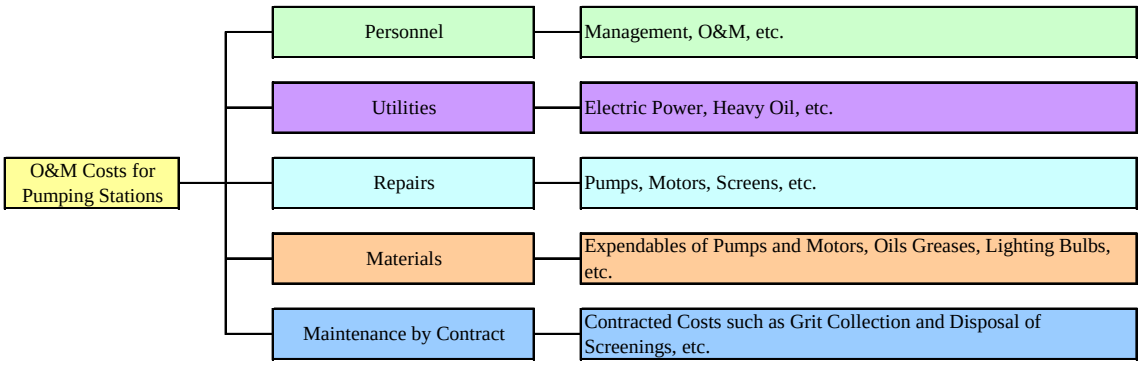


Figure 7.2.2 - O&M Cost for Pumping Station

7.2.3 Cost for Wastewater Treatment Plants

O&M costs for wastewater Treatment plans consist of the following costs as respects:

(1) Personnel
(2) Utilities
(3) Chemicals
(4) Repair
(5) Materials
(6) Laboratory
(7) Maintenance by contract
(8) Others

(1) Personnel who are engaged in management and O&M are embraced.
(2) Electrical power and heavy oil for generators are included in these costs.
(3) Liquid chlorine or sodium hypochlorite which is used for disinfection of effluent is embraced.

(4) Repair of pumps, motors, aerators, sludge collectors and screens etc. is embraced.
(5) Materials such as expendables of pumps and motors, oils, greases and light bulbs etc. are included.
(6) Chemicals and expendable parts of equipments which are used for water quality analysis are embraced. Kinds and amount of expendables and chemicals used for analysis depend on analyzing parameters. It should be noted that equipments and chemicals are usually expensive. Therefore analyzing parameters must be minimized especially for small scale sewerage works. Because maintenance of sophisticated analyzing equipments such as atomic absorption photometer which is used for analysis of heavy metals, requires professional knowledge and techniques. It is usually carried out by contract.
(7) When some O&M works such as grit collection, periodical maintenance of machines and maintenance of laboratory equipments are outsourced, required cost for maintenance by contract has to be capitalized.
(8) Costs for stationary goods and books etc. have to be embraced.

Figure 7.2.3 illustrates O&M cost for Wastewater Treatment Plant.

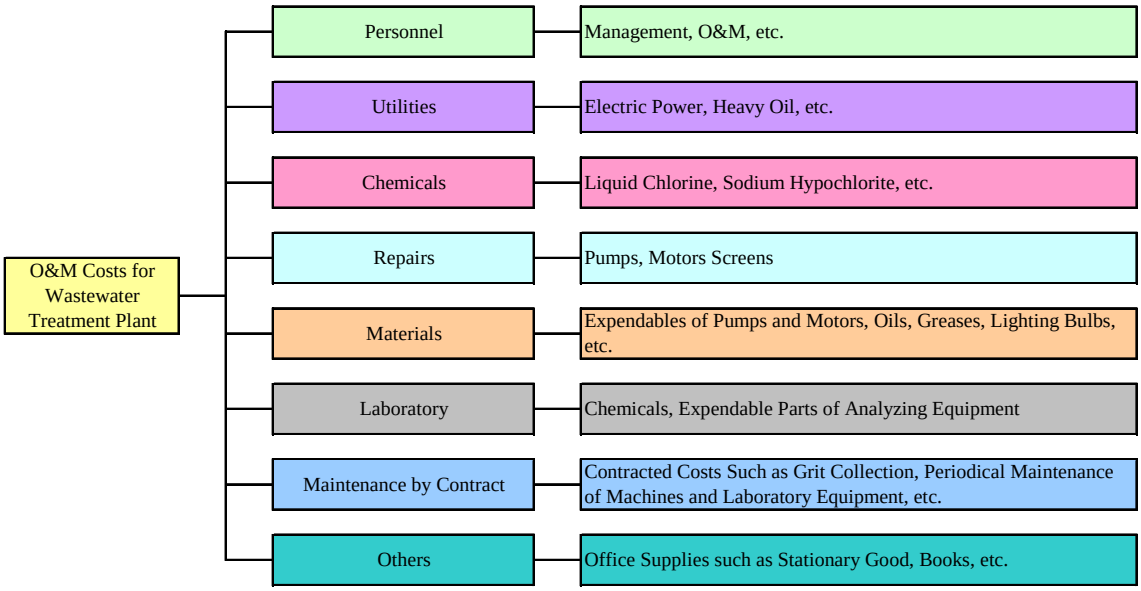


Figure 7.2.3 - O&M Cost for Wastewater Treatment Plant

7.2.4 Cost for Others

O&M cost for others includes the following costs as respects:

(1) Public relations
(2) Promotion activities for household connection
(3) Inspections of hazardous industrial sewerage
(4) Collection of service charges

(1) Costs for meeting with stakeholders, invitation to treatment plant and publication of report etc. has to be capitalized.
(2) In order to promote household connection explanation for communities and demonstration of sewerage is indispensable. Costs for those activities have to be capitalized.
(3) When industrial wastewater is accepted to sewerage system, inspection of factories is vital. Costs for analyzing toxic substances such as heavy metals or cyanide have to be prepared.
(4) When service charge is collected directly by service providers, personnel costs have to be capitalized, and when the collection is outsourced, contracted cost is capitalized.

Figure 7.2.4 presents O&M cost for others.

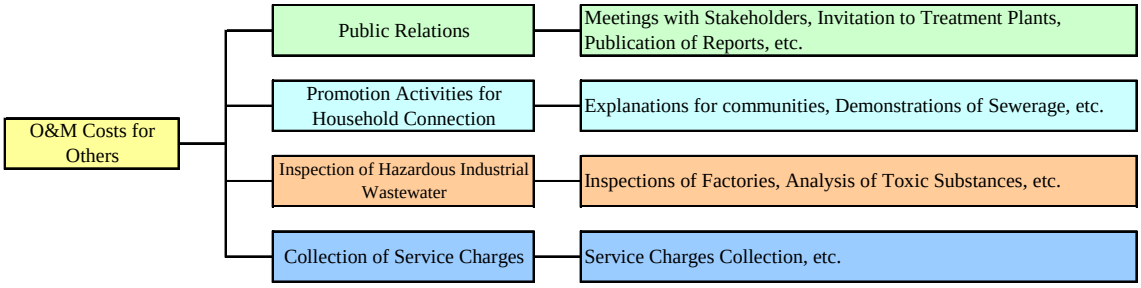


Figure 7.2.4 - O&M Cost for Others

7.3 Cash Flow Analysis Model of Sewerage Management

7.3.1 Economic and Financial Evaluations

Through the financial and economic analysis of sewerage projects, it can be determined whether the project is economically and financially feasible. The project can be economically evaluated by quantifying the economic, environmental and sanitary benefits.

(1) Financial Analysis

Financial analysis calculates the profitability of a project. It indicates how much interest is returned on funds for project construction and operation investments (outflow of funds). The sum of the inflow of funds minus the outflow of funds is rebated in the form of interest (discount rate) and the present value is calculated. This total equals zero (Financial Rate of Return, FIRR). In other words, a surplus or lack of funds in present value gives a total that is equal to the discount rate (this equals the FIRR). This equation gives the rate of profitability on investments (interest on investments). If items not counted in outgoing funds, such as payments of interest to investors can be covered by the profit from FIRR, the project is evaluated as finally viable.

For example, in the case of a project with a forecasted income and outgo of funds such as is shown in ***Table 7.3.1*** the calculation of present value and FIRR of income and outgo of funds for a discount rate of 7 - 10 % is shown in ***Table 7.3.2***. In this example, a discount rate of 7 % creates a surplus in present value of 342,000. At 10 % there is 187,000 lacks of funds in preset value. FIRR is 8.882 %. The result of calculating the discount rate is shown in ***Figure 7.3.1***.

Table 7.3.1 - Inflow and Outflow Rate of Capital for a Given Project

Annual	1	2	3	4	5	6	7	Total
Capital Outflow	3,000	2,000						**5,000**
Capital Inflow			1,000	1,000	1,000	2,000	2,000	**7,000**
Total	-3,000	-2,000	1,000	1,000	1,000	2,000	2,000	2,000

Note: No Currency Unit
Source: Guidelines for Management of Sewerage Facilities in Development Countries (Draft) by IDIJ, July 2002

Table 7.3.2 - Present Value (Identifying Inflow as Plus and Outflow as Minus)

Discount Rate	Annual							Total
	1	2	3	4	5	6	7	
10.000 %	-3,000	-1,818	826	751	683	1,242	1,129	**-187**
9.000 %	-3,000	-1,835	842	772	708	1,300	1,193	**- 20**
8.000 %	-3,000	-1,852	857	794	735	1,361	1,260	**156**
7.000 %	-3,000	-1,869	873	816	763	1,426	1,333	**342**
8.882 %	-3,000	-1,837	844	775	712	1,307	1,200	**0**

Note: No Currency Unit
Source: Guidelines for Management of Sewerage Facilities in Development Countries (Draft) by IDIJ, July 2002

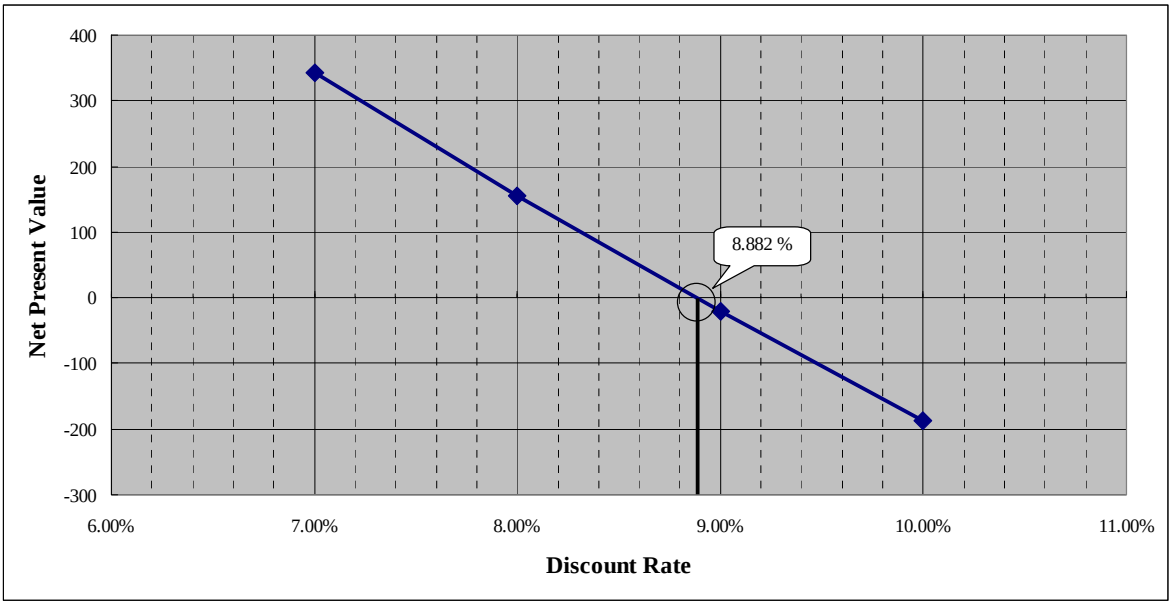


Figure 7.3.1 - Discount Rate and Net Present Value
Source: Guidelines for Management of Sewerage Facilities in Development Countries (Draft) by IDIJ, July 2002

What is counted as income as funds and outgo of funds and therefore how the FIRR is determined by what benefits are analyzed.

1) Central government and foreign donors determine the profitability of a project by the FIRR. In this case, FIRR is irrelevant to deciding the method of fund procurement, such as using funds on hand or by loans. Accordingly, it is not necessary to count funds from loans as income of funds. Likewise, repayment of principal and payment of interest does not need to be counted as a cost. Interests' payments are made up of allocated funds on hand and in part profit ratio derived from the FIRR. As a result, the FIRR gives a maximum limit on cost of procuring capital (a weighted average of interest and dividend). Generally, open market rates are used as a basic standard of whether the FIRR is suitable for investment or not.

2) For private banks that intend on investing on in a sewerage project, only profitability from funds on hand rather than overall project funds are important. In this case, deposits of capital other than funds on hand (principal of loans and investments from other sources) should be included in income of funds calculations and payments of interest and repayments of principal should be included in outgoing funds. The FIRR derived from these calculations gives a profit ratio for self-financing and from this profit; allocations can be covered by funds on hand.

(2) Economic Analysis

Economic analysis determines whether a project can give large benefits to the social economy, or whether the budget should be used for a different purpose or project.

The table below shows a simplified form of the return of benefits. In financial analysis, a vertical sum of the cost and benefit of the implementing organization (in the table this is shown as sewerage service operator) is examined and discussed. On the other hand, economic analysis discusses the net benefits for society as a whole (a right-most sum in the table).

Table 7.3.3 - Example of Components of Return on Benefits in Sewerage Service Operation

	Sewerage Service User	Sewerage Service Provider	Public Sectors such as Central Government	Downstream Water User	Total
Construction Cost		- C			**- C**
O&M Cost		- M			**- M**
Service Charge	- R	R			**0**
Benefit	B1			B2	**B1 + B2**
Subsidy		G	- G		**0**
Tax	- T1		T1 + T2	- T2	**0**
Total	**- R + B1 - T1**	**- C - M + R + G**	**- G + T1 + T2**	**- B2 - T2**	**- C - M + B1 + B2**

Source: Guidelines for Management of Sewerage Facilities in Development Countries (Draft) by IDIJ, July 2002

This component chart is designed to clarify transition of costs and benefits and final return of benefits to stakeholders for projects to be evaluated.

In practical terms, a with a scenario and without scenario is compared and future increases in both material and immaterial benefits and the cost for these benefits are calculated for each year. As this is a calculation for net benefits for the overall society, unrequited transfers, such as tax and subsidies cannot be included in costs.

A simple and largely adopted method for calculating benefits is to use the objective willingness to pay price, which is also market price. For example, the cutting of treatment costs for water-borne infectious diseases increases in agricultural and fishery production and increased income from tourism can be estimated from market prices. However, there are cases of benefits that cannot be ascertained by market price because of distortions in the market. As improvements of the environment cannot be bought and sold on the market, these benefits cannot be directly calculated from market price. In these cases, methods can be utilized to estimate benefits through related substitute markets. These methods include the Travel Cost Method and the Hedonic Pricing Method. Further information of item of benefits of sewerage services and evaluating benefits are available in the resource materials.

Cost must be converted to the Shadow Price, which eliminates the influence of monopolies and oligopolies.

From the costs a benefits derived from the above calculations, the cost (investment) and how much interest; Economic Internal Rate of Return (EIRR) will be returned to society can be calculated.

The discount rate "I" of the EIRR can be found by the following equation:

$$\sum Bn/(1+i)^n = \sum Cn/(1+i)^n$$

(Bn: n Annual Benefits, Cn: n Annual Cost)

If the EIRR is equal to or is higher than the country's capital opportunity cost, the project is deemed viable. The EIRR can also be used by governments as an index for prioritizing projects.

Benefits in economic analysis include decreases in water-borne infectious diseases, increases in land value and the protection of the environment. Many of these benefits cannot be thought of in terms of monetary value. Although the EIRR calculation cannot make allowances for this, it still gives an indicator for qualitative evaluation.

There are four combinations of FIRR and EIRR calculation results. An example of decisions made based on these combinations is shown in below ***Table 7.3.4***.

Table 7.3.4 - An Example of Decisions by FIRR and EIRR

	FIRR is greater than cost of funds	**EIRR is greater than capital opportunity cost**	**Decision**
1	Yes	Yes	Yes
2	Yes	No	If a yes decision is made in this case, there will be criticism of favouritism of one project while ignoring the socio-economic factors. Check that all benefits have been included. Consider simplifying facilities, increasing the service area and so on to maximize economic benefits.
3	No	Yes	By not counting assistance in the form of subsidies as project funds, the scale of investment can be reduced. This includes such items as simplifying facilities, increasing the service area and so on.
4	No	No	Refer to both 2 and 3.

Source: Guidelines for Management of Sewerage Facilities in Development Countries (Draft) by IDIJ, July 2002

(E.g. in case that the initial project cost is thought by loans from commercial banks in Indonesia, long-term interest rate is currently 12 percent or over in December 2009.)

Approaches for counting benefits and costs in financial and economic analyses are shown in ***Table 7.3.5*** as follows.

Table 7.3.5 - Approaches for Counting Benefits and Costs in Financial and Economic Analysis

Item	Financial Analysis	Economic Analysis
Raw Materials	Cost	Cost
Personnel (excluding wages)	Cost	Cost
Skilled Worker Wages	Cost	Cost
Unskilled Worker Wages	Cost	Cost However, this depends on the labour market. If there are no other employment opportunities leaving only unemployment or shadow unemployment as an alternative in this is not included. In other words, counted as zero cost.
Land Prices	Cost (Purchase Price)	Cost (Lost to the project and price of production)
Land Prices (unused land)	Cost	Zero cost
Tax	Cost	Not considered as item is unrequited transfer
Subsidies	Benefit	Not considered as item is unrequited transfer
Deprecation	Neither cost or benefit	Neither cost or benefit
Interest	- Not counted as cost in the FIRR for the entire project. For this reason, interest is included within the FIRR - In the case of self-financing for the FIRR, this is counted as payment cost to an outside supplier of funds.	Not counted as cost. The EIRR calculated is interest including social benefits.
Receipt if Principal	- Not counted as benefit in the FIRR for the entire project - In the case of self-financing principal is included in the benefit.	Not considered
Repayment of principal	- Not counted as cost in the FIRR for the entire project. - In the case of self-financing repayment of principal is included in cost.	Not considered

Note: Unrequited transfers: In economic analysis only resources used in the project are considered as cost items. In outgoing items, money that is only transferred, such as items that is transferred to and from governments and has no direct relation to the costs and benefits of the establishment of the project are not counted in the calculations.
Source: Guidelines for Management of Sewerage Facilities in Development Countries (Draft) by IDIJ, July 2002

7.3.2 Methodology for Setting and Collection of Service Charge

(1) General

To set sewerage service charges, data on the socio-economic conditions in the target area, including the patterns of household income, spending and a survey of willingness to pay has to be obtained. When charges are set, then how will the beneficiaries be assessed? Should the method of collection be handled by a flat charge, an assessment according to the amount of water charges? In addition, whether sewerage charges should be collected separately, the techniques of their collection and arbitration of disputes must be investigated.

The basis for sound management of sewerage services is to balance revenues, expenditures and have sufficient cash income to cover the service supplied. This should be done by the beneficiaries of the service according to benefits received. The basis cost coverage method, based on the principle of beneficiaries bearing the expense, recovers the necessary cost of supplying the beneficiary with the service. However, because of an assortment of limitations,

out of the various supply costs the business is often only able to recover the cost of O&M. Cases of also recovering construction costs are rare. Thus, it might be rather more difficult to adopt the cost recovering methods as a world standard. Actually, in the majority of cases, a basic water rate exists to which the sewerage charge is later added when it has been fixed.

The cost recovering method is used relatively widely in setting water rates. This concept provides for financing the water supply costs by revenue from charges. The cost of water supply is attained by adding all the necessary expenses of operating a water utility over a fixed period and is called the requisite net cash figure. Once the requisite net cash figure has been determined, divide this by the amount of water it is possible to sell during the business period and ascertain the average unit revenue. It is common for an income policy to be applied, in which a lower rate is ordinarily applied to household users than to industrial or commercial users. This differentiation between users is called an internal subsidy (cross-subsidization). The average unit income is amended by the internal subsidy and a new average unit is calculated for each type of user. For large scale household users, a progressive water rates system, in which the unit charge rises according to the amount used, is established and reciprocal internal subsidies are applied. If these processes are put in order, it can be depicted in ***Figure 7.3.2*** as follows;

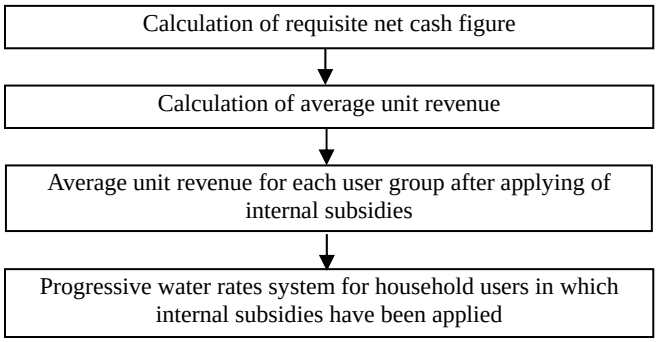


Figure 7.3.2 - Flow Chart of Cost Recovering Method
Source: Guidelines for Management of Sewerage Facilities in Development Countries (Draft) by IDIJ, July 2002

Statistics concerning the socio-economic conditions of the area under survey, the state of household income and expenditure and the willingness of the users to pay are required for fixing charges. In setting the level of charges and the affordability of sewerage users to pay, the possibility of subsidies from the state and the local government authority must be investigated thoroughly. In certain cases, according to the income level of the users, a social policy of applying differing charges may be feasible. This method is to apply higher tariff to higher income group such as enterprises and factories than ordinary domestic households. The point to be borne in mind in this instance is that the rate level should not exceed the affordability of the user to pay. As a guideline for affordability to pay, it is generally said that water and sewerage together should be about 5 - 6 % of household income, but this is a very old figure and the basis for it is no longer clear.

There are various methods of fixing the charge system for sewerage services. These can be roughly classified into having (A) charges being assessed according to the amount of use, and (2) households connected to the sewer bearing a fixed charge. Another method of meeting costs, although a bit removed from the concept of a charge, is to have residents pay a fixed sum in tax regardless of whether they use / are connected to the sewers.

There are various charge systems for sewerage use. For example, the fixed charge system of a public utility charge or a tax, the method of proportional assessment by floor area of the house,

and the addition of a specific charge to the water rate can all be considered. In whichever case, a legal basis is necessary for the assessment of charges. For methods of billing and collecting sewerage service charges, there are many instances of these charges being paid at the same time the water rate is collected, both included on a single bill as a single charge for water and sewerage service, and a fixed proportion allotted to the sewerage service portion. In particular, the method of adding it to the water rate enhances office efficiency, so there are many cases of employing this method of collecting the water rate and the sewerage charges at the same time. If sewerage service charges are set at a fixed proportion, say 50 % of the water rate, and if the right to amend the rate is held by the water supply service organization only, care must be taken to avoid a damaging effect on overall sewerage service activities.

The basic collection of charges should be carried out fairly, impartially and without delay. Special beneficiaries must not receive exceptional treatment without good reason. A long-term, continuing relationship between sewerage service contractors and beneficiaries is a pre-requisite, and a situation in which the beneficiaries do not pay the charges, or one in which delays become customary, will damage the continuity of the project and must be carefully avoided.

Methods of collection must be those laid down in ordinances and regulations. These can include direct collection, certificates of payment or disbursement from bank or post office accounts but, for user convenience, it is desirable that there should be a choice of means and places.

Where there is default due to a valid reason (illness, loss of job, etc.) partial payments can be accepted, or welfare or social insurance systems utilized, but the customer should always be accorded consideration as a long-term sewerage user. If defaults routinely continue in spite of taking these steps, or in cases in which a lack of sincerity is displayed, cutting off the water supply may be inevitable.

(2) An Example Method for Setting of Service Charges

The Japan International Cooperation Agency (JICA) suggests a method for setting of new charges. This method is based upon there being a worldwide legal standard for the order of each item of household expenditure, irrespective of the amount of income or the nature of the region. By examining the average expenditure makeup in the region under survey and listing it in order of amount, the position in which sewerage charges ought to lie and how great percentage they ought to be can be calculated, and thus a practical and reliable affordability-to-pay figure for the beneficiary can be established.

Figure Step (User Charge)

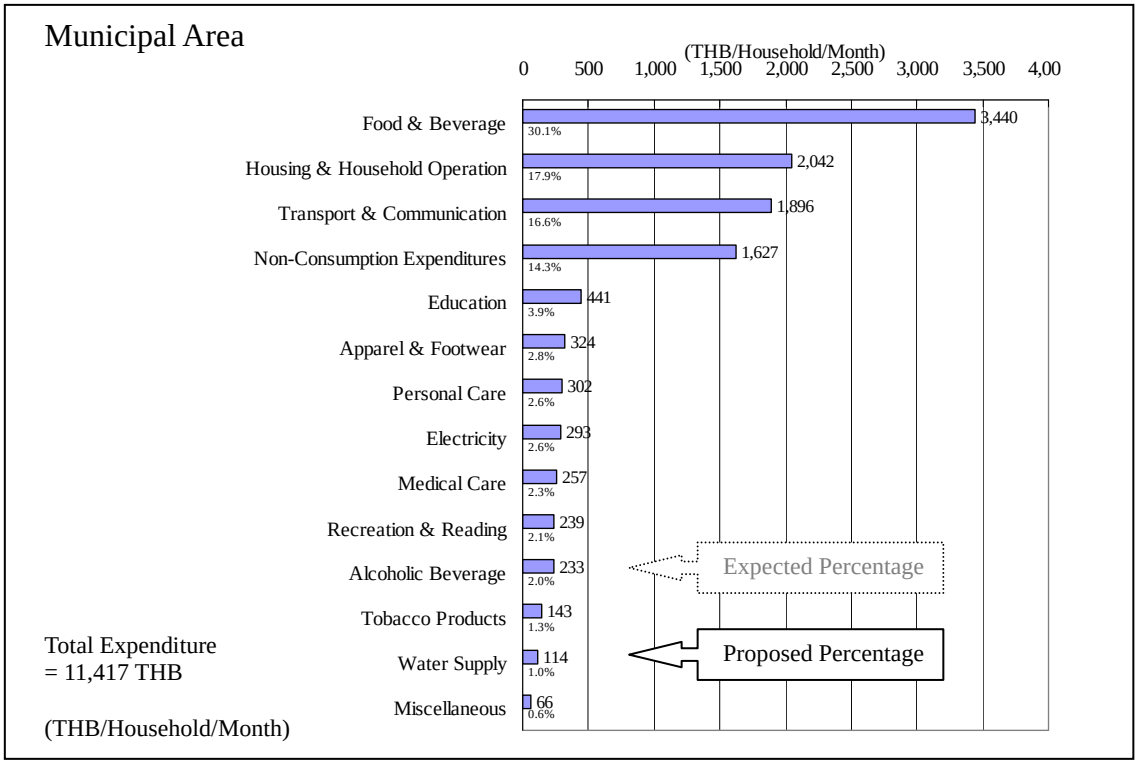
The upper limit of affordability for the sewerage user charge can be obtained by referring to the average monthly expenditure structure per household. An example average monthly expenditure structure per household is given in ***Figure 7.3.3***.

The example method of affordable sewerage service charge setting is described in followings:

Step 1 To survey the structure of monthly household expenditure. If possible, the analysis of average monthly expenditure is to be based on the low income class (out of high, middle and low income classes). And then, the model of result of analysis should be prepared (***Figure 7.3.3*** is an example).

Step 2 Based on above model, affordable sewerage service charge should be set in next of; 1) vital cost for life such as food; 2) costs for education and health care; 3) vital costs for public utilities charge such as for electricity, gas, water supply, and so on.

When the affordable sewerage service charge is set, it is important to note the position of sewerage service charge in the structure of household expenditure rather than the amount of wastewater charges. And it is important to explain of above method to the inhabitants in the target area. If the residents in the target area agree the order of service charges estimated by above method, the amount of sewerage service charge is automatically set in a range of the item of expenses.



Note: THB: Thai Baht

Figure 7.3.3 - Example of Average Monthly Expenditure Structure per Household

Source: Guidelines for Management of Sewerage Facilities in Development Countries (Draft) by IDIJ, July 2002

As shown in ***Figure 7.3.3***, around 2.0 % of the average monthly expenditure can be expected to set as affordable charge for sewerage services by above method. However, current service charge for water supply is 1.0 % of average monthly expenditure, if sewerage service charge will be set as 2.0 % of the average monthly charge, water supply charge will be cheaper than sewerage charges. In this case, 2 options can be considered to take as below;

Option 1 Reducing the expected sewerage service charge to 1 % of average monthly expenditure as equal as or cheaper than water service charge.

Option 2 Raise the water service charge rate to match to 2 % of average monthly expenditure as equal as or higher than sewerage service charge rate.

However, the public utilities service charges, not only water supply and sewerage charges, should not weight on household accounts, otherwise, public works will reduce the level of life of people, therefore, **Option 1** should be taken.

If the sewerage service charge is decided in this procedure and residents in the target areas agree above methodology of setting of sewerage service charge, it will be acceptable to sewerage service recipients.

7.3.3 Setting of Charge

(1) General

There is less desire to pay for sewerage than water supply. Water supply infrastructure, being a major merit for residents, ensures a comparatively safe water supply to each house or to a nearby faucet. On the other hand, residents who are accustomed to disposing their sewerage near the house think of sewerage disposal as being free of charge. With the existence of communities that lack in hygiene awareness, long-term programmes to make residents aware of the value of a sewerage system are necessary. A large majority of surveys have shown that residents intend to pay very little and actual value of having a sewerage system to gain the understanding of the community and progress with suitable policies.

Problems in collecting service charges for water supply services often relate to actual collection o sewerage service charges. When water supply charges are based on the amount of water used (**Commodity Charge System**), it is often the case for sewerage service charges to be based on the same system. A point to be aware of is water theft, such as the illegal tapping from water pipes to avoid payment of service charges. If water theft is widespread throughout society there will be no equilibrium between water supplied and sewerage. Such water theft may make the feeling of residents who pay service charge faithfully disagreeable. This kind of water theft is easily identified when considering the average amount of water each household uses. Meter readers need to gather and maintain information so that an environment is created where service charges can be collected. It is necessary to raise the social status of meter readers and to establish information systems and countermeasures against illegal acts concerning meter reading and billing systems. In the case of fixed service charges (**Fixed Charge System**) being set for water supply, sewerage service charges are also set at a fixed rate. This payment system encourages an attitude of getting something for nothing and using more water, which in turn enters the sewerage system and increases the burden of sewerage maintenance costs for pumping stations, etc. This also applies in cases of water supply facilities that are deteriorated and lacking in capacity, not supplying enough water to the community. The summary of the above is shown in ***Figure 7.3.4***.

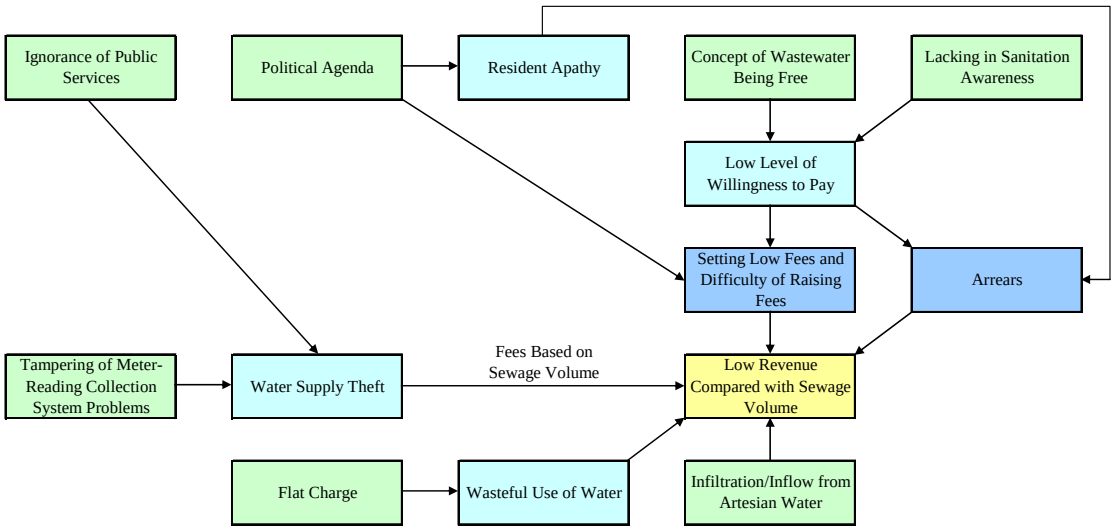


Figure 7.3.4 - Problems in Cost Recovery
Source: Guidelines for Management of Sewerage Facilities in Development Countries (Draft) by IDIJ, July 2002

As detailed above, there are two payment systems for service charges; the Commodity Charge System and the Fixed Charge System. The fixed charge system can be used when collecting sewerage service charges alone or when water supply service charges are set at a uniform rate,

but this system creates a feeling of unfairness and an attitude of getting something for nothing among users. This system also causes O&M costs to soar with the increase in sewerage, thus leading to many changes in service charges. Water rate proportional service charge is a rational method, problems of water not being accounted for can occur. Special consideration is also needed for areas where wells serve as the main water supply. In cases where the water supply sector collects sewerage service charges, it is possible for problems to occur if the full collected amount is not transferred to the sewerage sector. With water rate proportional service charges, there is a subtle difference between charging for the amount of water used (e.g. 1 IDR/m^3) and charging a ratio of the service charge (e.g. 50 %). In the former, service charges change rationally, in accordance with the unit cost of the amount of water treated, making this system more desirable. The latter creates a situation wherein the unit service charge is governed by the water supply service charge, causing an imbalance in service charge income and sewerage management costs.

It is fundamental to decide upon sewerage service charges only after through examination of user payment affordability and willingness to pay. The amount of users are willing to pay is said to be 1 % or less of the household income. Affordability to pay for the total payments of water supply, sewerage and refuse is limited to a maximum of 6 %. If a service provider should try to cover construction costs and O&M costs of sewerage development by setting service charges well above the willingness to pay at the initial stage of operation, social problems will be occurred.

Willingness of citizens to pay will remain low if the advantages of having the service cannot be clearly seen. In the construction of sewerage services in project target areas, in cases there are already onsite facilities established and simplistic flushing systems constructed. In situations such as these, the benefits for citizens of having a complete sewerage system are very limited.

Willingness to pay for a sewerage system is lower if water supply is developing first. Constructing a sewerage system first is difficult but it is advisable to construct both water supply and sewerage system simultaneously. It is also important to promote the effects of a sewerage system to the public.

In the setting of service charges, attention must be paid to the relationship with water supply service charges. Various measures need to be implemented, such as construction grants, technical arrangements to keep costs low, and surcharges for hotel operators or office buildings, etc.

(2) Sample Charge

The assumed flow rates by building type are listed in ***Table 7.3.6***, which are reoffered from the material of PD PAL JAYA. These assumed flow rates of sewerage should be reviewed, examined and revised by additional study or survey when the Charge will be considered.

Table 7.3.6 - Typical Assumed Flow Rate of Wastewater by Building Type

No.	Type of Building	Unit	Water Consumption	Flow Rate of Sewerage
1.	Good Housing	lit/member/day	250	200
2.	General Housing	lit/member/day	150	120
3.	Apartment	lit/member/day	250	200
4.	Apartment for Low Income People	lit/member/day	100	80
5.	Dormitory	lit/member/day	120	96
6.	Small Hospital/Local Public Health Centre	lit/visitor/day	3.0	2.7
7.	Good/High Class Hospital	lit/ bed/day	1,000	800
8.	Middle Class Hospital	lit/ bed/day	750	600
9.	Public Hospital	lit/ bed/day	425	340
10.	Primary School	lit/student/day	40	32
11.	Secondary School	lit/student/day	50	40
12.	High School	lit/student/day	80	64
13.	University/Education Institution	lit/student/day	80	64
14.	Shop-House/Office-House	lit/staff or employee/day	100	80
15.	Office Building	lit/employee/day	50	40
16.	General Store (shop, mall, department store)	lit/m^2 of floor area/day	5.0	4.5
17.	Factory/Industry	lit/m^2 of floor area/day	50	40
18.	Terminal	lit/m^2 of floor area/day	3.0	2.7
19.	Airport	lit/m^2 of floor area/day	3.0	2.7
20.	Restaurant	lit/seat/day	15.0	13.5
21.	Recreation Amenities	lit/seat/day	10	9
22.	Theatre	lit/seat/day	10	9
23.	Hotel with a scale of zero to three stars	lit/room/day	150	120
24.	Hotel with a scale of three stars or higher	lit/room/day	250	200
25.	Mosque	lit/person/day	5.0	4.5
26.	Library	lit/visitor/day	25.0	22.5
27.	Bar	lit/visitor/day	30	24
28.	Government Institution	lit/visitor/day	30	27
29.	Night Club	lit/seat/day	235	188
30.	Meeting Room	lit/seat/day	25	20
31.	Laboratory	lit/staff/day	150	120
32.	Traditional/Modern Market	lit/unit/day	40	36

Source: PD PAL JAYA, 2009

And, Governor's Decree of DKI Jakarta Province, No. 1470/2006, dated 6th September, 2006 defined the Charge charged by dimension basis (m^2) for customers of PD PAL JAYA as shown in ***Table 7.3.7*** as follows as a sample;

Connection cost of sewer consists of:

A. Connection cost of service pipe to inspection chamber for each category of customer that they have the individual treatment facilities like septic tank

Table 7.3.7 - Typical Sample of Charge for Sewerage Service (1/2)

Group	Costumer Category	Tariff (IDR)
I	**Household**	
1	Household type A	90
2	Household type B	113
3	Household type C	135
4	Household type D	158
II	**Small Business/Commercial**	
1	Shop	135
2	Office (Building up to 3 floors)	135
3	Salon	158
4	Catering	180
5	Small Restaurant	225
6	Cheap Hotel	225
7	Others small business	225
III	**Big Business/Commercial**	
1	High Building Office	450
2	High Building Office (include of Restaurant/Fitness centre)	495
3	Department Store/Mall/Super Market/Show Room	495
4	1 to 3 Stars Hotel	495
5	Apartment/Condominium	675
6	4 Stars Hotel	675
7	Amusement Centre/Big Restaurant/Cafe	720
8	Private Hospital	720
9	5 Stars Hotel	720
10	Others large business	720
IV	**Social**	
1	Praying House	50
2	Local Government Clinic	135
3	School	180
4	Government Institution	180
5	Other Institutions	180
6	School include dormitory	180
7	Swimming Pool	225
8	Government Hospital	270
9	Clinic	270
V	**INDUSTRY**	
1	Small Industry	180
2	Middle Industry	540
3	Big Industry	585

Type A = Household with electric power installed up to 900 Watt
Type B = Household with electric power installed up to 1300 Watt
Type C = Household with electric power installed up to 2200 Watt
Type D = Household with electric power installed over 2200 Watt

B. Connection cost of service pipe to the special inspection chamber for customer group of big commercial that don't have the individual treatment facilities like septic tank

Table 7.3.7 - Typical Sample of Charge for Sewerage Service (1/2)

Group	Costumer Category	Tariff (IDR)
III	**Big Business/Commercial**	
1	High Building Office	450
2	High Building Office (including Restaurant/Fitness center)	495
3	Department Store/Mall/Super Market/Show Room	495
4	1 to 3 Stars Hotel	495
5	Apartment/Condominium	675
6	4 Stars Hotel	675
7	Amusement House/Big Restaurant/Cafe	720
8	Private Hospital	720
9	5 Stars Hotel	720
10	Others large business	720

C. Supervision cost for connection of service pipe from inspection chamber up to the building.

1.	Design fee	=	7 % × Q
2.	Administration fee	=	4 % × Q
3.	Supervision fee	=	4 % × Q
	Total	=	15 % × Q

Note: Q (IDR): Construction cost for installation of connection pipe from inspection chamber to the building.

(3) Charge Example

It is recommended the charge will be charged by water consumption basis which unit is;

Charged (IDR) = Water Consumption (m^3) × Applied (IDR/m^3) × 1 month (30 days)

for each building type

The assumed flow rate of sewerage per month for general house as an example modified from above sample Charge of PD PAL JAYA is shown in ***Table 7.3.8*** as follows;

Table 7.3.8 - Assumed Flow Rate (m^3) per Month

Type of Building	Water Consumption (lit/day)	Flow Rate of Wastewater (lit/day)	Household Members (person)	Total Wastewater (m^3/month)
General Housing	**150**	**120**	**6**	**21.6**

Based on above flow rate and assumed affordability to pay of 15,000 IDR which is mentioned in the reports of USAID, the service charge for general house as an example is calculated as follows;

15,000 IDR / 21.6 m^3 = 694 IDR/m^3 = approximately **700 IDR/m^3** (per connection/month)

Then, the sewerage service charge for general house will be set at 700 IDR/m^3 as the one of the basement of charge structure.

Further detailed study, analysis and calculation should be carried out, when the project will be

implemented in specific area. And in calculating the charge for sewerage services, it may also need some additional patterns/ models, which also include penalty/ sanction for customer.

On the other hand, other Charge for non-water supply user should be considered, such as for example as in Bandung; 5,000 IDR/connection for non-water supply users.

7.4 Sound Basis for Financial Management

The WS&SSE needs to develop business planning practices as well as new, sound accounting and budgeting procedures and formats to ensure effective financial management, control and sustainability. This will include the need for sound computerised financial application software and computer systems; a "Financial Information System" (FIS). Where financial staff are placed operational site or Customer Service Centres, system will need to be "Networked" to ensure access to and security of finances and financial information. The WS&SSE will need to invest in this as well as other systems to establish /improve/develop financial as well as operational performance. The application is advisable to be developed as "Total Integrated Application"; a system suite that integrates application across all business processes including finance, human resources, operations, project planning, etc; however it will be needed heavy investment.

An asset evaluation/revaluation exercise will also have to be undertaken to establish a complete list and value of current assets for effective planning and depreciation. Based on the above, it is likely that intensive staff training will be required to raise the level of financial management and control throughout all levels of the organization, including technical, field and accounting staff.

The WS&SSE will also need to develop and use a number of relevant key financial performance indicators to monitor performance.

7.5 Financial Self-Sufficiency

7.5.1 Need for Financial Self-Sufficiency

Financial self-sufficiency will afford WS&SSE:

- Freedom in financial management with discretion to decide how to use the funds generated form services provided. WS&SSE will have to work within the limits of the constraints of financial capacity that revenues bring.
- Incentives to improve overall financial performance through efficiency savings (reducing operational expenditure through optimisation of business and operational process)
- Incentives to increase revenues through improved service delivery and customer services (improving commercial billing and revenue practices and focussing on the reduction of Non-Revenue Water (NRW) in water supply system)

7.5.2 Achieving Financial Self-Sufficiency

It is recognised that the provision of water supply and sewerage services has both socio-economic and financial dimensions; however, whilst these may be essential services for all regardless of social and financial standing, service providers will need sufficient financial incentive through cost recovery mechanisms (charges and revenues) to sustain a viable business.

In the long term, financial self-sufficiency means that revenues received (mainly from water supply and sewerage service charges) are able to cover the direct and indirect operating

expenses, indirect costs, debt service and capital expenditure.

7.6 Financial Indicator

After start the operation, WS&SSE's Financial Information System (FIS) will need to be capable of providing managers with timely and vital financial information relevant to their responsibilities within the organisation. This can be provided by Financial Analysis and Evaluation Section. Relevant financial reports and key performance indicators and/or "financial rations" will also need to be measured and tracked to provide internal information as well as satisfying external reporting needs.

One of the major purpose of compiling the financial statements; Balance Sheet (B/S), Income Statement (I/S), and Cash Flow Statement (CFS), are to assess the financial condition of WS&SSE. More emphasis should be placed on financial performance through the analysis of financial indicators. These are calculated from the information contained within the financial statements and are designed to show the relationship between various components of the entity's financial statements

There are a number of useful indicators such as:

- Liquidity ("Current Ratio", "Gearing Ratio")
- Profitability ("Operating Ratio", "Return on Assets", "Unit Production Costs", "Unit Price")
- Solvency ("Debt to Equity Ratio")
- Efficiency ("NRW Ratio", "Facilities Utilisation Ratio")
- Productivity ("Staff per 1000 Connections", "Accounted for Water per Employee")
- Current Asset Management Capability ("Collection Efficiency", "Accounts Receivable Turnover Ratio")
- Others

WS&SSE will need to focus on performance measurement in this way in order to measure financial performance and to enable comparison with other organisations (benchmarking). This will enable WS&SSE to not only track performance but will provide "tool" performance improvements generally by tackling the areas of concern identified by the various indicators.

7.7 Implementation Methodology

7.7.1 Methods of Procurement of Project Funds

According to the scale and content of the project, various options in the procurement of project funds can be hypothesized. Various methods of procurement and their conditions and, for individual projects, the feasible employment of two-step loans or micro credit for fund procurement and use are considered.

Project funds can be divided into domestic currency funds used for local procurement and foreign currency funds used when domestic procurement is difficult and procurement from abroad becomes unavoidable.

Domestic procurement makes use of individual investment and bond issues or aid from the state. Procurement conditions may differ depending on state policy. Loans from commercial banks carry high rates of interest and strict repayment conditions so they are almost never used.

Foreign procurement depends upon international banks or aid between the two countries. (There are cases, however, where loans from banks are not only for foreign currency funds but are appropriated for part of domestic currency funds as well.) The interest rates and amortization periods of these loans are very considerably, and the amount borrowed will affect the basic fees that are changed. Loan conditions from international banking facilities are shown in ***Table 7.7.1***.

For on-site treatment in areas that are not included in the sewerage project area, the two-step loan process in which the domestic financial institution receives a loan from an international banking facilities and uses this loan to provide financial service to a small or medium-sized business or to an individual or the system of micro credit, in which small unsecured loans are made to individuals through a domestic financial institution, may be considered.

Table 7.7.1 - Loan Conditions of International Financial Institutes

Institutes	Interest Rate	Repayment Period	Grace Period	Front-end	Borrower	Country	Notes
International Bank for Reconstruction and Development (IBRD)	LIBOR *1 + 0.17 % *2	15-20years	3-8years	0.25 %	Governments or public and private institutes which can offer appropriate guarantee	Member countries whose per-capita GNI are between USD1,135～6,725.	IBRD Flexible Loans (IFLs) as of September 2009.
	LIBOR + 0.60 % LIBOR + 0.50 % *3	By 10 years					
	LIBOR + 0.80 % LIBOR + 0.70 % *3	10 - 14 years					
	LIBOR + 1.05 % LIBOR + 0.95 % *3	Over 15 years					
International Development Association (IDA)	0 %	20 years *4	10years	0.75 %	Governments or public and private institutes which can offer appropriate guarantee	Member countries whose per-capita GNI is below USD1,095.*7	As of November 2009.
		35 years *5					
		40 years *6					
International Finance Corporation (IFC)	Market Rate	7 - 12 years *8	Determined on a case-by-case basis.	0.5 - 1.0 %	Private companies	Member developing countries	As of November 2009.
Asian Development Bank (ADB)	4.68 % *9	Depending on project condition	Depending on project condition	0.15%	Public and Private sectors	Member developing countries	Ordinary capital resources loans of July 2009 *12 Asian Development Fund for Investment Loan *13
	1.90 % *10			0.15%			
	Cost-base rate plus market rate *11			0.15%			
	1.0 % (grace period) 1.5 % (repayment period)	32 years	8 years	-			
Japan International Cooperation Agency (JICA) (Yen Loan)	0.01%	40 years	10 years	-	Governments	Low-Income Countries	Effective from July 2008
	0.70% *14	30 years	10 years	-	Governments	Least Developed Countries	
	0.65% 0.60% *15 0.55%	25 years 20 years 15 years	7 years 6 years 5 years				
	0.55% *16	40 years	10 years				
	0.45% 0.40% *17 0.30%	30 years 20 years 15 years	10 years 6 years 5 years				
	1.20% *14	30 years	10 years	-	Governments	Low-Income Countries whose per-capita GNI are below USD905.	
	0.90% 0.75% *15 0.65%	25 years 20 years 15 years	7 years 6 years 5 years				
	0.55% *16	40 years	10 years				
	0.45% 0.40% *17 0.30%	30 years 20 years 15 years	10 years 6 years 5 years				
	0.20% *16 0.10% *17	40 years 30 years	10 years 10 years				
	1.40% *14	30 years	10 years	-	Governments	Lower-Middle-Income Countries whose per-capita GNI are between USD906 and USD1,735.	
	0.80% 0.70% *15	20 years 15 years	6 years 5 years				
	0.65% *16	40 years	10 years				
	0.55% 0.50% *17 0.40%	30 years 20 years 15 years	10 years 6 years 5 years				
	0.20% *18	40 years	10 years				
	0.10% *19	30 years	10 years				
	1.40% *14	25 years	7 years	-	Governments	Middle-Income Countries whose per-capita GNI are between USD1,736 and USD3,595.	
	0.95% 0.80% *15	20 years 15 years	6 years 5 years				
	0.65% *16	40 years	10 years				
	0.55% 0.50% *17 0.40%	30 years 20 years 15 years	10 years 6 years 5 years				
	0.20% *18	40 years	10 years				
	0.10% *19	30 years	10 years				
	1.70% *14	25 years	7 years	-	Governments	Upper-Middle-Income Countries whose per-capita GNI are between USD3,596 and USD6,275.	
	1.60% 1.50% *15	20 years 15 years	6 years 5 years				
	1.20% *16	25 years	7 years				
	1.00% 0.60% *17	20 years 15 years	6 years 5 years				
Japanese Grant Aid	0.00%	-	-	-	Governments	Developing countries excluding Upper-Middle-Income Countries	As of November 2009.

*1 London Inter-Bank Offered Rate. LIBOR is a floating interest rate which banks can borrow unsecured finds from other banks in the London wholesale money market.
*2 Variable Spread applicable for USD, EUR and JPY and is adjusted every six months.
*3 Fixed Spread is determined at loan signing and remains constant over the life of the loan. Upper % is applicable for USD and EUR. Lower % is applicable for JPY.
*4 Period for IDA-only
*5 Period for Blend and Hard Term Lending
*6 Period for Hardened Term
*7 Indonesia is IDA-eligible based on per capita income level, but are also creditworthy for IBRD borrowing. Then it referred to as blend countries.
*8 7-12years are typical period. Some loans have been extended to as long as 20 years .
*9 Applicable for USD.
*10 Applicable for JPY.
*11 Applicable for local currencies.
*12 The rate of USD and JPY shall be changed every 6 month. ADB also provides LIBOR-Based Loan, which is similar to IBRD LFLs.
*13 Asian Development Fund also includes grant scheme.
*14 General Terms (Standard)
*15 General Terms (Option)
*16 Preferential Terms which is applicable for sewerage management projects. (Standard).
*17 Preferential Terms which is applicable for sewerage management projects. (Option).
*18 STEP (Special Terms for Economic Partnership) (Standard)
*19 STEP (Special Terms for Economic Partnership) (Option)

7.7.2 Key Points to be Sound Finance

Financial condition of the WS&SSE at initial stage of operation is depicted in ***Figure 7.7.1***, and desired condition in full cost recovery of WS&SEE in future is depicted in ***Figure 7.7.2***.

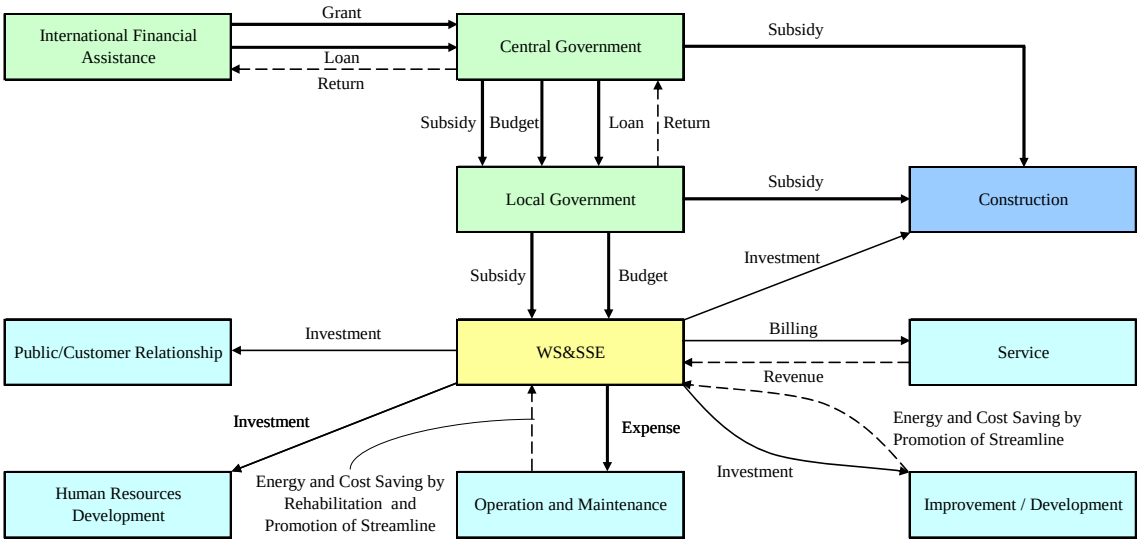


Figure 7.7.1 - Financial Process at Initial Stage

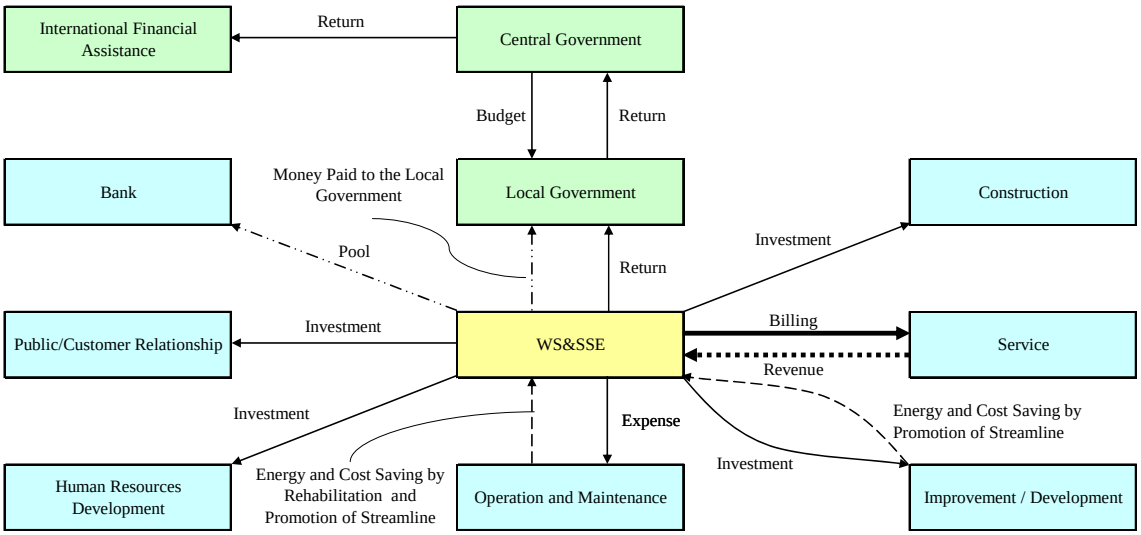


Figure 7.7.2 - Desired Financial Process in Full Cost Recovery

At the initial stage, WS&SSE will need financial support for construction of the sewerage system by the Central Government of Local Government, and will need enough subsidy or budget for the costs for O&M and other expenses from Local Government since that the number of connection to the system will not many and revenue collection will be not much.

The key points to start and operate the system at the initial stage are to receive the enough assistance (financial and technical) for the construction and O&M. And, introduction of the Energy and Cost saving technologies and system in O&M is also one of the effective key points to curb the O&M costs. (E.g. curb the expense for electric charge, chemicals, personnel, etc.)

After expansion of the service area, increasing the number of connections, proper billing and enough revenue collection, WS&SSE will can operate in the condition of full-cost recovery. And WS&SSE may be able to pool some funds in the bank for future development, and may distribute the profit to the Local Government for development or improvement of other infrastructures.

The key points to be sound finance are to secure the service area and customers and to assure the billing and collections. And the most important key section in the structure of WS&SSE will be Customer Service Section.

7.8 Case Studies

(1) Initial Investment Cost

Table 7.8.1 shows initial investment cost for sewerage works, and ratio to unit design influent and actual influent quantity in 15 years. In case of PD PAL Jakarta, existing storm water reservoirs are utilized for aerated lagoon ponds, therefore initial investment cost is quite low and the ratio also is low. In case of PDAM Bandung, treatment plant was freshly constructed therefore the ratio is much higher i.e. 259.2 IDR/m^3. On the other hand, the ratio of actual influent quantity is higher by twice against design influent quantity i.e. 518.5 IDR/m^3. When no large increase of influent quantity is expected, step-by-step construction in proportion to increase of household connection has to be considered. Calculation is not carried out in BLUPAL Denpasar because no connection to stared hotel is progressed yet.

Table 7.8.1 - Initial Investment Cost and Ratio to Unit Design Influent and Actual Influent Quantity

	PD PAL Jakarta	PDAM Bandung
Initial Investment Cost (bill. IDR)	11.86*	113.55*
Cost/Design Influent in 15 years (IDR/m^3)	50.60*	259.20*
Cost/Actual Influent in 15 years (IDR/m^3)	156.80	518.50

* Source: Comparative Study - Centralized Wastewater Treatment Plants in Indonesia, USAID, September 2008

(2) O&M Cost

Table 7.8.2 shows the service charge revenue and O&M cost in the three service providers surveyed. Because the ratios in the table are higher than 1.00, the three providers seem to have favourable financial balance. However the situation is different form each other. In case of PDPAL Jakarta, 29 % of revenue is surplus and is used for investment. On the other hand in case of PDAM Bandung, 60 % of revenue is surplus and financial condition seems to be quite favourable. However according to PDAM, such situation is caused by the use of surplus in water works and O&M cost in sewerage works is short. In PDAM Bandung, 30 % of water charge is collected additionally as sewerage charge however a part of the sewerage charge collected is not used for sewerage works. This must be one of the disadvantages/advantages of combined structure of water works and sewerage works. Therefore finance of sewerage works is key issue whether it should be independent from that of water works or not. In case of BLUPAL Denpasar, all the revenue are consisted of contribution from province and two cities i.e. Denpasar and Badung and all the revenue are used as O&M cost; therefore the surplus ratio in the table is always 0 % until BLUPAL establish the service charge system.

Table 7.8.2 - Service Charge Revenue and O&M Cost in the Three Service Providers

	PDPAL Jakarta	PDAM Bandung	BLUPAL Denpasar
Service Charge Revenue (IDR/year)	24,960,685,664	21,506,644,000	2,493,803,700
O&M Cost (IDR/year)	17,699,829,050	8,623,229,671	2,493,803,700
Surplus Ratio (%)	29	60	0

Table 7.8.3 shows the O&M cost and influent quantity into wastewater treatment plant in the three service providers. O&M cost per wastewater quantity in PDAM Bandung is the minimum in the three providers. It is not mainly because the small distribution of the revenue to sewerage works but because economical oxidation pond is adopted. The facilities and equipment of BLUPAL are very new and don't have many problems, therefore O&M works is not frequently and O&M cost is not much.

Table 7.8.3 - O&M Cost and Influent Wastewater Quantity

	PD PAL Jakarta	PDAM Bandung	BLUPAL Denpasar
O&M Cost (mill. IDR/year)	17,700	8,623	2,494
Influent Quantity (m^3/day)	13,815	~ 40,000	8,000
Ratio of O&M Cost to Annual Influent Quantity (IDR/m^3)	3,510	~ 590	854

Source: PDPAL Jakarta, PDAM Bandung and BLUPAL Denpasar

(3) Idling Rate

Table 7.8.4 shows the idling rate in the treatment plant of the three service providers. High idling rate means low influent quantity comparing to treatment capacity. When the idling rate is high, O&M cost per influent quantity tends to increase because O&M cost can not be vastly reduced even if influent quantity is small. In case of PD PAL Jakarta, because existing storm water reservoirs were converted to aerated lagoon, the idling rate can not be controlled. In case of PDAM Bandung, current idling rate is around 50 % however when west side of the city is connected to service area, it will be reduced to around 20 %. In case of BLUPAL Denpasar, the idling rate is still very high on account of low house connection rate. In order to reduce the idling rate, a part of treatment facilities should be stopped operation.

Table 7.8.4 - Idling Rate in Wastewater Treatment Plants

	PD PAL Jakarta	PDAM Bandung	BLUPAL Denpasar
Design Influent Quantity (m^3/day)	42,768*	80,000	51,000
Actual Influent Quantity (m^3/day)	13,815	~ 40,000	8,000
Idling Rate (%)	68	~ 50	84

*Source: Comparative Study - Centralized Wastewater Treatment Plants in Indonesia, USAID, September 2008

(4) Number of Staff

Table 7.8.5 shows the number of staff, household connections and number of connections per staff in the three providers. 12 connections per staff in PD PAL Jakarta are around 1/30 comparing to that in PDAM Bandung. In case of PD PAL Jakarta, most of the customers are large scale buildings; therefore even though number of connection is only 1,444, influent quantity is as much as 13,815 m^3/day. On the other hand, in case of BLUPAL Denpasar, only a year has passed after the completion of construction of treatment plant and the number of connection is still small; therefore the ratio of connection per staff becomes low. In case of Bandung, most of the customers are domestic household and sewerage works are already in stable condition, therefore the number of connection per staff seems be the most proper in these three service providers. According to the Management Evaluation of Water and Sewerage Works of Kyoto City (2009) as an example in Japan, the number of water meter per staff is 622. In Kyoto city, number of staff in water works and sewerage works is not much different; therefore the ratio i.e. 622 seems to represent the number of connection per staff in sewerage works. Consequently the ratio in Bandung i.e. 713 is not remote from Japanese example.

On the other hand, World Bank recommends the 5 staffs per 1,000 connections (means 200 staffs / connection) as indicator.

Appropriate number of staff differs to financial condition and employment policy of municipality, however it is effective to compare to other providers in same scale.

Table 7.8.5 - Number of Staff and Household Connection

	PD PAL Jakarta	PDAM Bandung	BLUPAL Denpasar
Staff	121	138	69
Household Connection	1,444	98,350	8,647
Connection / Staff	12	713	125
Staff / 1,000 Connections	83.80	1.40	7.98

Source: PDPAL Jakarta, PDAM Bandung and BLUPAL Denpasar

(5) Service Charge Collection

Table 7.8.6 shows service charge collection systems in PD PAL Jakarta and PDAM Bandung. In PD PAL service charge is collected independently because water works is completely privatized. On the other hand in PDAM Bandung service charge is collected together with water charge because sewerage works and water works is implemented under same organization. Service charge collection efficiency shown in the table indicates that efficiency by independent collection is lower than that by together. Therefore accompanied collection with water charge is better for a sound sewerage works management.

Table 7.8.6 - Service Charge Collection Systems

	PD PAL Jakarta	PDAM Bandung
Collection system	Independent	Together with water charge
Collection efficiency	60 to 80 %	80 %

Source: Comparative Study - Centralized Wastewater Treatment Plants in Indonesia, USAID, September 2008

CHAPTER 8

HUMAN RESOURCE

CHAPTER 8 HUMAN RESOURCE

8.1 General

The sewerage service provider should conduct activities of;

(1) Human Resource Management (HRM)
(2) Human Resource Development (HRD)

(1) Need for HRM Policies

HRM policies ensure that everyone is treated fairly and consistency and that their contributions to the success of the Water Supply & Sewerage Service Enterprise (WS&SSE) are appropriately recognised and rewarded. All employees should be fully aware of what is expected of them and what they, in return, should expect from the WS&SSE. HRM policies summarise the organization's responsibility to individuals and their responsibility to the organisation.

The Policies

Detailed HRM policies and procedures will need to be developed and preferably be contained in an "Employee Handbook", which would also require development. The HRM policies/procedures should be readily accessible to all employees and the WS&SSE will need to take responsibility for facilitating understanding through training where appropriate.

(A) Recruitment and Selection

The WS&SSE should have a non discriminatory policy to recruit and promote on merit as well as seniority, regardless of sex, pregnancy, trade union membership, sexual orientation race, disability, age or religion. Wherever possible, experienced employees should have an opportunity to apply for vacancy/promotion opportunities. The WS&SSE will need to clearly defined recruitment and selection procedures/techniques which support this policy, and for training recruiters. All newly appointed employees should be integrated into their new role through a supervised induction programme and therefore be given appropriate support and guidance until they are fully competent to do the job.

(B) Development and Training

Through performance management processes the WS&SSE will aims to ensure that all employees know what is expected of them and possess the necessary skills, knowledge, values and experience to achieve the highest level of performance of which they are capable. Wherever possible, the WS&SSE will undertake to provide development opportunities, such as study for qualifications, secondments, project work and undertaking other challenging roles.

(C) Reward and Motivation

The WS&SSE's aim is to reward with fair and competitive salary and benefit packages. All elements of reward will need to be designed to support the achievement of desired behaviour, values and standards as well as high performance and continuous improvement/development. Reward procedures and mechanisms will need to be accessible and transparent. The WS&SSE will also recognise that pay/benefits are only one element of reward, and that personal development, recognition and celebration of achievement are also equally significant.

(D) Equity, Diversity and Dignity at Work

The WS&SSE's employment policies will need to be based on the principles of equality and

diversity, this being in the belief that the elimination of unfair discrimination in the workplace contributes to productivity and performance as it allows people's talents to be most effectively utilised. The WS&SSE will also need to commit to ensuring the dignity at work and fair treatment of all, and that procedures are in place for resolving any grievance or harassment issue which staff may have in connection with their employment.

(E) Conduct and Capability

The WS&SSE will need to ensure that there is a strong management framework and key principles to support people at work. The purpose of the policy is to allow managers to deal effectively with staff and colleagues when their conduct, performance or attendance falls below acceptable standards. The WS&SSE will need to provide guidance and rules under which people can operate effectively, and through which the organization can ensure compliance with relevant employment laws.

(F) Job Security and Pensions

The WS&SSE will need to provide an equitable pension scheme for all employees. Where individuals are affected by changes to their role or their personal/health circumstances, all reasonable steps are taken to enable them to stay with the organization. This may be through discussing possible solutions to enable them to continue in their role, adjusting working hours/patterns, or helping find a new role within or outside the Authority. As a responsible employer, there will also be a need to have in place policies which support a reasonable work-life balance. The WS&SSE should also aim to implement a "Health and Safety Policy" which will set out the approach to managing "occupational Health and Safety" of all employees.

(G) Communications, Information and Consultation

The WS&SSE should encourage an open and honest culture, and to ensure that all employees are regularly updated with what is happening in all areas of the business, and that consultation takes place as appropriate. Two way and face-to-face communication is essential, giving everyone the opportunity to ask questions and have a voice in decision making. The WS&SSE should also encourage a "no-blame" culture, so that all can have their say without fear of reprisal or discrimination. Accordingly, the WS&SSE will need to put in place channels of communication (direct and indirect) and feedback, as well as making sure that communication is timely and inclusive. The WS&SSE will recognise and work with registered trade unions and put in place appropriate collective bargaining arrangements as necessary.

(2) Need for HRD Method

The management of human resources is integral to business success. People are ate the heart of the organization and effective business, operations and customer services performance is closely linked to having a well-trained and committed work force in place. It is evident that the workforce and management in the WS&SSE are technically competent and capable of delivering the service required, however, there are opportunities for the WS&SSE to capitalise on these inherent skills by introducing more effective systems and strategies.

The WS&SSE will need to improve on their HRD approach in order to "add value" to the training efforts initially provided, by "**professionalizing**" the functioning of the Human Resource Department and by "building" capacity of the staff engaged in delivering HRD and training services. The Human Resource Department will need to be developed to take a more proactive role by providing overall direction and strategy for HRD and training activities and by providing support to "line managers" responsible for the key business processes described earlier. This approach will ensure that line managers take a more active role in staff development issues whilst at the same time ensure that employee needs and expectations are adequately managed.

8.2 Suitable Staffing

As mentioned in Chapter 1, implementation of sewerage works requires many kinds of technologies like civil, mechanics, electricity, chemistry, biology and so on. Therefore suitable staffing of these engineers is an important event for implementing sewerage works. More over, not only engineers but also skilled technicians and workers are required for the works.

8.2.1 Required Human Resources

For implementation of sewerage works, the following kinds of occupation are required;

(1) Mechanics
(2) Electricity
(3) Civil
(4) Chemistry
(5) Biology
(6) Business management
(7) Mechanical and electrical technicians
(8) O&M field workers

Even though sewerage works requires those technologies, it is not easy to assign them all because of shortage of budget and human resources. In such situation, promotion of reciprocal cooperation with staff in different fields is important.

Because sewerage works consumes a lot of energy and budget, its management is extremely significant. Therefore staff regarding business management is helpful.
Skilled technicians and workers are important resources. They should be nourished by continuous trainings.

8.2.2 Employment of Staff

For employment of staff, the following respects have to be considered;

(1) Staffs have to be employed step-by-step in proportion to expansion of sewerage works.
(2) Because sewerage works is usually thought to be impure and unpleasant, salary of staff has to be higher than that of other institution such as water works.

(1) At the beginning of sewerage works, the number of staff necessary for O&M is not many because service area and influent quantity to treatment plant is small. Therefore employment of staff has to be step-by-step in proportion to expansion of the works.

At the first stage of the works, staff for promotion of household connection is required however staff for that work can be reduced in proportion to expansion of service area and increase of household connection rate. Surplus staff can be transferred to O&M of sewer pipes or wastewater treatment plant.

(2) Sewerage works is usually thought to be impure and unpleasant. Therefore it is sometimes necessary for staff to fix a higher salary than that in other institutions to keep staff in the organization. For example, salary for staff in sewerage works in a Middle East country is 80 % higher than that in other institutions like water works.

8.2.3 Qualification of Staff

In order to maintain sufficient quality of sewerage works, O&M of sewerage system should be carried out by qualified staff. The following procedures are adoptable for qualification of staff;

(1) Certification of specific training program of national government
(2) Pass of specific examination of national government

Although no qualification is required for implementing sewerage works in Indonesia now, it is better to make qualification for O&M of sewerage system in order to maintain sufficient quality of sewerage works.

(1) Periodic training programmes on sewerage system designed by national government are efficient for nourishing staff in sewerage service providers. Certification of those trainings might be used for qualification of O&M of sewerage system. Professors or lecturers in universities and professional engineers in advanced organizations are appropriate for trainer. In consideration of required kinds of occupations in sewerage works, training programmes shown in ***Table 8.2.1*** are desirable. Qualification of O&M of sewerage system should be accorded for certificated participants of trainings. JICA Training Centre is a suitable place for these certification trainings however, it is used not only for sewerage works but also for many other subjects. Therefore annual arrangement of training programme in the Centre is required.

(2) In order to promote motivation of staff for O&M in regional sewerage service providers, enforcement of specific examination which is controlled by national government, will be effective. Courses of examination might be based on the training courses. Salary and/or position of passers of the examination should be improved.

Table 8.2.1 - Example of Training Course

Course	Specialty	Level	Target
Planning	Introduction	P	Regional staff
	Practice	IM	Central and Regional staff
Designing	Sewer Pipe 1	P	Regional staff
	Sewer Pipe 2	IM	Central and Regional staff
	Wastewater Treatment Plant 1	P	Regional staff
	Wastewater Treatment Plant 2	IM	Central and Regional staff
Supervision of Construction	Sewer Pipe	IM	Regional graduated staff
	Wastewater Treatment Plant	IM	Regional graduated staff
Operation and Maintenance	Sewer Pipe	P	Regional certificated staff
	Wastewater Treatment Plant 1	P	Regional certificated staff
	Wastewater Treatment Plant 2	IM	Regional graduated staff
	Water Quality Analysis 1	P	Regional graduated staff
	Water Quality Analysis 2	IM	Regional graduated staff
Management	Management	IM	Regional section chief

Note: P: Primary, IM: Intermediate

8.2.4 Trainings

Continuous training for staff is indispensable to development of organizations. Not only technical trainings but also training of safety/hygiene and management is required. Training methods is divided to on-the-job training and training by lectures. Trainings have to be evaluated by both of trainers and trainees and result of evaluation has to be filed with record of training.

8.2.5 Required Trainings

Usually in organizations regarding sewerage works, the following trainings are required to implement.

(1) Safety and Hygiene Training: Shortage of oxygen, Toxic gas, Electricity, Hygiene, etc.
(2) Technical Training: O&M methods, Water quality analysis, etc.
(3) Skill Training: Routine of O&M, Mechanical and electrical works, etc.
(4) Management Training: Finance, Quality management, Risk management, etc.

(1) Safety of offices and sites is one of the most important subjects in sewerage works. There are many spots in sewerage facilities where accidents such as shortage of oxygen, generation of hydrogen sulphide, short circuit of power and infection of diseases might occur. Therefore repetition of training of safety and hygiene is indispensable. The training has to be carried out by section or office at least once a year. For newcomers to section or office, individual training must be implemented. Especially in wastewater treatment plants, pumping stations and maintenance site of sewer pipe, the training has to be taken place on a spot where accidents can occur.

(2) Technical training is taken place in order to polish knowledge and technique of staff. It includes operation and maintenance methods, water quality analysis and mechanism of biological wastewater treatment etc. Basically On-the-Job Training (OJT) is applied for technical training however in case of training of advanced techniques, group training in central or provincial government training Centre is effective. In such training professor, lecturer or professional engineer may act as trainer. In case of instrumental water quality analysis, engineer of manufacturing company is the optimum trainer.

(3) Objective of the skill training is to nourish skilled technicians and workers. Skilled technicians and workers might play vital roles in emergency case. Contents of the training are routine of O&M, directions of tools, Electrical and Mechanical (E&M) works, etc. The training is taken place by OJT.

(4) Management training requires advanced knowledge and experience in sewerage works. Therefore it is recommended to be organized by national government. Target of the training is superior level of section chief in regional service providers. Finance, quality management and risk management etc. is practiced in the training.

Table 8.2.2 shows basic concept of training required for sewerage service providers.

Table 8.2.2 - Basic Concept of Training required for Sewerage Service Providers

Training	Contents	Target	Place	Trainer	Frequency of Lecture
Safety	Shortage of Oxygen, Generation of Hydrogen Sulphide, Short Circuit of Power etc.	Staff in O&M Sites	OJT, Lecture in each Site	Senior Engineers	1/year
Hygiene	Infection of Diseases etc.	Staff in O&M Sites	Lecture in each Site	Hospital Doctor, Emergency Service	1/year
Technical	O&M Methods Water Quality Analysis, Mechanism of Biological Treatment etc.	Engineers	OJT, Lecture in each Site, Other Institutes	Senior Engineers, Specialists, Professors and Lecturers	1 to 2/year
Skill	Routine of O&M, Directions of Tools, Mechanical and Electrical Works etc.	Technicians and Workers in O&M Sites	OJT	Senior Engineers	-----
Management	Finance, Quality Management, Risk Management etc.	Superior level of Section Chief	Lecture in Training Centre	Specialists, Professors and Lecturers	at the appropriate time

8.2.6 Training Methods

Trainings regarding sewerage works are taken place by the following methods;

(1) On-the-job Training (OJT)
(2) Training in Central or Provincial Training Centre
(3) Dispatching Trainee to Other Organizations
(4) Invitation of Trainer
(5) Technology transfer through Overseas On-The-Job Training by visiting similar facilities in developed countries or neighbouring countries

(1) OJT of which senior engineers or technicians act as trainers is the basic method of training. Although OJT can be carried out easily in each office and site, it has to be implemented intentionally and continuously in order to obtain sufficient results.

(2) Trainings in central government or provincial government office and JICA training Centre have been promoted in Indonesia. However trainings regarding sewerage works are limited. In proportion to increase of municipalities where sewerage works are implemented, frequency of the training and numbers of trainee has to be reviewed.

(3) Dispatching trainee to other organization has often been used in Indonesia. Dispatched organizations include other municipalities, universities, national institutions and foreign organizations. This method is effective to enlarge staff's experience however it is the most expensive training method.

(4) Invitation of trainer is effective and cheap training method. Many kinds of specialists can be trainers. For a training of instrumental water quality analysis, engineer of manufacturing company might be the optimum trainer. For safety training, hospital doctors or staff of emergency service might be suitable.

(5) For Indonesian Staff or Government Counterparts for Manager/Head of Directorate/Head of Sub-Directorate (intermediate-high ranking officer) level, capacity development and strengthening for sewerage management are strongly required.

8.3 Capacity Assessment

A capacity assessment is an essential basis for formulation of coherent strategies for capacity development, and an analysis of current capacities against desired future capacities, which generates an understanding of capacity assets and needs of specific entities and individuals within the system, which in turn leads to the formulation of capacity development.

The Human Resources Development Section will assess the capacity of staffs, and the Administrative and Operation Improvement Section will assess the capacity of their organization, and then understand of capacity assets and needs for the formulation of capacity development.

A typical process of capacity assessment is depicted in ***Figure 8.3.1***.

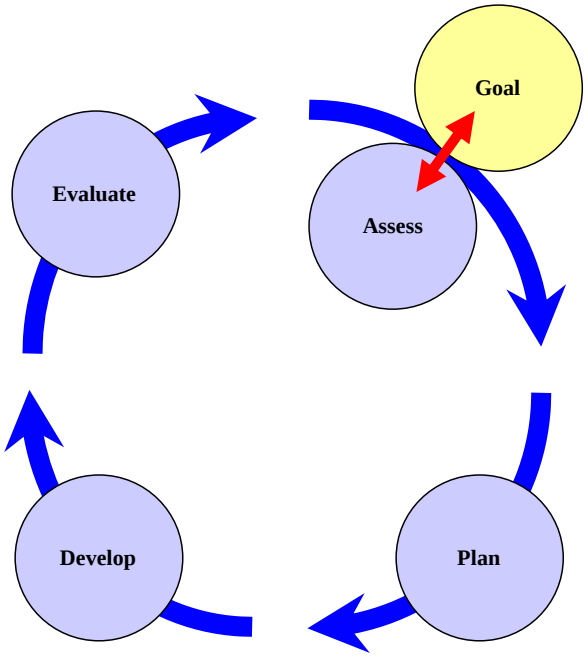


Figure 8.3.1 - Typical Process of Capacity Assessment
Source: Capacity Assessment Handbook by JICA, September 2008

The first step is setting the desired goal, and then analyzes the current condition, after that, implement the capacity development based on plan, and finally evaluates the result. If it was found that the planned results were not achieved as a result of evaluation, same process will be repeated again.

8.4 Capacity Development

8.4.1 General Model for Human Resource Development System

There are four basic assumptions shown as follow:

- HRD planning is not "one-shot" but continuous process. (E.g. planning and management are interrelated)
- An effective HRD education and training delivery system should be responsible to shifts in the specific demands of labour markets at all levels
- HRD should be planned through systematic definition and understanding occupational supply and demand for the sector
- HRD planning necessitates a coordinated interagency approach, involving all the necessary stakeholders

The interchange between education/training and the workplace should be dominated by the need to realize improved productivity in the provision of products or services. ***Figure 8.4.1*** outlines this relationship. Information on the demand for job skills must flow continually from the sewerage sector so that education and training programmes can provide the necessary competencies for a skilled labour force. As new technologies create needs for new or changed occupational skills, appropriate information must be communicated to those responsible for curriculum design and achievement and competency testing so that skills taught are those needed in occupational settings. This information flow is crucial to successful HRD planning.

Effective HRD planning should involve all parties concerned and their separate individual and agency jurisdictions and prerogatives and should recognize the statutory, fiscal, and regulatory environments within which any plans will be implemented.

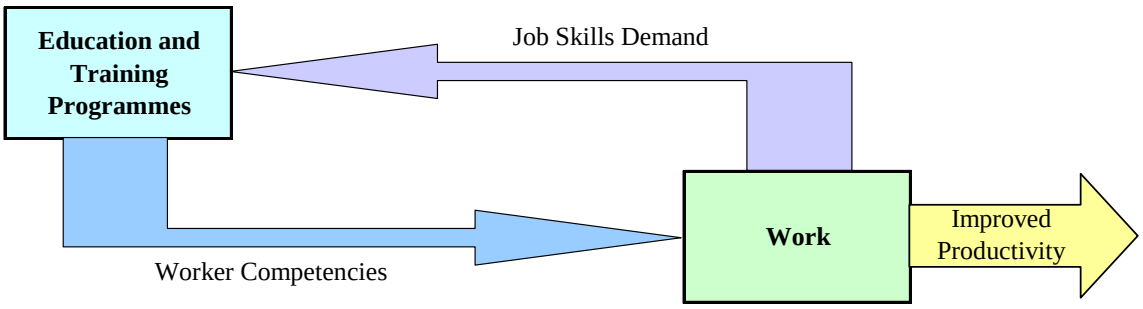


Figure 8.4.1 - Education and Training for Improved Productivity
Source: Human Resource Development Planning: Guidelines for the Water Supply and Sanitation Sector by WASH, 1988

Effective HRD planning should involve all parties concerned and their separate individual and agency jurisdictions and prerogatives and should recognize the statutory, fiscal, and regulatory environments within which any plans will be implemented. Agencies are assumed to act in their own interests and to base actions on anticipated consequences. These adopt a systems approach to HRD planning. ***Figure 8.4.2*** expands ***Figure 8.4.1*** into a general model for a human resource development system in relation to education and training.

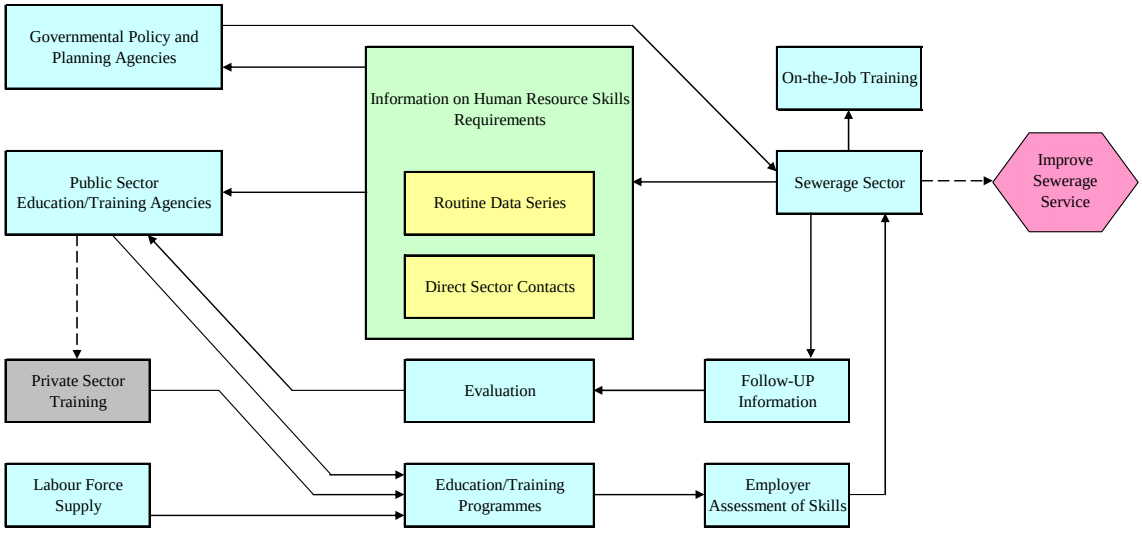


Figure 8.4.2 - Model for Human Resource Development System
Source: Human Resource Development Planning: Guidelines for the Water Supply and Sanitation Sector by WASH, 1988

The model assumes that governmental planning agencies in the sewerage sector interact with other public or private education and training agencies.

Individuals are employed in the sewerage sector after completing training, and their skills are assessed by employers in the sewerage sector. Employers may provide on-the-job training as a means to correct or upgrade skills. Information on employer's needs, in the form of specific skill requirements, can be obtained by agency planners either through routine statistical surveys, periodic needs assessments, or direct contacts with specific employers. Planners can also routinely receive information on educational and training programmes and employ evaluations to determine progress and/or introduce new programmes.

It is this systematic "sensing" of occupational information from the sewerage occupational environment to HRD planners that is the key element of the approach. If it works well, this occupational information system can serve as a kind of institutional "radar", where skilled observers attend to specific signals from relevant labour markets and translate that information into data for management decisions. Routine methods for scanning the occupational environment through periodic employment and skills surveys, for example, seldom exist. Statistical data series are often rudimentary at best. Inadequate information, imperfect linkages between agencies, and uncertainty concerning policy and resource allocation are more often the rule than the exception.

Yet HRD planning, to be successful, requires information which can be used by HRD planners. Where there is little formal organization or structure in the conduct of HRD planning. Where basic occupational information systems exist, the approach should assist in ensuring the provision of data into HRD policy and programmematic decision-making. The model therefore provides conceptual foundation for a systematic approach to the education/training components of human resource development. A summary of the approach describes in next **Section 8.4.2**.

8.4.2 Outline of the Approach

The basic structure of the planning approach is divided into four components as follows:

- Assessing the **context** within related data for sewerage sector
- Estimating **demand** by obtaining estimates of current and projective skill needs by occupation and level of skill
- Determining availability of skilled labour, estimating occupational **supply** by compiling inventory of existing educational and training institutions and programmes, and completing an assessment of their ability to provide the human resources required to meet skill needs and/or correct demand/supply imbalances in the sewerage sector
- Preparing a **plan** for (a) meeting the short-term skills needs of the sector in a cost-effective and timely manner and (b) ensuring the long-term capability for responsive HRD planning in the future.

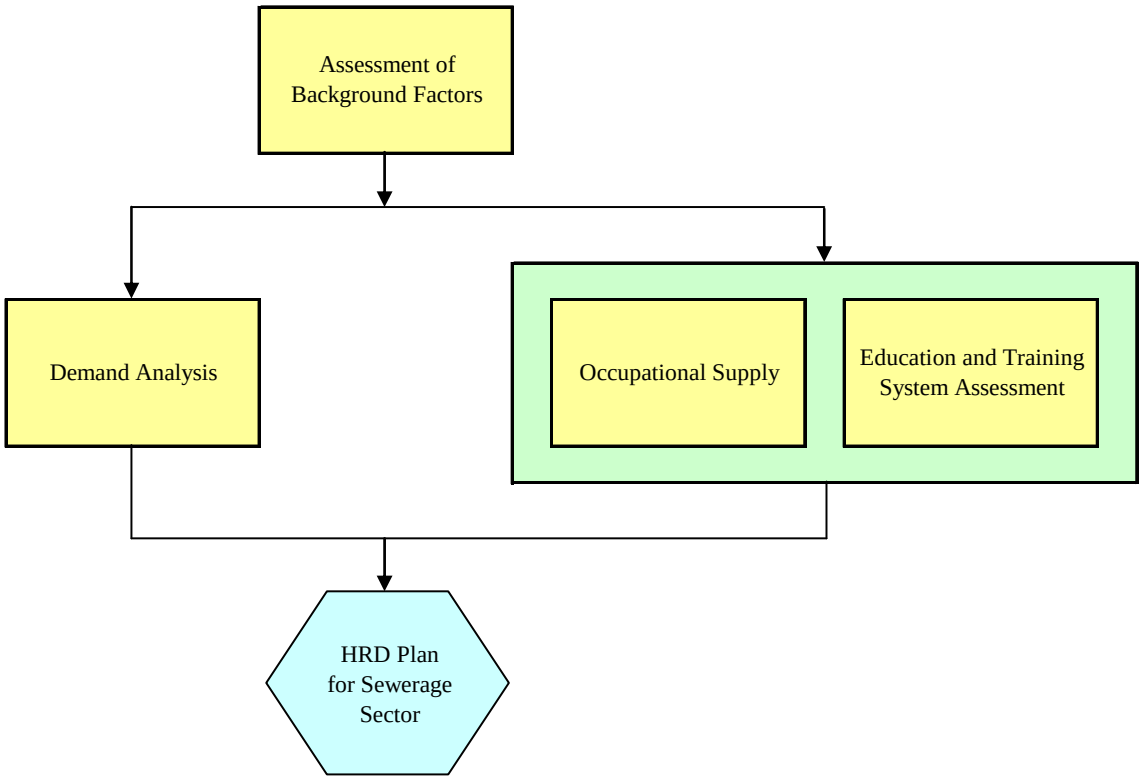


Figure 8.4.3 - The Four Components of the HRD Planning Approach
Source: Human Resource Development Planning: Guidelines for the Water Supply and Sanitation Sector by WASH, 1988

Figure 8.4.3 shows the interrelationships of these four components. The first component involves definition of the purpose and anticipated user of the plan, identification of background factors such as the major ministerial, donor, and other agency involvement in the planning, legislation, and policy statements affecting sewerage operations, and determination of availability of the necessary data to conduct the demand and supply analysis. Some of the activities in this first component can be carried out before project start such as recent sectoral and economic studies, or other relevant documentation.

It is important however that the current and anticipated configuration of ministry and other key agency involvement in planning be well understood prior to the development of HRD plans.

Part of the background factor assessment will therefore need to be done in country, particularly the final identification and meeting with representative stakeholders in sectoral HRD planning.

The second and third components deal with estimating the demand for and supply of skilled labour. Depending upon the availability of data on both occupational supply and demand (determined during the background assessment), the extent of reliance on existing data sources versus primary data gathering must be determined. Resources will limit the analyses to consideration of existing data in most cases. Techniques for collecting new data are included in the guidelines and it will be necessary for the analyses.

Estimate of occupational demand will require assessment of accuracy, coverage and comparability of occupational classifications across agencies, job titles, and descriptions and educational and training requirements for discrete occupations or occupational clusters. In general, the approach consists of assessing available data, identifying and, where possible, reconciling interagency differences in classification and occupational statistics, and preparing tables showing current resources and estimated needs by sub-sector. Extensive review by stakeholders of agency job definitions, skill needs requirements, and current and projected demand will result in revised final tabulations. If appropriate, occupations can then be ranked by such criteria as gross demand, perceived shortages, training time needed to reach proficiency, and how critical the occupations are to sector operations. Occupations so identified and ranked will serve as a guide in the analyses of occupational supply.

The two sub-components in the determination of occupational supply estimation are (1) deriving numerical estimates of available skilled labour for identified occupational needs and (2) assessing the adequacy of the education and training system to equip individuals with the necessary skills. Data on all sources of occupational supply are more difficult to obtain than occupational demand estimates, since occupational supply includes not only the output from educational, training, and other institutions into the labour force but also those currently employed who may be available to change jobs (occupational transfers) or who may enter the labour force form outside regional boundaries. These considerations should be addressed to the extent that data permit and estimates of occupational supply adjusted accordingly.

Assessment of education and training programmes, facilities, staff, and other factors affecting the supply of skilled labour will also be based on existing secondary data sources. For occupations identified as relevant to the sewerage sector, institutional and on-the-job training programmes are identified by training institution agency. Such an inventory not only indicates comparative sources of occupational supply, but also suggests where duplication and overlap is occurring. Comparison of supply estimates with data on occupational demand permits detection of major imbalances and provides empirical evidence of skill shortages. Assessment of education and training system capacity to meet documented demand illustrates directions in which resources need to be targeted.

Above component structure in a series of fifteen steps is illustrated in ***Figure 8.4.4***. Although the steps need not necessarily be conducted in sequential order, each step is comprised of a set of discrete activities which should be completed during the development of the HRD plan.

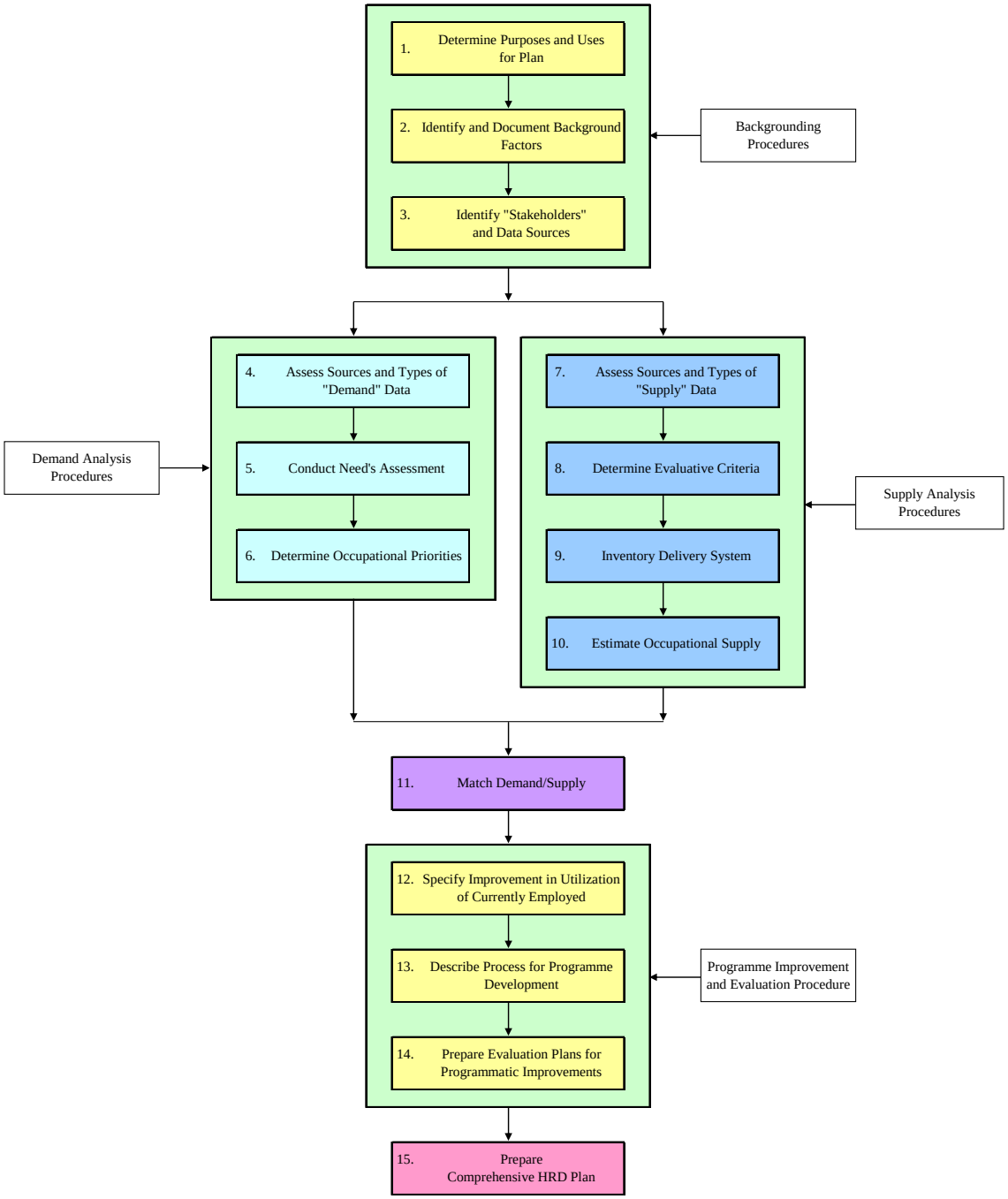


Figure 8.4.4 - Diagram of Steps for Preparing a Comprehensive Human Resource Development Plan
Source: Human Resource Development Planning: Guidelines for the Water Supply and Sanitation Sector by WASH, 1988

The details of Step 1 through 15 will be reviewed and developed in further studies.

8.4.3 Establishment of Training System

In order to implement appropriate human resources development, establishment of the following systems are required.

(1) Training system in organization
(2) Training of trainers
(3) Evaluation system
(4) Modification system

(1) Training system has to be established by recognizing necessity of human resources development in the organization. The system might be established in personnel section. The roles of the system are decision of annual training subjects, decision of trainer, and selection of trainees and preparation of training programme for internal training. For external training, the roles are extraction of training and selection of trainees. Evaluation of trainings has to be also carried out in the system.

(2) What is most important for efficient trainings is the appropriate trainer. Competent engineer is not always a good trainer. Trainer also has to be trained efficiently. If possible, appropriate staff has to be dispatched to special training for trainers.

(3) Evaluation of training is indispensable for valid human resource development. Training methods and subjects are reviewed by the evaluation system and the result of evaluation is reflected to the training programme of next year. Evaluation of capacity development also has to be carried out. Capacity of each trainee has to be evaluated fairly.

(4) Based on the result of evaluation, training methods and subjects are modified and reflected to next programme.

Figure 8.4.5 shows the example of implementation procedure of internal and external training.

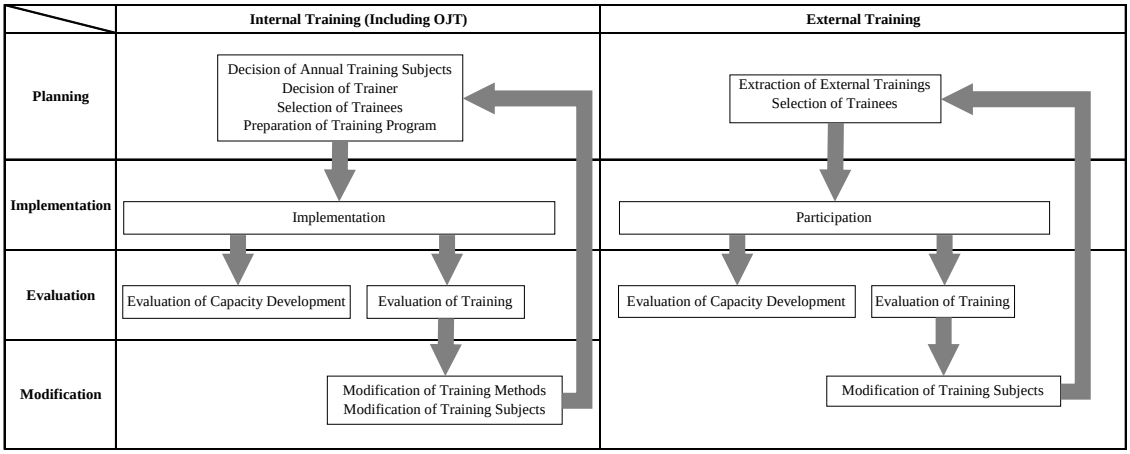


Figure 8.4.5 - Implementation Procedure of Internal and External Trainings

8.5 Case Studies

In order to implement capacity development of staff in service providers, continuous and effective trainings are indispensable. ***Table 8.5.1*** shows the implemented training in the three service providers. PD PAL Jakarta and BLUPAL Denpasar have implemented overseas trainings while no safety training has been carried out. Overseas training is quite effective to promote capacity development of staff at the initial stage of sewerage works, however after commencement of the works ongoing safety and technical trainings which are carried out by OJT or by lecture in the site are much important than overseas training.

There are many perilous spots or unhygienic spots in wastewater treatment plant and pumping station; therefore safety training must be implemented continuously for the staff.

Table 8.5.1 - Implemented Training in the Three Service Providers

	PD PAL Jakarta	PDAM Bandung	BLUPAL Denpasar
Safety	No	Training for operators in wastewater treatment plant was carried out in 2001.	No
Technique	Training supported by ANMC (Asian Network of Metro City) has been carried out in foreign countries.	No	In the DSDP Phase I, several training was carried out in foreign countries and in the cities in Indonesia like Surabaya.
Skill	Training for workers was once carried out by using text book.	Training for operators in wastewater treatment plant was carried out in 2001.	No
Management	No	No	No

CHAPTER 9

COMMUNICATION AND PUBLIC AFFAIR

CHAPTER 9 COMMUNICATION AND PUBLIC AFFAIR

9.1 General

It is important to recognize that public understanding and attitudes regarding sewerage management differ significantly from every other form of infrastructure service. The very question is often subject to a taboo, since people do not want to recognize their individual contributions to waste generation. In addition, the system is one of collection; there is no tangible "product" with witch "value" can be associated. And the infrastructure is almost entirely invisible and therefore suffers from a problem of "out of sight, out of mind". Furthermore people quickly forget problems and discomforts they suffered before an adequate system was established. Besides, it is very difficult to sanction non-payment or non-compliant use of the system. All these factors combined present a formidable challenge to policy and decision-makers, planners and operators. This challenge has to be met both at the inception of the system and throughout the life of the service.

Success of sewerage management programmes depends on effective public communication through information, awareness, and education. A communication process includes advocacy, social mobilization and programme communication, three components that do not necessarily happen consecutively.

Communication for behavioural change is a complicated process of human action, reaction, and interaction. It involves looking at situations from the viewpoint of other people, and understanding what they are seeking. It requires understanding potential obstacles to change, presenting relevant and practical options, and informing people about the impacts of choices they make.

Communication can help to make policy-makers, the private sector, and communities committed to programmes and to prevent expensive mistakes. People must be informed and convinced, or they do not feel part of a process and may not be motivated to change their behaviour. Leaders who initiate, promote, and coordinate activities, contribute much to the success of a programme. Also "champions" like an active neighbourhood or group of families can be a critical component for success.

Figure 9.1.1 describes a strategy for advocacy and raising awareness. It lists the various steps required to mobilize different segments of society to support sustainable sewerage works management.

Stepwise Approach to Advocate and Raise Awareness

1. **Formulate the Overall Vision**
   What should be the result of implementing a sewerage management strategy? This could for example be a call for a clean river, stream or lake, or for clean gutters.

2. **Assess the Current Situation**
   Focus on systems in place for wastewater collection, disposal and treatment. Conduct the assessment through local government staff (citywide or at neighbourhood level) and involve major stakeholders, such as the private sector, community level authorities, and communities. The assessment itself is a powerful tool for raising public awareness.

3. **Conduct Audience Research and Formulate Target Groups**
   Assess among the various segments in society what peoples' needs are, and what knowledge, attitudes and practices exist among them. Then divide all stakeholders into characteristic target groups, each with specific communication requirement for instance policy-makers, sector professionals, local government staff, and communities. Develop clear target group-oriented messages. Messages must relate to present knowledge, attitudes, and practices in order to be effective.

4. **Set Priorities**
   Set realistic priorities, especially for the short-term, which will actually influence decisions of the various segments. Usually local government has to take responsibility for action and play a leading advocating role to involve others.

5. **Find the Right Incentives**
   Find the specific incentives which will best mobilize people to become more involved in the management of sewerage. For each target group incentives may vary considerably. To stimulate active participation, ensure that incentives clearly relate to the target group.

6. **Set Goals and Agree on Verifiable Indicators**
   Reach agreement on specific operational goals that realistic and achievable in the specified period. Involve main stakeholders in setting the goals and in developing and agreeing upon verifiable indicators. Chances of achieving set goals will increase when consensus was reached among the actors.

7. **Build Alliance**
   Identify and mobilize potential partners for political and financial support and for actual implementation. Approach every stakeholder connected with sewerage management, including legislative bodies, industries, professional groups, NGO's religious groups, the media, and communities.

Figure 9.1.1 - Stepwise Approach to Advocate and Raise Awareness
Source: Guidelines on Municipal Sewerage Management by UNEP, 2004

9.2 Public Announcement

The way to communicate with people for announcement on the roles and responsibilities, kinds of services, water qualities, service charges and water conservation etc. are;

(1) Word of mouth
(2) Direct contact
(3) Advertising
(4) Publicity
(5) Identity
(6) Event
(7) Media

Communications and relations with people through communities are advisable to carry out efficient sewerage works in Indonesia.

(1) Word of Mouth

This is how information about a transferred from one person to another, often the most important method of disseminating information. However, if the services are unsatisfactory, word of mouth will damage the reputation of the organization.

(2) Direct Contact

Face to face announcement, door-to-door announcement, phone calls or mailouts and so on, direct contact is also effective. However, high-pressure or too-many contact will also damage the reputation of the organization.

(3) Advertising

Advertising uses mass communication media such as newspapers, television, radio, billboard, web-sites etc. It is less time-intensive; however, it should be conducted professionally and cost.

(4) Publicity

Good publicity is always important to give the information to the people such as organizational profile, journal, poster, guideline, and so on. However, free publication will be cost.

(5) Identity

Logos, images or catchphrases, mascot character are non-verbal form of communication, those will impress your organization to people's mind. However, good or excellent design will be required.

(6) Event

Communication through the events or campaign such as Water Treatment Plant or Wastewater Treatment Plant Excursion, Water Supply & sewerage Exhibition, Water Supply & sewerage Festival, Environmental Seminar, Stop discharging Oil campaign, Water recycle campaign etc. are also good way for announcement of sewerage issues. However, events or campaign will be also cost.

(7) Media

Announcements through Radio, News Paper, Local TV, Internet etc. is also very efficient to make impression to residents, however the announcement through the Medias always costs except Internet. Therefore, it is recommended to utilize the internet as commercial tool with effective information and contents.

9.3 Public Education

Public education is indispensable for public awareness on sewerage works, which in turn may serve to promote household connection and reduce complaint of resident. The following methods are effective for public education;

(1) Education of sanitary and hygiene in school
(2) Education of sanitary and hygiene to cadres of National Movement Organization of Empowerment and Welfare of the Family (PKK)
(3) Invitation to site tour (e.g. SANIMAS sites)
(4) Invitation to treatment site
(5) Publicity by TV, newspaper and poster

(1) Education in school is usually considered to be the most assured method of public awareness although it takes longer time to obtain the outcome. In Japan, for example, ten years old students take lectures about sewerage works in class room and after that they visit treatment plant to see the actual situation. In order to implement efficient education in school education to teachers is indispensable. Text books and lectures for teachers about sewerage works have to be prepared by sewerage service providers.

(2) By giving lectures and simulation of sanitary and hygiene in family or neighbourhoods surrounding areas through Empowerment and Welfare of the Family (PKK) is also efficient method.

(3) In Indonesia, site tours in Community-Based Sanitation (SANIMUS) system have been taken place frequently. Observation of dried and no smell ditches in sewered area might cause well understanding for effect of sewerage system. Lecture about sewerage works after the site tour will promote synergy effect for understanding of visitors.

(4) Visit to wastewater treatment plant is effective way to make residents understand sewerage works. Staff of treatment plant guides the plant from inlet to outlet by showing actual influent and effluent water. What is important to notice is the safety of visitors. The route of guide has to be fixed and safety measures to the route have to be implemented in order to prevent accident.

(5) Publicity of sewerage works by TV, newspaper and poster is commonly used in Indonesia. Such publicity can diffuse the importance of sewerage works widely. Usually it costs much therefore cost evaluation is indispensable.

9.4 Case Studies

As shown in ***Table 9.4.1***, various kind of public communication is carried out in the three service providers. Public communication will encourage customers in understanding of sewerage works, which in turn will make it easy to revise service charge or reduce number of complaints from customers. Because the communication is quite important for proper management of sewerage works, advanced providers are required to guide service providers which are developing their sewerage works.

Table 9.4.1 - Public Communication in Indonesia

PD PAL Jakarta	➢ Promotion of house connection for future service area has been carried out. No public communication program for existing sewered area is implemented.
PDAM Bandung	➢ Presentation of information about sewerage works is carried out by staff of PDAM in communities. ➢ Public communication by TV and radio has been implemented. ➢ Site visit to wastewater treatment plant which is not only for primary school students but also for university students is carried out 20 to 30 times a year.
BLUPAL Denpasar	➢ Public communication by using TV, radio and newspaper has been carried out. ➢ Door-to-door promotion of house connection is implemented by staff of Consultant Company in DSDP. ➢ Around 10 schools visit wastewater treatment plant in a year. ➢ Staff of Consultant Company shows the plant for them. After the completion of DSDP-II in 2014, staff of BLUPAL will guide the plant for students.

CHAPTER 10

CUSTOMER SERVICE

CHAPTER 10 CUSTOMER SERVICE

10.1 General

The WS&SSE should have a clear customer mandate describing the level of service to be provided and responsibilities of customers to pay bills, settle arrears and to comply with regulations with respect to illegal connections or improper disposal, tampering with providers, etc.

The WS&SSE should conduct customer survey and develop the database to ensure that all customers who connected the wastewater collection system are registered on the billing database. Whilst there is evidence of illegal connections and improper disposal of domestic wastewater on a large scale, audits are not systematically. Opinion surveys are not used to improve service shortfalls.

The monthly billing is advisable. In an attempt to increase revenues, current bills include a portion of outstanding arrears and an interest charge for outstanding debt. This is a good approach to revenue management as monthly billing makes the charges more affordable and allows customers to budget their outgoings; however, it remains to be seen to what extent this approach has on reducing receivable and improving collection rate.

The WS&SSE must have “Customer Service Strategy” or service policy in place. Consequently, customer service practices and standards vary within and across Regions and are highly dependent on local management attitudes towards customer service provision. The WS&SSE will therefore need to consider introduction of a strategy that clearly details the organisation’s strategic intent with regard to customer services. This should state short and long term service aspirations and service standards to be applied across the customer base.

10.2 Structure and Function

10.2.1 Effective Provision and Management of Customer Services

Effective provision of customer services will require that the WS&SSE is organised in such a way that focuses on service delivery. Viewed as a "key process", customer services will be an "enabler" to business success through integration with other key corporate processes such as operations and other support activities including finance, systems, Human Resource Management (HRM), strategic and business planning etc. ***Figure 10.2.1*** depicts holistic approach of customer services.

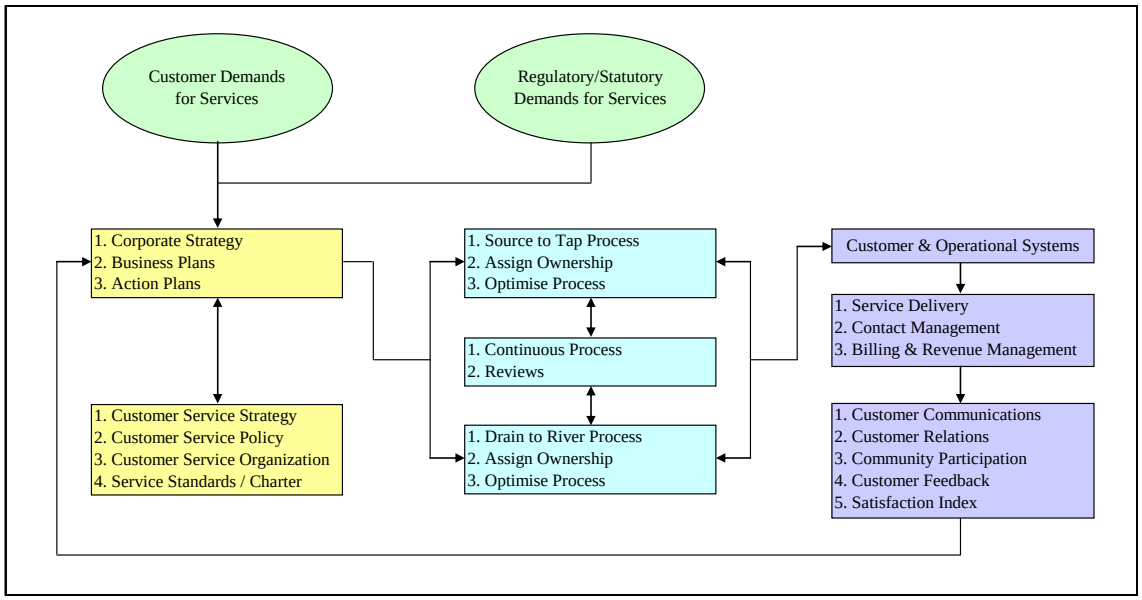


Figure 10.2.1 - Customer Model
Source: The Study on Water Supply and Sewerage System in Karachi in Pakistan (DF/R). NSC under JICA, May 2008

Control of revenue stream is vital to long-term financial sustainability and proper, responsible control of revenue through accurate metering and billing followed by responsive collection will ensure that the WS&SSE's financial position is sufficiently healthy to sustain growth and investment in future. In addition, timely response to customer service inquiries and requests (as well as complaints handling) is essential in building public confidence and support of the utility's management.

In order to highlight the importance of "Customer Services" and ensure that it receives the highest priority across the business, the WS&SSE will need to consider implementing a "Customer Focus Programme". The programme would be designed to focus on all "customer facing activities" including contact management, billing and revenue collection as well as customer and community relations.

This programme will need to detail the agreed service standards to be applied by the WS&SSE (built around customer needs and values) and should seek to integrate the functional and process areas as shown in ***Figure 10.2.2***. A fundamental part of this programme involves consulting with customers to ensure they are provided with the opportunity for feedback and a say in how services are provided.

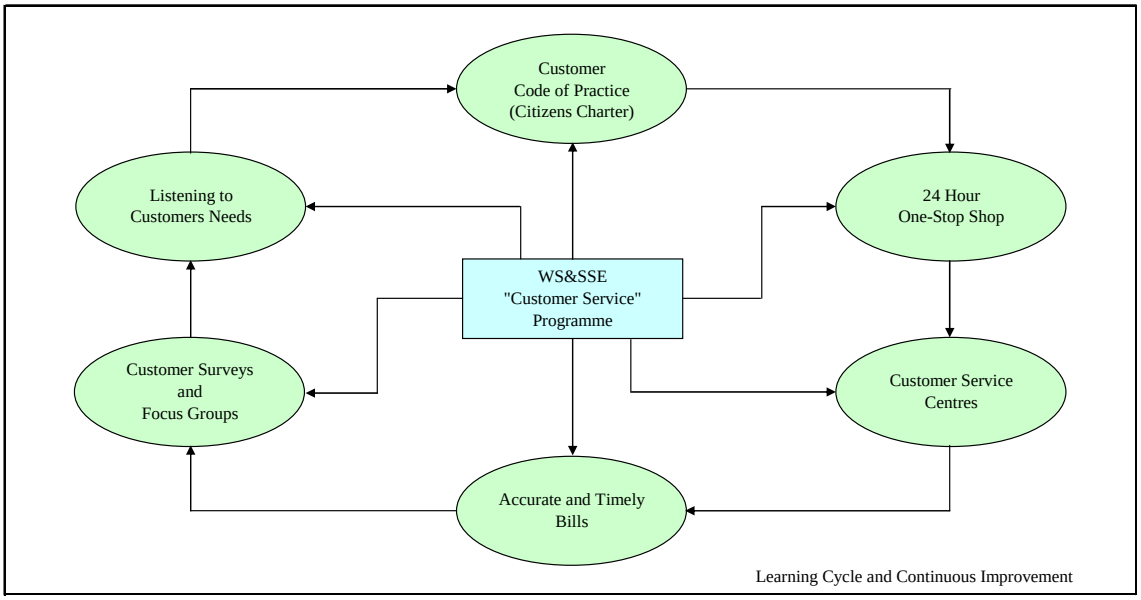


Figure 10.2.2 - Customer Focus Programme
Source: The Study on Water Supply and Sewerage System in Karachi in Pakistan (DF/R). NSC under JICA, May 2008

10.2.2 Organization Design

The WS&SSE should recognize that staff has key to their success and that creating the right culture is fundamental to delivering excellent service. In this respect, customer service training should be provided to all staff. Recruiting, developing, and retaining the right people with the skills and behaviours to deliver excellent customer service will also be an essential part of enhancing customer satisfaction. A customer culture, vision and values will need to be developed that is visible in the work environment. Staff will need to be supported with quality procedures and the "tools to do the job".

Organizational Model

The sewerage service provider's goal will be to provide a seamless service "to protect public health, environment and water resources". This can be achieved by centralising the key customer processes, managed at "the Centre" without losing sight of the importance of local service provision within the regions. The sewerage service provider should therefore maintain a network of regional Customer Service Centres with clear accountability to the Centre. The key functions at the Centre are listed as follows;

(1) Customer Relations
(2) Revenue management
(3) Performance and Planning

The key functions at the Centre would be as follows:

(1) Customer Relations - call Centre, special accounts, customer correspondence, and complaints management,
(2) Revenue management - account administration, planning and coordination of meter reading, bill review and adjustment, payment processing, credit management, legal, contract management, and revenue maximization,
(3) Performance and Planning - analysis of management information, performance management reporting, business plan development, monitoring of business plan delivery, coordination and communication of change activity,

The Customer Service Centre should offer local customer contact and payment (possible to pay for water bill or as with water bills) facilities; although much of this activity will be centralized over time as business processes and customer behaviours change.

10.2.3 Commercial and Customer Contact System

The sewerage service provider should conduct customer database management, bill printing and some contact management (complaints handling) activities. In order to maintain "ownership" of customer data, the sewerage service provider should ensure that customer systems are developed that ensure sound financial performance whilst at the same time provide staff with the information they need to provide excellent service. This will require the continued development of the systems to ensure full integration of customer related activities that will provide staff with reliable, efficient, and instantaneous access to customer accounts, water system status, and other resources for ensuring customer satisfaction. The main activities for the managements on customer services are;

(1) Revenue Management
(2) Contact Management

(1) Revenue Management

Whilst a part of the bill collection services are being conducted by water supply service providers, the WS&SSE will want to ensure that customers are provided with clear, accurate billing and collection in the most efficient and cost-effective way available. As such the WS&SSE will need to ensure that existing water supply service provision arrangements are closely monitored in accordance with the contract to ensure compliance with performance standards.

1) Billing

The billing system is one of the key businesses as it covers the process from metering through to collection, and provides supporting information on previous queries, details of payment history etc. The WS&SSE will want to ensure that data held within is both accurate and up-to-date so as to facilitate correct billing and therefore should ensure that:

- The database which is used for billing for sewerage service charge is advisable to be combined in the database of water supply service provider.
- Any changes to billing practices are introduced in a controlled, progressive manner with a clear plan of action with regard to communication and training to ensure that employees and customers alike are aware of new and/or amended policies and procedure.
- Clear. Concise bills that are easy to read and understand are designed with customer input to help reduce customer inquiries/complaints and prevent delays in bill payment.
- "Right First Time" bills are produced, minimizing cancellations and unnecessary customer contacts thereby reducing the need for debt recovery.
- Procedures to ensure that changes of property ownership are completed with both ends of the chain captured to verify dates of ownership to minimize the "moved in yesterday" syndrome.
- Fieldwork turn-around times are managed to minimize accounts awaiting work completion.
- Key Account Liaison staff monitor high-volume commercial account, and other key accounts, and provide personalised services to these customers; focussing on additional revenue generation.

2) Revenue Collection

The WS&SSE will want to maximise revenues at optimum cost. This will require development of a robust credit management policy and procedures which are clearly documented and communicated to all employees and customers, and which are applied without exception.

The WS&SSE (through bill collection by the water supply service provider) will want to ensure:

- A pro-active approach to collection by activity chases outstanding debt.
- Prioritised actions and interventions are taken based on materiality (e.g. bill value).
- All collection activities are carried out in a fair and reasonable manner.
- Flexible payment term is offered to those less able to pay.
- Introduction of new payment options which will become benefit to both customers and providers.
- Bill payment strategies that activity promotes cost-effective and convenient payment methods, such as automated bank drafts, payment at ATM's etc.
- Customer payments are proceed and deposited without unnecessary delay.
- The Call Centre and the Customer Service Centre will provide one of the main opportunities for influencing customer behaviour are provided with scripts and processes to ensure opportunities for managing credit risk are handled on a consistent basis.

(2) Contact Management

The WS&SSE will target to provide customers with a courteous, informed, and prompt response to their enquiries. The resolution of customer's problems at first contact will be a key to achieving this objective and will require that staff (through water supply service provider) have the proper tools, training, and management systems and programmes to help them serve customers.

Customer-facing staff should have rapid access to all information necessary to resolve enquiries in a timely fashion, and to the complete satisfaction of the customer wherever possible. All customer contacts should be logged to ensure that a complete record of contacts is available for future reference and analysis. Customer Service staff should work closely with Field Service personnel across the entire operational area to enable customer's problems to be investigated and rectified promptly.

Contact management training can be provided effectively through developing and introducing a reference or training manual. The manual would contain all relevant procedures, details of policies relating to billing and collection/operational matters, and also key facts sheets with information about subjects such as water quality, wastewater quality, current rates, water conservation, as well as answers to frequently asked questions. The manual should be regularly updated and supplemented with daily briefings on planned water supply interruptions construction projects, or other activities that could impact customers. This will be provided as an "electronic bulletin board" on the application in the Call Centre.

1) Complaints Management

The WS&SSE will need to adopt a focused, pro-active approach to complaints handling. To ensure that procedures are followed, timescales are met, and that standards of response are satisfactory, responsibility for complaint management should be assigned to dedicated teams who are trained to handle, track, progress chase, and monitor complaints.

All complaints should be recorded and coded as such to allow accurate information to be produced about the volume and nature of complaints received, and about response times to resolve them. This information should be used for the purposes of monitoring performance against the agreed standards and also for identifying trends in complaint volume/types.

2) Customer Service Centres

The WS&SSE should push ahead with the strategy to introduce "Customer Service Centre". The customer service centre should provide customers with the opportunity to interact with the WS&SSE face-to-face, and in this way will play a role within customers as information and service providers.

Customers should be able to visit the Customer Service Centre to set up contract for water/sewerage services, pay their bills, resolve any questions about their accounts, request technical assistance, register complaints, and pick up information leaflets.

3) Call Centres

The WS&SSE will need to consider a number of call centre options available to them. Best practice suggests a single call centre acting as a "single point of contract" on a 24-hour, 365-day basis is most effective for the consistent handling of both routine and emergency contacts. However, this requires major investment in and integration of systems. For ease of contact, there will be just one Customer Service telephone number that would be publicised widely.

Robust communication links supported by efficient and effective systems will need to be developed to facilitate the "one-stop shop" concept and to ensure that, as far as possible, customers experience a seamless service.

Customers will be able to contact the Call Centre to query and settle bills, make payment arrangements, and secure connection or termination of services. They will also be able to report operational problems and request advice or assistance on technical matters.

4) Customer Correspondence

Customers should be able to contact with the WS&SSE by letter, fax, and email, with all correspondence logged on the system. The WS&SSE may wish to consider establishing a Customer Correspondence Team to ensure that incoming customer services mail is correctly sorted, logged, and distributed. Where appropriate they will investigate and respond to customer enquiries and complaints direct. If investigation or action is required by other departments, the correspondence team will track and monitor progress to ensure a prompt and full response to the customer. A key part of the Customer Correspondence Team's activity will be to monitor and analyse customer correspondence on a regular basis to identify and eliminate problems, highlight potential areas for improvement, and reduce unnecessary contracts.

10.2.4 Customer Relations

The WS&SSE will need to develop a "Communication Strategy" that addressed the need to provide customers with clear concise information about services, for example; routine day to day operational information such as advance notification of interruptions of water supply, sewerage flooding or public education information, such as advice on water conservation.

The strategy may include the development of a range of customer information leaflets available at the Customer Service Centre or distributed with the bills as part of specific awareness campaigns focusing on topical issues. For example; an annual or semi-annual customer

newsletter could be used to provide information about the WS&SSE's progress, about new services, an about forthcoming events. It could also contain articles on water and sanitation related topics, such as advice about water conservation, water hygiene practices etc.

With the view of improving awareness and company image, the WS&SSE could also consider a regular programme of "open services", "road shows", talks and presentations to the general public, community groups and businesses. Additionally as par to the WS&SSE's website strategy, customers should be able to obtain basic billing and operational information, for example, a guide to rate, what to do if you spot a leak, advice on saving water, etc.

(1) Interruption to Service

On occasions interruptions to services will be necessary to allow improvements to the network. The WS&SSE should aim to provide customers with a minimum of 24 to 48 hours notice of any planned interruption to the service. In the event of unplanned interruptions; as a result of pump break down for example, the WS&SSE should aim to inform customers and relevant stakeholders as soon as possible of the loss of service and advise them on when service will be restored. This notification could take any of the following forms depending on the extent of the problem and the number of customers affected: hand-delivered notice, verbal notice from Field Service personnel, loud-hailed message, and radio broadcast etc.

(2) Public Education and Outreach Programme

The cornerstone of the "Communication Strategy" should be a "Public Outreach Programme" that would focus on the following four main areas of interest:

- **Role and Responsibilities of the WS&SSE**: what services are provided, process involved in supplying portable water, wastewater collection and treating wastewater, cost of providing water and sewerage services and standards to be met in terms of service delivery, water resource, etc.
- **Customer Service/Billing and Collection**: how to enquire or complain, what are the current rates, how is the bill calculated, how are meter read in water supply services, what payment methods/payment plans are available, what happens if you don't pay, etc.
- **Water Quality**: how safe is the water to drink, how can you prevent contamination of the supply, how can you prevent make impact to water body and environment, how to get the quality tested. Etc.
- **Water Conservation**: why conserve water (health, financial and environmental benefits), how to save water in the home, water management in buildings (urinal controls, cistern displacement devices, grey water recycling in schools, offices, etc.)

(3) Customer Feedback and Consultation

The WS&SSE will want to maximize the use of customer feedback and consult with customers about current and future standard of service. In this way the WS&SSE would be able to monitor actual performance, measure the effectiveness of activities implemented, and anticipate future requirements. In addition, consulting with customers will help the WS&SSE to establish a direct relationship with customers and to demonstrate that customers' opinions are valued. Not all customers have the same level of expectations and requirements. Customer surveys will help the WS&SSE to identify and prioritise the elements and levels of service required by different customer types.

The WS&SSE may want to consider establishing "Regional Customer Advisory Councils" composed of a cross section of the customer base. Establishing an ongoing dialogue with customers will be of benefit and the creation of Regional Customer Advisory Councils will provide useful forum for sharing information and ideas, create an atmosphere of openness, and

ensure that the WS&SSE remain focused on customer issues.

The Regional Customer Advisory Councils would be made up of volunteer customers who would meet with the WS&SSE representatives on a regular basis to discuss customer-related issues/initiatives. For example, the councils could review new/revised customer literature, advise on proposed service improvements, provide a customer perspective on future legislative or policy changes, etc. Working in partnership with different sectors of the community in this way will undoubtedly help the WS&SSE to identify how they can offer further assistance or respond more appropriately to their needs, thereby enhancing customer satisfaction.

The WS&SSE may also wish to consider introducing customer suggestion boxes that will be posted at the Customer Service Centre. Similarly an electronic suggestion box could be linked to the WS&SSE website so that those customers with access to the Internet could email their suggestions for service improvement.

10.3 Customer Service System

The Customer Service Centres and Call Centres are closely related, and three important functions assumed by these Centres are: (1) Finance (2) Information (3) Communication, and are depicted in ***Figure 10.3.1***

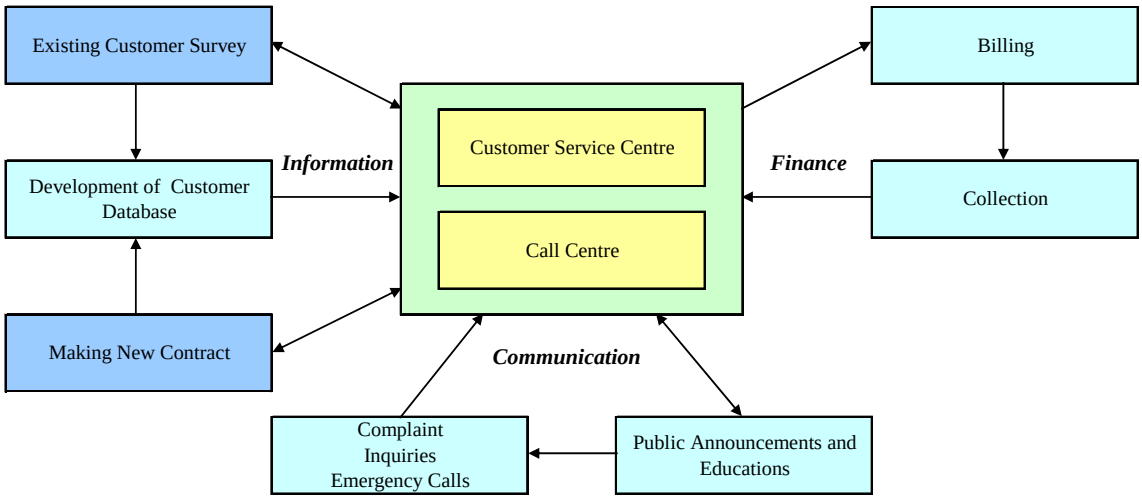


Figure 10.3.1 - Functions of Customer Service Centres and Call Centres

10.4 Case Studies

As shown in ***Table 10.4.1***, the service providers surveyed have their own customer service system. In case of PD PAL Jakarta, head office manages customer service instead of establishing customer service centre because the service area is quite small. In case of PDAM Bandung not only customer service section in head office but also branch of the section established in each district manage customer service because the service area is already large. In case of BLUPAL Denpasar, there are two customer service centres. One is organized by DSDP which is in charge of construction project and the other is organized by BLUPAL which is in charge of O/M. After the completion of DSDP-II in 2014, the centre of DSDP will be integrated into that of BLUPAL. The number of customer service centre required depends on the scale of municipalities and is better to increase in proportion to expansion of service area.
The three service providers adopt round-the-clock call centre in their head office for inquiries from customers.

Table 10.4.1 - Customer Service in the Three Service Providers

	PD PAL Jakarta	PDAM Bandung	BLUPAL Denpasar
Service Centre	No, because service area is small.	Customer service section is in PDAM. Branch offices of customer service section are in each district.	Currently one is in BLUPAL and one is in DSDP. After completion of DSDP Phase II in 2014, service centre of DSDP will be merged with BLUPAL one.
Call Centre	24 hr service	24 hr service	24 hr service

CHAPTER 11

QUALITY MANAGEMENT

CHAPTER 11 QUALITY MANAGEMENT

11.1 General

Sewerage systems are built and operated mainly to protect public health and the environment. The Type of sewerage system needs to be chosen and adapted in context with the density of the population, climatic conditions, environmental requirements for treatment and the technical/socio-economical ability of the responsible body to implement it, operate it and maintain it. It needs to be cost effective and sustainable, as well as permitting phased development to overcome the financial constraints while not compromising the stated objectives.

Operationally, the service providers' objectives of a utility are to provide wastewater collection services on a continuous or at least intermittent basis (depend on the service mechanism chosen), meeting the related capacity requirements. Methods of wastewater treatment and/or disposal need to correspond to the chosen collection system.

Appropriately treated sewerage is eventually returned to the environment and can have significant impact on both quantity and quality of natural water resources.

Effective and safe management of residues resulting from wastewater treatment, including their final disposal or reuse, is becoming increasingly important due to concerns about both environmental protection and resource conservation.

Sewerage infrastructure needs to demonstrate intergenerational equity, since it often has a lifetime stretching over several human generations. Consequently, a sewerage utility, regardless of ownership, is public in nature and will be subject to public scrutiny and policy.

11.2 Quality Management System

The organization will conduct;

(1) Water Quality Management
(2) Organizational Quality Management
(3) Quality Management for Construction

(1) Water Quality Management

For the water quality, the Water Quality Control Section in association with Technical Quality Management Division, Laboratory, and Human Resources Management Division etc. will control the effluent quality through operation of the treatment plants. The water samplings at several points in the river, channel, manholes, and treatment plants are taken by Laboratory staff and analyzed on routine basis, results of analysis will be submitted to Water Quality Control Section, and the Water Quality Control Section will evaluate it, and prepare and submit the monthly report to the Local Environment Management Agencies. The Local Environment Management Agencies monitors and evaluates water quality management by WS&SSE. The system of water quality management is shown in ***Figure 11.2.1***.

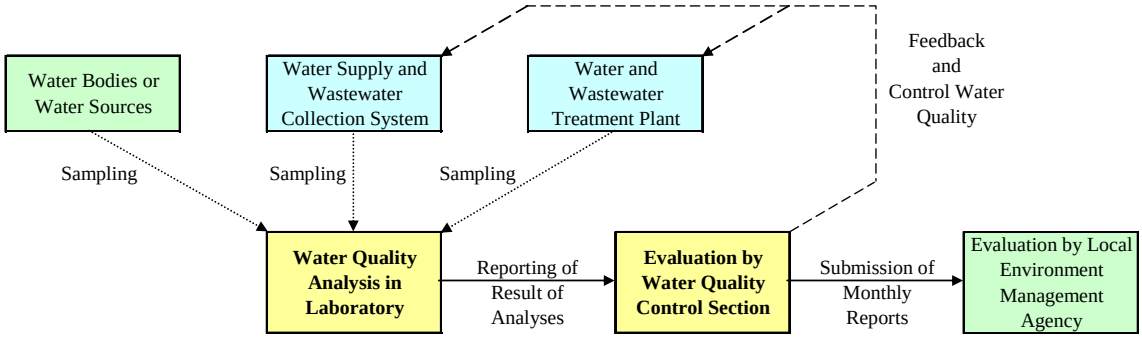


Figure 11.2.1 - Water Quality Management System

(2) Organizational Quality Management

For the management organization, Organizational Quality Management Section will control the quality based on Quality Management System (QMS) by ISO9001 & ISO 9004 with Environmental Management System (EMS) by ISO14001 & ISO14004 and ISO/TC224 for Service Activities relating to Drinking Water Supply and sewerage as the Guideline. The Summary of ISO9001, 9004, 14001, 14004 and TC224 are shown below:

ISO9001

ISO 9001 is an international standard that gives requirements for an organization's Quality Management System (QMS)

ISO 9001 is an international standard that gives requirements for an organization's Quality Management System (QMS). It is part of a family of standards published by the International Organisation for Standardisation (ISO) often referred to collectively as the "ISO 9000 series". For this reason, you may sometimes hear your suppliers refer to being "ISO 9000 certified", or having an "ISO 9000-compliant QMS". This will normally mean that they are claiming to have a QMS meeting the requirements of ISO 9001, the only standard in the ISO 9000 family that can be used for the purpose of conformity assessment.

The objective of ISO 9001 is to provide a set of requirements that, if they are effectively implemented, will provide you with confidence that your supplier can consistently provide services that:

- To meet your needs and expectations and
- To comply with applicable regulations

ISO9004

ISO 9004:2009 provides guidance to organizations to support the achievement of sustained success by a quality management approach. It is applicable to any organization, regardless of size, type and activity. ISO 9004:2009 is not intended for certification, regulatory or contractual use.

ISO14001

The ISO 14000 family addresses "Environmental Management". This means what the organization does to:

- To minimize harmful effects on the environment caused by its activities, and to
- To achieve continual improvement of its environmental performance.

ISO 14001 specifies the requirements for such an environmental management system. Fulfilling these requirements demands objective evidence which can be audited to demonstrate that the environmental management system is operating effectively in conformity to the standard.

ISO 14001 is a tool that can be used to meet internal objectives:

- To provide assurance to management that it is in control of the organizational processes and activities having an impact on the environment
- To assure employees that they are working for an environmentally responsible organization.
- ISO 14001 can also be used to meet external objectives:
- To provide assurance on environmental issues to external stakeholders - such as customers, the community and regulatory agencies
- To comply with environmental regulations
- To support the organization's claims and communication about its own environmental policies, plans and actions
- To provide a framework for demonstrating conformity via suppliers' declarations of conformity, assessment of conformity by an external stakeholder - such as a business client - and for certification of conformity by an independent certification body.

ISO14004
ISO 14004:2004 provides guidelines on the elements of an environmental management system and its implementation, and discusses principal issues involved.

ISO/TC224
ISO/TC224 reveals indicators which have to be taken into consideration for implementing water and sewerage works in order to provide efficient and high quality management.

Although many Performance Indicators (PIs) are provided in O&M, user service, management and environment, PIs which are adoptable might be sufficient at the beginning of the sewerage works. For example, the following PIs are useful to evaluate the quality of the works:

* O&M cost per user (IDR/capita)
* Maintenance cost of sewer pipe per meter (IDR/meter)
* Power consumption in wastewater treatment plant per unit wastewater (kWh/m^3)
* Revenue per staff (IDR/staff)
* Charged wastewater ratio (%)
* Rate of obedience to effluent standards (%)
* Number of complaint per unit population

Those standards and systems below shown will be applied to the quality management system, and a typical organizational quality management process is shown in ***Figure 11.2.2***.

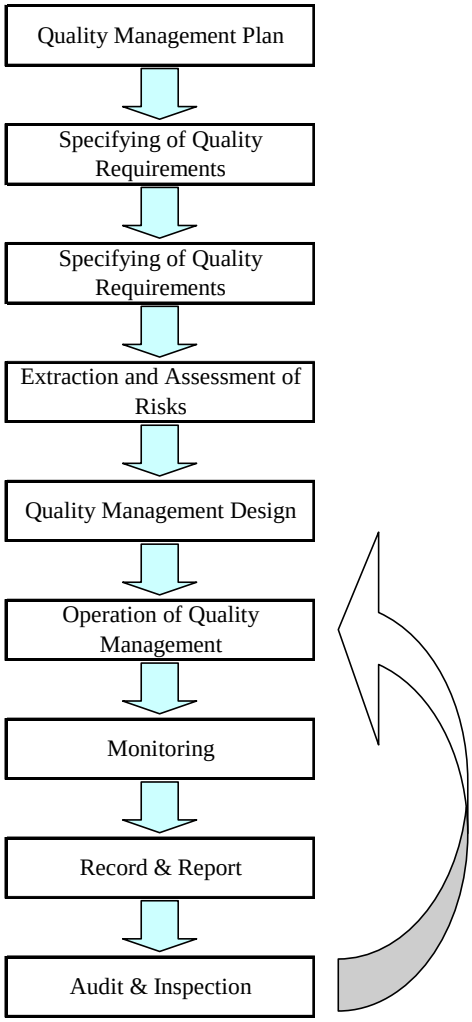


Figure 11.2.2 - Typical Organizational Quality Management Process

(3) Quality Management for Construction

The Supervision and Technical File Section in association with Technical Review Section and Risk Management Section etc. will manage the qualities in constructions.

11.3 Case Studies

As shown in ***Table 11.3.1***, effluent water quality management which is one of the most important quality management parameters in sewerage works is carried out in the three service providers surveyed as a quality management. Each provider has managed effluent quality against the effluent standard and no target quality is fixed. Water quality management by obedience to the target quality is desirable in order to promote economical O/M.

Not only water quality management but also quality management in construction, repair and O/M are also required for implementing sewerage works. Establishing quality standard for claim management or repair in wastewater treatment plant will be useful.

Table 11.3.1- Quality Management in the Three Service Providers

	PD PAL Jakarta	**PDAM Bandung**	**BLUPAL Denpasar**
Quality Management	Effluent water quality management is carried out however no other quality management is carried out.		

CHAPTER 12

RISK MANAGEMENT

CHAPTER 12 RISK MANAGEMENT

12.1 General

All managements entail a variety of risks - small and some large. When operate the sewerage service, full consideration has to be given to the categories and extent of risks involved in the management, and how to avoid them.

Risk management in a management is likely to include the followings:

- Identification of risks involved
- Evaluation of the impact of risks, if and when they materialize
- Minimization of risk
- Dispersion and apportionment of risks that cannot be avoided

12.2 Extraction of Risk and Risk Management Planning

The risks in the management of sewerage services are categorized as follows:

(1) Risks in planning, design and construction phases
(2) Risks in O&M
(3) Economic and financial risks
(4) Indirect risks

The types of risk that are likely to be involved include the following:

- Risks Related to Technology (Planning, Design and Construction)
- Financial Risks in O&M
- Risk Related to Demand for the Service Provided
- Risk Related to Earning
- Macroeconomic Risk
- Risks in Financial Affairs
- Unavoidable Risk (Natural Disasters, etc.)
- Legal Risk
- Others

Those risks are can be categorized as follows:

(1) Risks in Planning, Design and Construction Phases: Risk related to technology, etc.
(2) Risks in O&M: Financial risks in O&M, risk related to demand for the service provided, risk related to earnings, etc.
(3) Economic and Financial Risks: Macroeconomic risk, risks in financial affairs, etc.
(4) Indirect Risks: Unavoidable risk, legal risk, etc.

Table 12.2.1 shows minimization and apportionment of categorized typical risks.

Table 12.2.1 - Minimization and Apportionment of Typical Risk (1/2)

Category of Risk		Measures to Minimize Risk	Parties Bearing Risk
In Panning, Design and Construction			
Cost Overruns		Receive sufficient financial assistance, select operator with proven record	Service Provider, Local Government, Consultant or Contractor
Schedule Overruns		Same as above	Service Provider, Local Government, Consultant or Contractor
Design	Innovation	Same as above	Consultant
	Technical/Technological Control	Technological Solutions	Consultant
Project Completion	Quality of the Work	Receive sufficient financial assistance, select operator with proven record	Consultant and Contractor
	Interfacing/Subcontracting	Select a flexible independent operator	Contractor
Unforeseeable Events	Geology	Implement the preliminary design survey	Service Provider, Local Government, Consultant
	Climatic/Weather Conditions	Allow float days	Service Provider, Local Government, Consultant or Contractor
In Operation and Maintenance			
Volume	Divergence from Project Demand	Verify initial data	Service Provider, Local Government, Consultant
	Price Elasticity	Conduct preliminary study	Service Provider, Local Government, Consultant
	Increased Demand	Verify assumptions	Service Provider, Local Government, Consultant
Price	Charge Exceed Level Allowed		Service Provider, Local Government
Revenue Shortfalls	Non-Payment of Subsidies	Confirm pledges made by central government	Service Provider
	Non-Payment of users	Set and follow up appropriate service charge	Service Provider
	Drop in Supply		Service Provider
	Reduce Service Provided		Service Provider
Operation Cost Overruns	Increased Operating Expense	Select experienced operator	Service Provider
	Increase in Government Requirement	Revise contract clauses	Service Provider, Central and Local Government
Economic and Financial Risks			
Financial Parameters	Cost Indexation	User guarantee method	Service Provider, Bank
	Interest Rate	Same as above	Service Provider, Bank
	Exchange Rate	Same as above	Central Government, Bank
Financial Commitments	Refinancing		Bank
	Counterpart	Insurance	Bank
Indirect Risks			
Act of God	Natural Disasters		Service Provider, Central and Local Government, Insurance Company
	Political Embargoes, Wars	Guarantee risk protection on basis of bilateral relationships	Service Provider, Central and Local Government, Insurance Company
	VISA, Police, Foreign Experts	Government Assistance	Service Provider, Central and Local Government
Economic Risks	Delay in Start of Operations	Renegotiate Contract	Service Provider, Central and Local Government
	Economic or Financial Crisis, Currency Devaluation	Same as above	Service Provider, Central and Local Government, Insurance Company, Bank
	Energy Shortfalls		Same as above

Table 12.2.1 - Minimization and Apportionment of Typical Risk (2/2)

Category of Risk		Measures to Minimize Risk	Parties Bearing Risk
Institutional and Legal Risks	Indirect Legislative Evolution	Renegotiate Contract	Service Provider, Central and Local Government
	Legal Recourse by a Third Party	Verify conformity with current laws	Service Provider, Central and Local Government
	Jurisdictional dispute	Strengthen legal protection measures	Service Provider, Central and Local Government, Contractor, Insurance Company, Bank

Source: Guidelines for Management of Sewerage Facilities in Development Countries (Draft) by IDIJ, July 2002

12.3 Risk Management System

The Risk Management Section will implement the measures to minimize risks as mentioned above and monitor the operation condition. However, the minimization of the risks sometime will cost much; therefore, the risk management should be conducted in moderation with considering about the costs implemented.

The Risk Management Section will develop the "Emergency Response System" (ERS) and "Emergency Response Manual" (ERM) to provide against emergency cases.

12.3.1 Emergency Response System

To provide against emergency cases, such as abnormal operation of WWTP, overflow of wastewater, the case that wastewater contains substances harmful to health etc., the Emergency Response System (ERS) should be established and developed, and typical ERS is shown in ***Figure 12.3.1*** as for example.

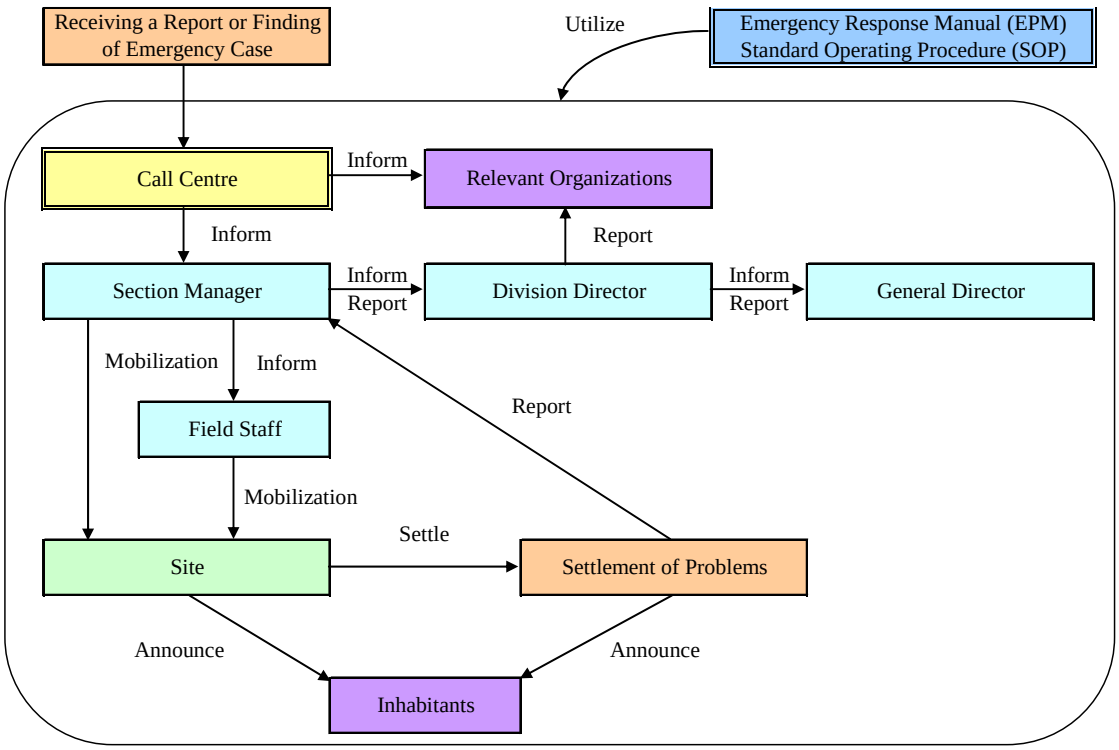


Figure 12.3.1 - Typical Emergency Response System

12.3.2 Emergency Response Manual

The Emergency Response Manual (ERM) should be provided to provide against emergency cases. The typical rules which will be contained in the manual are shown in following ***Table 12.3.1*** as an example. This sample is for control of pollution to minimize the impact to the environment and human health, when the emergency case will be occurred.

Table 12.3.1 - Typical Rules in Emergency Case (1/2)

Rule 1. The scope of water bodies applicable under the Rules is specific as following;

1. Running Water
2. Drinking Water Source
3. Water for Irrigation Canals
4. Aquaculture Water

Rule 2. Where the enterprises or wastewater systems discharge sewerage into the water bodies referred to in the preceding Rule and meet either of the following circumstances, the health of human beings, aquaculture production or drinking water are likely to be substantially endangered:

1. wastewater Treatment facilities experience a failure, abnormal operation or accident and also meet either of the following circumstances:

   (1) Discharged sewerage contains substances harmful to health.
   (2) Sewerage is discharged without treatment and thereby affects the normal purpose of the water body.
   (3) Discharged sewerage is beyond the enterprises' or wastewater system's treatment or storage capacity and thereby affects the normal purpose of the water body.

2. The place for operation of chemical substances is the site of a disaster and voluminous sewerage, resulting from responding to the disaster, is discharged without treatment.

Rule 3. Where enterprises or wastewater systems meet either of the circumstances referred to in the preceding rules, the responsible person thereof shall take certain emergency response measures, including;

1. Stop discharging sewerage immediately
2. Limit or confine the area of pollution and prevent pollution from spreading continuously
3. Inform the business unit using the polluted water body, management unit or the public who obtain drinking water, irrigation water or aquaculture water from the polluted water body within one hour to enable them to take necessary action
4. Inform the local regional Environmental Management Agency within three hours

Rule 4. Where the responsible person from an enterprise or wastewater system takes any emergency response measure, such measure shall be taken in the following manner;

1. Close discharge points or install intercept or blocking facilities.
2. Decrease or stop production or service operation volume.
3. Prepare sufficient storage facilities to store sewerage temporarily; otherwise the responsible person shall stop the operation discharging or producing sewerage.
4. Subject to the circumstances on site, suppress or eliminate abnormal operation, failure in facilities or accidents, and also start the back up.
5. Subject to the substance of contaminations in the sewerage, execute proper pollution control and dilute the hazard.
6. Take a sample from the polluted water body to analyze the substance in the water body, including hydrogen ion concentration, Dissolved Oxygen, chemical oxygen demand, electric conductivity and substances harmful to health contained in the production process.
7. Conduct the sampling and analysis referred to in the preceding paragraph every four hours at appropriate locations selected in the areas likely to experience pollution until the water body recovers the reference value; the result of the water quality analysis shall be provided to the business unit using the water or management unit.
8. Where there is any public sewerage system or sewerage system exclusively for industrial zones nearby, the responsible person shall apply for emergency inclusion or treatment of the sewerage.

Table 12.3.1 - Typical Rules in Emergency Case (2/2)

	9. Where it is impossible to remove the pollution within the time limit prescribed by the competent authority for any necessary actions, the responsible person shall install ducts to discharge the untreated sewerage into locations outside the area of the water body referred to in Rule 1 herein. 10. Where responsible person of sewerage system shall inform relevant subscribers to decrease their discharge of sewerage. 11. Inform the local environmental protection authority or the business unit using the polluted water body and management unit by phone or fax or in writing. 12. Where the place for operation of chemical substance is the site of a disaster and voluminous sewerage results from responding to the disaster, the responsible person shall install intercept, collection and temporary storage facilities, and take care of the situation or entrust another person to take care of the situation with care.
Rule 5.	Where the wastewater systems are those exclusively used for new communities and no administrative committee is incorporated or no administrator has been nominated, the convener elected by rightful owners or the temporary convener designated by the competent authority of municipality directly under the jurisdiction of the Central Government or Local Government shall be the administer responsible for executing the emergency response measures.
Rule 6.	Where enterprises or sewerage systems are ordered to execute any emergency response measure within a time limit but fail to execute the measure with the time limit, the local competent authority and industry competent authority shall assist them to execute the measure.

Source: Taoyuan county Government - Environmental Protection Bureau, Taiwan

12.4 Case Studies

As shown in ***Table 12.4.1***, no special risk management is carried out in the three service providers surveyed, besides management against claims from customers or residents in vicinity. However, because sewerage works has always possibility to be involved in serious accident, therefore service providers have to implement risk extraction and consider precaution and provision method in order to shelter the organization. It may lead to proper management of service providers.

Table 12.4.1 - Risk Management in the Three Service Providers

	PD PAL Jakarta	PDAM Bandung	BLUPAL Denpasar
Risk Management	Management against claims from customers and residents in vicinity, No other risk management is carried out.		

CHAPTER 13

CORPORATE GOVERNANCE

CHAPTER 13 CORPORATE GOVERNANCE

13.1 General

Corporate governance is defined as audit and order of management of enterprise. For public enterprise or public institution like sewerage works enterprise, the definition is read to be appropriate management of enterprise or institution and apt relationship with stakeholders.

The targets of corporate governance are said to be;

(1) To prevent scandal in enterprise or institution
(2) To strengthen profitability of enterprise or institution

In case of public enterprise or public institution like sewerage works enterprise, the target of corporate governance is considered to be appropriate management of organization and apt relationship with stakeholders.

(1) Scandal in enterprise or institution may raise credibility gap of stakeholders and it makes enterprise or institution difficult to acquire cooperation of stakeholders for implementation of sewerage works.

(2) Mutual understanding with stakeholders built by public communications and aboveboard management may create clear perception of sewerage works for stakeholders. Such situation might improve "willingness to pay" by users which in turn might improve service charge collection.

13.2 Stakeholder

(1) In case of public enterprise, stakeholders might be as follows:

- Central, provincial and municipal government
- Customers
- Relevant communities
- Staff (employees)

(2) Public enterprise should be governed by internal and external audit for appropriate management. For external audit, committee which consists of stakeholders and experts has to be established.
(3) Apt relationship with stakeholder is executed by public relations like periodic meeting and publication of data and information.

Figure 13.2.1 shows concept of corporate governance for public enterprises.

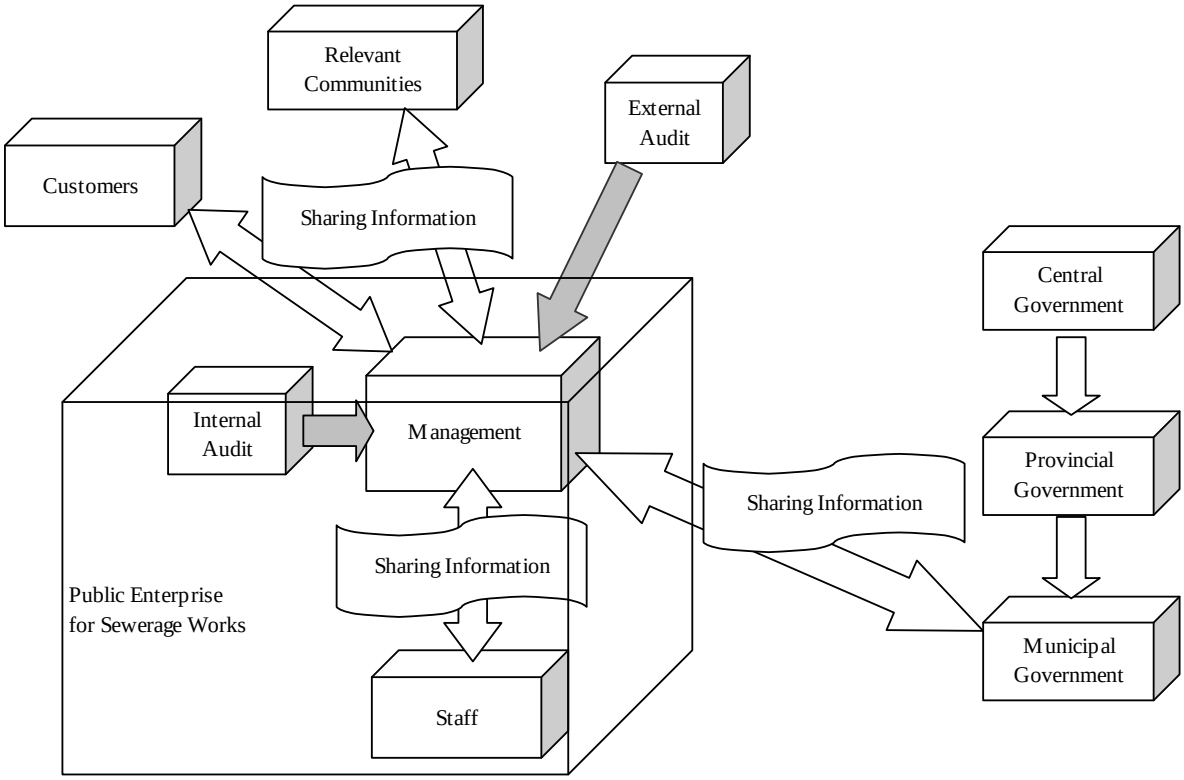


Figure 13.2.1 - Concept of Corporate Governance for Public Enterprises

(1) Central, provincial and municipal government regulates activities of enterprise, customers accept service of enterprise, relevant communities are influenced by facilities of enterprise and staff has strong stake with enterprise. Therefore peoples of those four categories are considered to be stakeholder of public enterprise.

(2) In order to execute appropriate management and declare accountability, acceptance of objective audit over accomplishment of enterprise is indispensable. Organization which can implement internal audit is required. For external audit, committee which consists of stakeholders, experts and enterprise or institution side has to be established. Results of internal and external audit should be released and reflected to the management of enterprise.

(3) Apt relationship with stakeholder is essential process to execute corporate governance. Public relations like periodic meeting with stakeholder and publication of data and information is effective to execute apt relationship. Invitation of customers and community people to treatment site is quite effective to make them understand sewerage works. In case of treatment site tour, safety of invited people has to be secured.

13.3 Evaluation

Achievement of corporate governance has to be evaluated. Implementation of evaluation in internal and external audit is efficient. Results of evaluation are published and reflected to provision.

Corporate governance has to be carried out based on the cycle of PDCA (plan, do, check, action) for continual improvement. Evaluation corresponds to check stage in the cycle.

In consideration of efficiency and convenience, evaluation is recommended to be carried out in internal and external audit. Results of evaluation have to be published together with results of audit as annual report.

13.4 Implementation Methodology

Corporate governance is raised based on the following stages:

(1) Establishment of internal committee for implementation of corporate governance
(2) Preparation of management system of corporate governance
(3) Establishment of internal and external audit committee and approval of the system by the committees
(4) Preparation of program of corporate governance of next year

(1) Member of internal committee is gathered from various sections like financial, general affairs, treatment plant and pipe construction.
(2) Based on discussion among internal committee, management system of corporate governance is prepared. The system has to be reviewed continuously.
(3) Internal and external audit committee is established. As for internal audit committee, member must not be concurrent with internal committee. As for external audit committee, member is usually selected from users, relevant communities, economical and technical experts and municipal government officers.
(4) Program of corporate governance of next year is prepared based on discussion among internal committee. The programme is published.

Figure 13.4.1 shows an example of schedule of corporate governance.

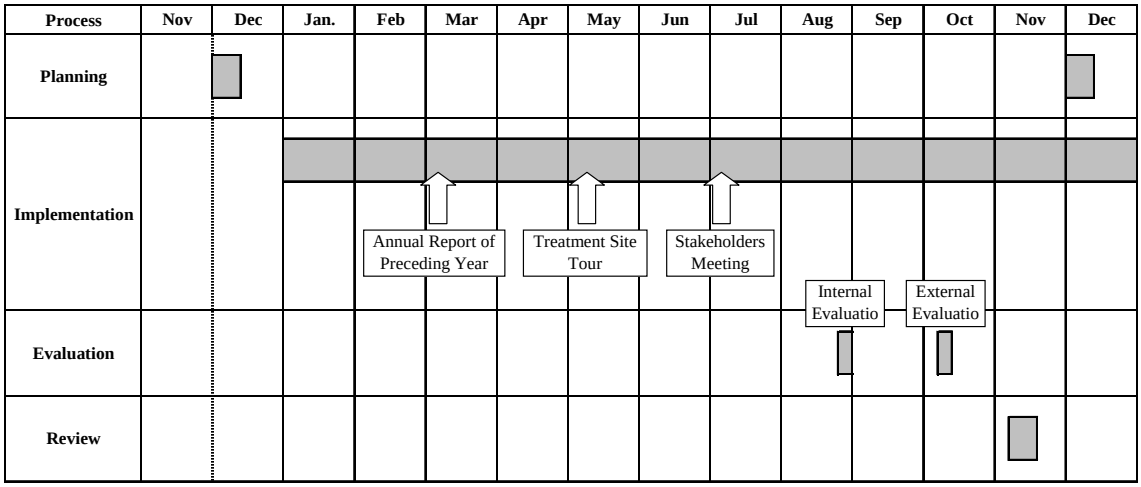


Figure 13.4.1 - Example of Schedule of Corporate Governance

13.5 Case Studies

In Indonesia, president decree regarding corporate governance was already declared and each organization is required to promote appropriate corporate governance.

Three service providers surveyed have propelled good relationship with stakeholders like national, provincial and municipal government, customers and communities by sharing information. This means the corporate governance although the providers do not declare those activities as corporate governance. Improvement of those activities and guidance regarding corporate governance for newly developing service providers are requested for the three providers.

CHAPTER 14

MANAGEMENT CRITERIA

CHAPTER 14 MANAGEMENT CRITERIA

14.1 General

This basic design of draft management criteria needs further development with more selectable alternative options to be suited to regional condition in the Indonesia. Indonesian side should be proactive in developing the management criteria. The further development of the management criteria needs basic concept and policies based on National Sewerage Law.

14.2 Implementation Methodology

14.2.1 Implementation Schedule

The implementation schedule with mile stones for developing the management criteria is needed to commence the concrete actions. An example of implementation schedule is introduced in ***Figure 14.1.1***, however the Indonesian side should review and revise or prepare the more detailed and feasible implementation schedule. Development of the management criteria should be reviewed and revised through workshops. And the results of development will be announced to relevant authorities through seminars.

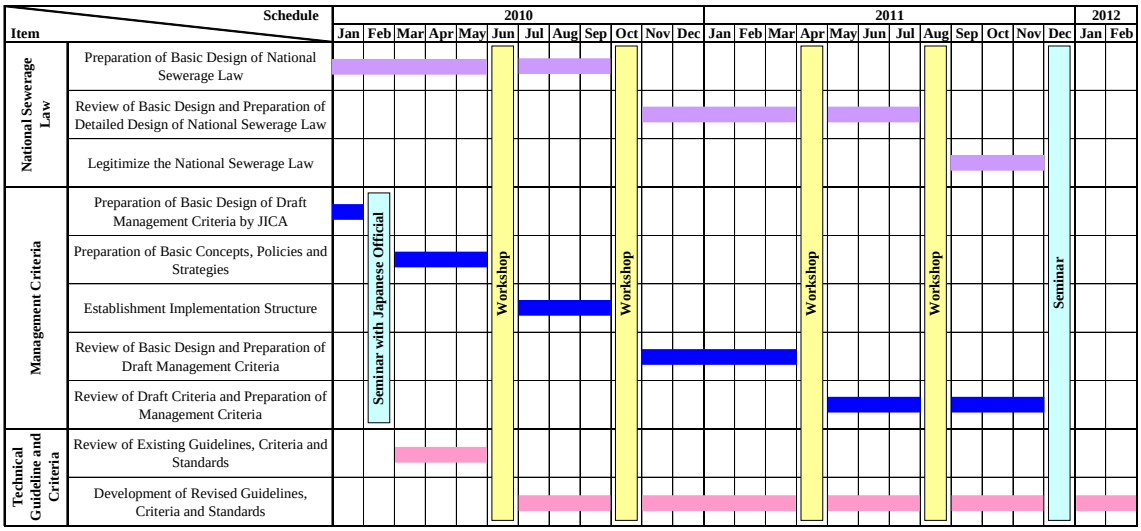


Figure 14.2.1 - An Example of Implementation Schedule of Development of Management Criteria

14.2.2 Implementation Framework

The "Special Task Force" for management of development works and "Development Project Team" with assignment of experts will be required to develop the management criteria. It is advisable to establish the "Sewerage Development Committee" consists of the 16 cities which already/will manage wastewater collection and treatment system, and the "Advisory Council" consists of 7 cities which manage large scaled wastewater treatment plant(s). The management criteria should be covered wide sectoral issues, and the scheduled development needs much human resources to be implemented in a short term.

An example of implementation framework for Development of Management Criteria is illustrated in ***Figure 14.2.2***.

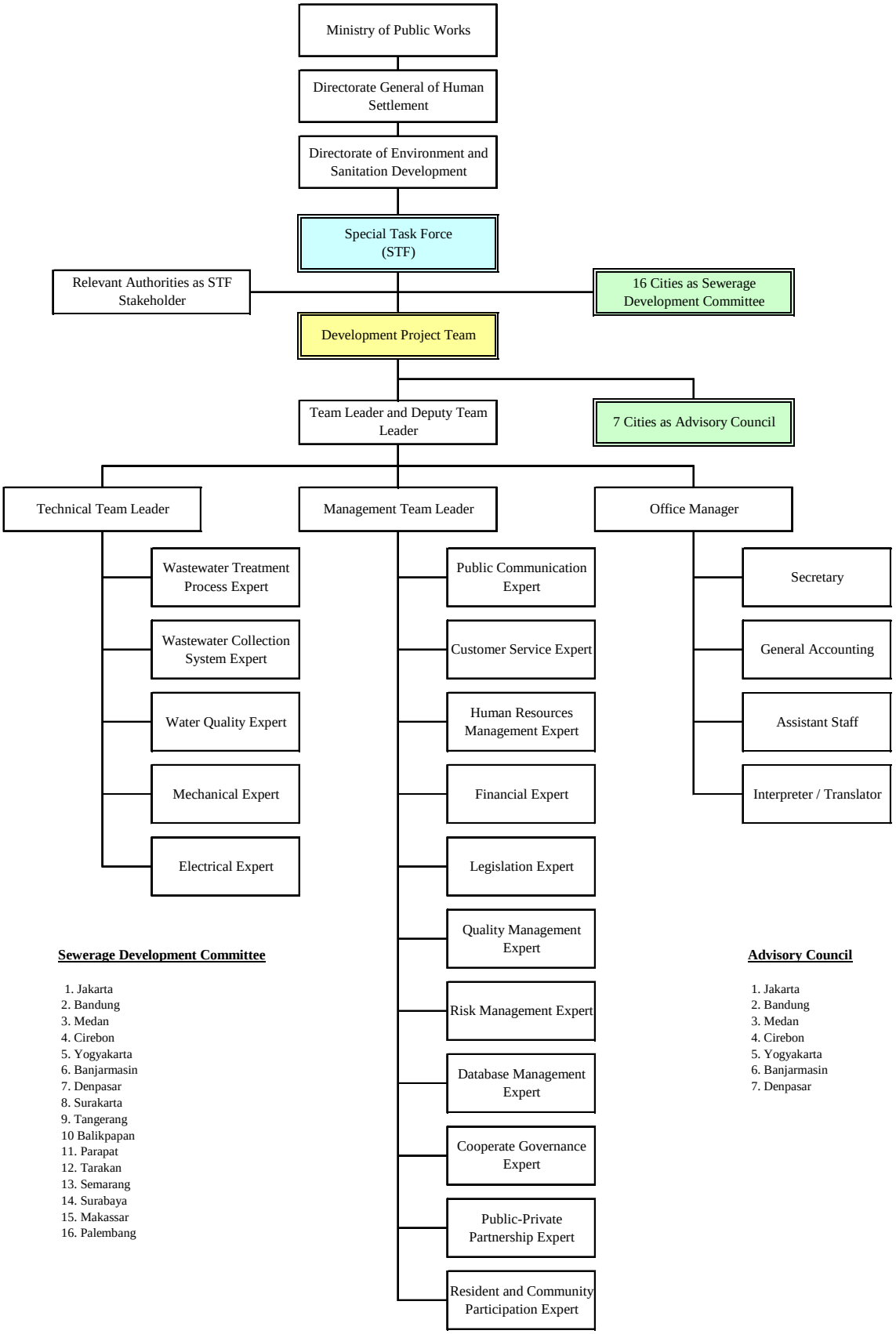


Figure 14.2.2 - An Example of Implementation Framework for Development of Management Criteria

ATTACHMENT

ATTACHMENT 2.2.1

SAMPLE QUESTIONNAIRE FOR WILLINGNESS TO PAY

Attachment 2.1.1 - Sample Questionnaire for Willingness to Pay

Questionnaire

No._____

Name of Area _____
Date _____
Distance to Shore _____ m
Time to Shore _____ min

Primary Sanitation/Sewerage Types (for sample diversification)

1) Which sanitation option does your household mainly use for disposing human waste water? _____

1. Toilet connected to sewer → **(1) to (7), (15) to (16)**
2. Latrine/septic tank/Other toilet → **(1) to (7), (10) to (14)**
3. Open defecation → **(1) to (7) to (9)**
4. Drop to sea → **(1) to (7) to (9)**

(1) Household Information

1) How many persons usually live in your household?

Adult men _____ persons
Adult women _____ persons
Children (<16 years old) _____ persons
In Total _____ persons

2) Sex of Respondent: _____
1. Male, 2. Female

3) Age of Respondent: _____
1. 18-25 years, 2. 26-35 years, 3. 36-45 years, 4. 46-55 years, 5. 56 years and over

4) Relationship of Respondent to Household Head: _____
Household Head's 1. Household himself/herself, 2. Wife, 3. Husband, 4. Parent, 5. Child, 6. Grand parent,
7. Grand child, 8. Relative, 9. Tenant, 10. Room mate, 11. Employee, 12. Others

5) Housing Ownership: _____
1. Own a house, 2. Rent a house, 3 Others

6) If "2. Rent a house ", how much is it? Kina _____ per month

(2) Economical Situation

1) How much did you usually pay for electricity per month? Kina _____ per month

2) Do you think the electricity fee is expensive? _____
1. Very expensive, 2. Expensive, 3. Fair, 4. Cheap, 5. Very cheap

3) How much did you pay for telephone in the last month? Kina _____ per month

4) What kinds of items do you have ? (Chose from the following items) _____ items
☐Television ☐ Audio (Radio, Cassette, CD player, etc.) ☐ Refrigerator ☐Electric cooker ☐Motorbike ☐Car

5) What are the main occupations of the household members earning money? (up to 2) _____
1. Fishery, 2. Office Worker, 3. Labour, 4. Storekeeper, 5. Others _____

6) How much is your household income per month (salaries of all members + pension + investment profit, et Kina _____ per month

(3) Understanding and Satisfaction with current Sanitation/Environment

1) Do you feel necessity to improve sanitary situation in your village?
1. Yes, 2. No _____
2) If "Yes", what is it? (Multiple response possible) _____
1. Water, 2. Toilet, 3. Garbage Collection, 4. Others _____

2) Are you satisfied with the current disposal of your human wastewater (excreta and urine)? _____
1. Yes, 2. Moderately, 3. Not at all

2) Do you think your human waste (excreta and urine) pollute your living environment and natural environment in your village? _____
1.Yes, 2. No

3) Would you prefer to have an improved human wastewater disposal options (excreta and urine)? _____
1. Yes, 2. No

4) Do you think that something has to be done to protect further deterioration of the water environment in your village? _____
1. Yes, 2. No

(4) Home Wastewater and Environment

1) Where are you dumping your garbage? (Multiple response possible) _____

1. Garbage collection point, 2. Garbage bin, 3. Garbage pit, 4. In the street, 5. In open drain/ditch, 6. Burning, 7. To the sea, 8.Others

2) Where do you dispose home wastewater (drain water from kitchen, bathing, washing etc.)? _____

1. To the Sewer, 2. To the open drain, 3.To the closed drain, 4. To the street, 5. To the soak pit/septic tank
6. Kitchen garden, 7. To the sea

3) Do you think your home wastewater (from kitchen, bathing, washing etc.) pollute natural environment or degrade living environment?

1.Yes, 2. No _____

4) Do you think it is important to dispose home wastewater to sewer to improve your living environment and natural environment?

1.Yes, 2. No _____

5) How much are you willing to pay at maximum to connect and dispose home wastewater to sewer for the improvement of environment?

Kina _____

(5) Hygiene Practices

1) Do the household members usually wash hands with soap? Please put four check marks in the following matrix.

	After Defecation			Before Eating		
	No	Yes, without soap	Yes, with soap	No	Yes, without soap	Yes, with soap
Adult						
Children						

2) Which is the primary water source in volume in your household? _____

1. House connection , 2. Public Stand Post (including neighbour's connections), 3. Shallow/deep Well,
4. Public Water Tanker, 5. Private Water Vender, 6. Rain, 7. Others (River, pond, etc.)

3) Do you reserve water in your house? _____

1. Yes, 2. No

3) If "Yes", what is your major container to reserve the water? _____

1. Overhead tanks, 2. PVC tanks, 3. Drums, 4. Buckets/Vessels

4) If "Yes", What is the capacity of containers in total? _____ m3

5) If "Yes", What is the capital investment for the containers in total? Kina _____

4) How often do you clean these vessels? _____

1. every day 2. once in a week 3. less than this

5) Do you use any treatment before consumption? _____

1. yes 2. no

8) If "yes", what treatment do you use? _____

1. Boil and simple filter, 2. Boil, 3. Simple filter, 4. domestic chlorination, 5. Using Alum, 6. other means

(6) Water-bone Diseases

1) Which of the following disease occurred in your household during the last year?

Diarrhea _____ times
Typhoid _____ times
Hepatitis _____ times
Malaria _____ times

2) When you get sick, how much does your family spend for doctor inspection and medicine per time in average?

Total Kina _____

3) How many times does your family go to clinic and/or drug store for doctor inspection and medicine per month in average?

_____ times/month

4) How much does your family spend for doctor inspection and medicines per month in average for disease relating water?

Water relating Kina _____

(7) Hygiene education, Health Care and Sanitation Promotion

1) Do you have any exposure to hygiene education or sanitation promotion? _____

1. Yes, 2. No _____

2) Do your children have hygienic education at their school? _____

1. Yes, 2. No, 3. I don't know

3) Do you think the promotion/education on water related hygiene and sanitation is necessary for your household to be healthier?

1. Yes, 2. No

4) Are there any residents' organizations concerning hygiene education, health care education and/or sanitary promotion?

1. Yes, 2. No

4) If "Yes", what kind of activities are they doing?

Organization Name(1) _____
Activities(1) _____
Organization Name(2) _____
Activities(2) _____

4) If "Yes", did you participate in those activities? (including your family)

1. Yes, 2. No _____

(8) For Household (Open Defecation and Drop to sea)

A. For Open Defecation

1) Do you have any available toilet/latrine? (Multiple response possible) _____

1. Yes, 2. No

2) If "1. Yes", why is the latrine not being used? _____

1. Latrine is used for other purpose such as storage
2. Latrine is dirty
3. Pit filled up/choked
4. Built only because of subsidy
5. Landlord has forbidden usage
6. Against culture/practice
7. Community latrine is too far
8. Others

If you select "No.7", how long does it take from your house? _____ m

3) If "1. No", what is the reason for not constructing a latrine so far? _____

1. The latrine is not needed / preference for open defecation
2. The latrine is too expensive / cannot afford
4. No space for constructing a latrine
5. Not enough water available
6. Temporary Residence
7. Others

4) If "1. No", would you like to have a private latrine or common latrine for your household? _____

1. Yes, I would like to have a private latrine, 2. Yes, common latrine, 3. No, I don't need a private latrine

B. For Drop to sea

1) Do you have any available toilet/latrine? (Multiple response possible) _____

1. Yes, 2. No

2) If "1. Yes", why is the latrine not being used? _____

1. Latrine is used for other purpose such as storage
2. Latrine is dirty
3. Pit filled up/choked
4. Built only because of subsidy
5. Landlord has forbidden usage
6. Against culture/practice
7. Community latrine is too far
8. Others

If you select "No.7", how long does it take from your house? _____ m

3) If "1. No", what is the reason for not constructing a latrine so far? _____

1. The latrine is not needed / preference for open defecation
2. The latrine is too expensive / cannot afford
4. No space for constructing a latrine
5. Not enough water available
6. Temporary Residence
7. Others

4) If "1. No", would you like to have a private latrine or common latrine for your household? _____

1. Yes, I would like to have a private latrine, 2. Yes, common latrine, 3. No, I don't need a private latrine

(9) Environmental Protection (only household not using toilets/latrines)

1) Do you think your untreated home wastewater and untreated human waste pollute natural environment or degrade living environment?
1. Yes, 2. No _____

2) If "1. Yes", what is it? (Multiple response possible)
1. Health hazard caused by eating fish and seashell in the polluted sea _____
2. Oral Infection caused by swimming on the polluted coast
3. Destruction of coral reef caused by polluted water
4. Decrease of fish catches caused by polluted water
5. Outbreak of mosquito and fly by bad odours and disease caused by mosquito and fly
6. Decrease of tourist
7. Others

3) We have a plan/idea to construct share washing space (ex. Washing hand, vegetable, body, hair) and share toilet on the land for preventing sea from pollution.
Do you want to use these share washing space and share toilet on the land? _____
1. Yes, I can use share washing space, 2. Yes, I can use share toilet, 3. Yes, I can use both of them, 4. No, I do not want to use both of them.

4) If you select "1 to 3", why do not want to use share washing space and share toilet? _____
1. It spends lots of times, 2. share washing space is dirty, 3. share toilet is dirty, 4. It cannot protect privacy, 5. Others

5) If you select "5", what is it? _____

6) If you select "2",
Do you want to use share washing space if operation and maintenance of share washing apace is properly conducted?
1. Yes, 2. No. _____

7) If you select "3",
Do you want to use share toilet if operation and maintenance of share toilet is properly conducted?
1. Yes, 2. No. _____

8) Do you think who is the better to maintain (including cleaning) the share washing space and share toilet ? _____
1. Government/municipality, 2. Residents, 3. Others( )

9) If above facilities are constructed (on condition that operation and maintenance is properly done), how much are you willing to spend for using these facilities?
Monthly charge: Kina _____ Construction fee: Kina _____

(10) Latrine/septic tank/Other toilet (without connecting to sewer)

1) Why do you use a toilet/latrine? (Multiple response possible) _____
1. Convenience, 2. Privacy, 3. Prevent diseases, 4. Others

2) Which type of toilet/latrine does your household use? _____
1. Pit latrine (without pour flush) or common toilet
2. Septic tank (with pour flush)

3) Where does the toilet/latrine dispose human waste water off? _____
1. To the open drain, 2.To the closed drain, 3. To the street, 4. To the soak pit/septic tank, 5. To the sea

4) Do you think the effluent from your toilet/latrine pollute the environment? _____
1. Yes, 2. No.

5) Do you know that your toilet/latrine might pollute sea or ground water? _____
1. Yes, 2. No.

6) Where is the toilet/latrine located? _____
1. Inside the house, 2. Outside the house

7) Do you have any problems on your toilet/latrine? _____
1. Yes, 2. No.

8) If "1. Yes", what is the major problem of your toilet/latrine? _____
1. Dirty, 2. Bad smell, 3. Dangerous, 4. No water available, 5. Problem with Privacy, 6. Overflow,

(11) Overflow from Toilets/Latrine (only toilet/latrine users without connecting to sewer)

1) Do the effluents from your toilet/latrine sometimes overflow to the surface because of the soak pits does not absorb enough wastewater?
   1. Yes, 2. No. _____
   2) If "1. Yes", how often does it overflow? _____
      1. Every week or more, 2. Few times a month, 3. Few times a year, 4. Once a year or less
   3) If "1. Yes", what is the main reason of the overflow? _____
      1. Hard laterite strata, 2. High water table, 3. Inflow of storm water, 4. Poor maintenance
4) How serious do you think the negative impact of the overflow from toilets/latrines on your living environment and natural area? _____
   1. Very serious, 2. Serious, 3. Not very serious, 4. Not serious at all
5) Do you think the overflow from the toilet/latrine lead to health hazard in your living environment? _____
   1. Yes, 2.No
6) Have your neighbourhood experienced flooding during rainy season? _____
   1. Yes, 2. No
   7) if "1. Yes", how often does it happen (how many days a year on average)? _____ per year
   8) if "1. Yes", how severe is it in terms of unsanitary condition? _____
      1. Very severe, 2. Severe, 3. Not very severe

(12) Maintenance of Toilets/Latrines (only toilet/latrine users without connecting to sewer)

1) How often is your toilet/latrine cleaned? _____
   1. Every day, 2. Every few days, 3. One a week, 4. Every two weeks, 5. More than two weeks interval.
2) How much do you pay for sludge disposal/withdrawing? Kina _____
3) How often do you withdraw sludge from the toilet/latrine? _____
   1. Six monthly, 2. Annually, 3. Five years, 4. More than five years, 5. Never did
4) Who (person, organization or company) usually withdraw sludge from the toilet/latrine? _____
   1. Local government, 2. Private staff, 3. Community, 4. My household

(13) Construction of Toilets/Latrines (only toilet/latrine users without connecting to sewer)

1) How did you construct the latrine? _____
   1. Own sources, 2. Govt. subsidy, 3. Borrowed money, 4. Others
2) How much is the construct cost of the latrine? Kina _____
3) How long do you have the toilet/latrine you mentioned? _____
   1. 1 year, 2. 1-5 years, 3. more than 5 years
4) How satisfied are you with the following aspects of your latrine?
   1=Very Good, 2=Good, 3=Fair, 4=Bad, 5=Very Bad
   Technology type _____
   Quality of construction _____
   Maintenance & Cleanliness _____
5) What improvements would you like in your household sanitation system/latrine (up to 3 choices)?
   1. Connect to the sewer
   2. Upgrade it to a better type — First Choice _____
   3. Construct it inside the house — Second Choice _____
   4. Install running water inside it — Third Choice _____
   5. Have regular exhauster service
   6. Have regular bucket service

(14) Willingness to Pay for New Toilets/Latrines and Upgrading (only toilet/latrine users without connecting to sewer)

1) Would you like to construct new toilet/latrine or improve the existing toilet/latrine?
   1. Yes, 2. No
   2) If "1. Yes", how much are you willing to spend for constructing /upgrading your latrine?
3) Would you like to connect to sewer?
   1. Yes, 2. No
   4) If "1. Yes", how much are you willing to spend for using sewer in terms of monthly charge and connection fee?
      Monthly charge: Kina _____ Connecting fee: Kina _____
   5) If "1. No", why don't have connection to sewer? Multiple choices (up to 3)?
      1. Monthly charge of sewer connection is too expensive _____
      2. Cost to connect to sewer is too expensive _____
      3. Don't want to spend any money for sewerage _____
      4. Current toilet/latrine is enough
      5. Not enough water to use flush toilet
      6. Don't understand the need of sewerage
      7 Don't think sewerage can improve our living environment or water environment
      8. Neighbour also don't connect sewerage
      9. The government doesn't enforce the connection and use of sewerage

(15) Sewerage and Complaints (only household connected to sewer)

1) Why have you connected to sewer? _____

1. Already connected to sewer before moving in, 2. To improve household sanitation, 3. To improve the water environment,
4. For convenience, 5. Forced to connect to sewer, 6. Others, 7. I don't know/I cannot say.

2) Is frequency of diarrhea decreased after connecting sewer? _____

1. Yes, 2. No

3) Which types of toilet do you use? _____

1. Toilet/latrine with flushing device, 2. Pour flush toilet/latrine,

4) Do you need more water to flush toilet properly? _____

1. Yes, 2. No

5) Do you have any complains on the existing sewerage system? _____

1. Yes, 2. No

6) If "Yes", what is your major complaint to sewerage? (up to 3) _____

1. Monthly charge is too expensive
2. Cost to connect to sewer was too expensive
3. Not enough water to use flush toilet
4. Clogging
5. Others (please specify..) _____

(16) Willing to Pay for the Sewerage already Connected (only household connected to sewer)

1) How much do you pay for public sewer system per month? _____ Kina

2) What will be the maximum limit you are willing to pay monthly to use existing public sewer system? _____ Kina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