Chapter Three
Research Methodology

III. 1. Introduction

This study is considered as evaluation research in which the performance of a water supply service is evaluated. For this evaluation purpose, the study uses a combination of complementary methods. It combines both quantitative and qualitative methods including case study, surveys with interviews, and focus group. Reasons for selecting the methods are explained. Reasons for choosing the case study focus and locus are also mentioned. The processes of data collection are described including the process of sampling. The processes of data analysis and a summary conclusion about the methodology complete the chapter.

III. 2. Using Evaluation Research

Some authors have given the same definition to both “evaluation research” and “performance measurement” in public administration. Evaluation research is defined by Babbie (2001, p. 333) as ‘a process of determining whether a social intervention has produced the intended result’. This definition is effectively the same as that for outcome performance measurement as defined by authors such as Hatry (1999), as discussed earlier in Chapter II Section 3. Weiss (1998, p. 4) mentions five key components of evaluation in his description of the full process as i) the systematic assessment, of the investigation of ii) the operation and/or (iii) the outcome of the program/policy, by comparing the evidence to (iv) a set of standards, for improving (v) the program and the policy. This is similar to the definition of outcome performance measurement in terms of cost effectiveness by Mayne and Goni (1997) in its linking efficient operation and end-outcome achievement, as also discussed in Chapter II Section 3. So, outcome performance measurement in this study is regarded as evaluation research.

This study involves measurement activities in terms of certain standards/indicators, objectives, decisions and stakeholders which have been categorized as the four generation evaluations by Guba and Lincoln (1989, p. 39). These writers (1989, pp. 39-40) believe that evaluation work should be aimed at the fourth generation evaluation in which the evaluator as constructivist is responsible for evaluating how stakeholders perceive their claims (favorable), their concerns (unfavorable), and their issues (disagreements).[1] The term 'Constructivist' is used in this designing of methodology[2] in a paradigm of Constructivism.[3]

However, having only the fourth generation evaluation in this case study may not achieve the study's evaluative purpose. This involves a need to identify, use and

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[1] According to Guba and Lincon (1989, pp. 40-1) stakeholders include 'agents', 'beneficiaries' and 'victims'. The 'agents' are all the persons who produce, use, and implement what is to be evaluated, called 'the evaluand'. They are the developers of the evaluand, the financers, local needs assessors, decision makers, providers, contractors and implementers. The 'beneficiaries' are the persons who generally get benefits from the uses of the evaluand, including the directly targeted group but also indirect beneficiaries. The 'victims' are persons who get disadvantages including those people who are systematically or politically excluded from the evaluand, and who suffer negative consequences or opportunity costs for missing opportunities as a result of the use the evaluand.

[2] Guba (1990, p. 18) mentions that 'methodology' is the way the inquirer should go about finding the knowledge. Other definitions include such as 'the logic of procedure' and 'the researcher's justification for choosing the methods used'.

[3] Constructivism in some ways can be considered as the opposite paradigm to Positivism. Ontologically, the Positivist (Realist) believes reality involves a separation of entity between observed and observer or it exists objectively in the world, while the Constructivist (Relativist) thinks realities depend on human constructions. Epistemologically, the Positivist (Dualist/Objectivist) keeps a distance and no interaction with the object being researched, while the Constructivist (Subjectivist) believes that recognizing the interaction process between inquirers and inquired is the way to produce knowledge. Methodologically, the Positivist tests theory (questions and hypotheses) for empirical approvals (experimental/manipulative), while the Constructivist generates theory or construction through substantial consensus derived from individual constructions drawn out and refined hermeneutically, and compared and contrasted dialectically (Guba, 1990, pp. 19-27).

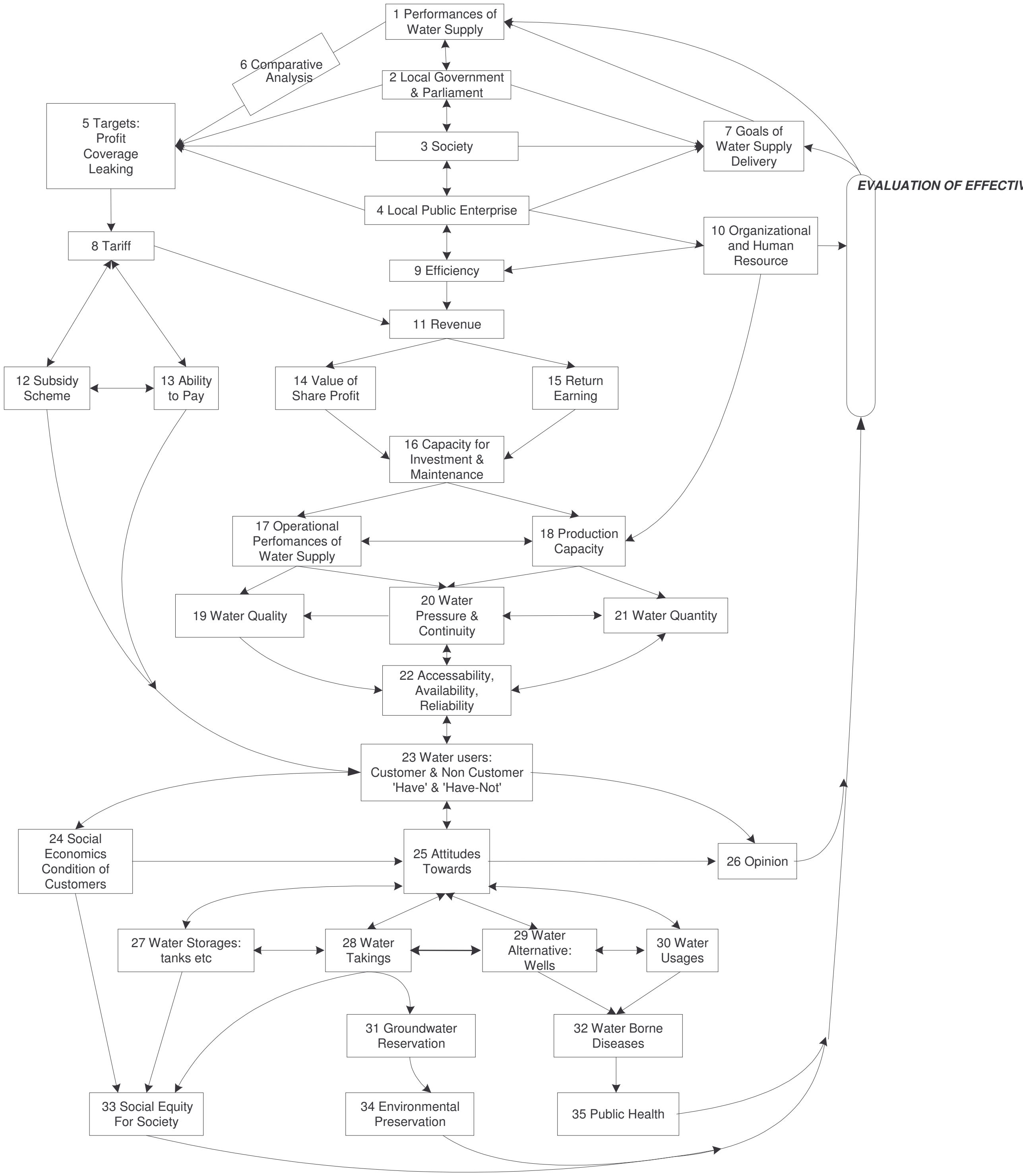
develop the existing indicators and standards, to measure them against policies and decisions, and to distinguish different claims, concerns and issues of various stakeholders from the government, the enterprise and the society. Therefore, all four types of Guba and Lincoln's evaluation are applied in this study.

Evaluating problems of organizational performance without preparing an evaluation framework risks obtaining too limited information from informants. Marginalized people such as those with low education and income level sometimes have no idea on a topic or difficulty in voicing their views, even though some of them can be very critical. Conversely, this situation quite possibly also often happens when people with high education and income levels provide only a limited time for interaction with the researcher's evaluation work.

For an example, a survey with a mixture of closed and open questions was used to interview respondents in this study. It was designed to gather hopefully a maximum but at least a minimum of information whether they responded directly to the survey at the time of the interview or filled it in as a written questionnaire by themselves later. Some respondents who had no time or felt uncomfortable with the interview process could fill in or respond to the survey questionnaires by themselves. This survey with interviews could be considered as a systemic intervention in which the researcher provides a survey tool to invite further comments and ideas from the respondents. The other research methods used in this study, case study and focus group, are explained later. A more detailed research evaluation framework based on the model of outcome performance measurement and indicator webs in Chapter II is then developed for investigating information presented in Chapter IV (see Diagram III.1 Nrs 1-16, 23, 24, 26 and 33) and Chapter V (Nrs 1-7, 17-23, 25-32, 34 and 25).

Diagram III.1:

A Research Evaluation Framework of Water Supply Service Performance



Developing a web model as described in Chapter II (although the model is not used for testing any explicit theory or hypothesis), an evaluation framework (Diagram III.1 above) and using a survey approach (as well as using simple statistical analyses of performance data) in this study can be claimed as a part of the quantitative tradition. However, the study's use of perceiving views of different stakeholders and employing the case study and focus group approaches are a part of the qualitative tradition. Therefore, this study integrates research approaches from the two traditions. This follows other authors' suggestions that combining methods as long as they are complementary, supplementary, informational and developmental can lead to better research (Strauss & Corbin, 1998, p. 28).

III. 3. The Complementary Combined Methods: a Combination of Qualitative and Quantitative Methods

This study uses a combination of qualitative and quantitative methods, called 'complementary combined methods' in this study.[4] The term 'complementary' emphasizes that in this study the qualitative approach is an element which can not be separated from the quantitative approach. Having only one approach in this kind of study could decrease the research viability.

Although the dissimilarities between the approaches include the nature of their data, their collection methods and their data analyses, the stereotypes in dividing between qualitative and quantitative researches can be overdrawn because the two approaches share similarities in investigating empirical inquires and both can

[4] Other authors use other terms such as 'combined methods' (Creswell, 1994, p. 173), 'mixed methods' (Punch, 1998, p. 239) and 'multiple methods' (Singleton, Straits, & Straits, 1993, p. 391).

involve testing and generating hypotheses and theory (Punch, 1998, p. 240). Strauss and Corbin (1998, p. 31) state:

> Unless unduly constrained, routinized, or ideologically blinded, useful research can be accomplished with various combinations of both qualitative and quantitative procedures. This is so for each and every phase of the research, whether researchers are collecting data, formulating hypotheses, seeking to verify them, or giving illustrations when writing publications.

'Triangulation', a term borrowed from surveying, navigation and military strategy was used by Denzin in 1978 as the reason for combining methods in studying the same phenomenon (Creswell, 1994, p. 174). The triangulation follows the logic of measuring certain phenomena more accurately by applying two or more different instruments or approaches each of which would provide less accuracy if used on their own (Singleton et al., 1993, p. 392). The original use was to for surveyors to take three sights on a point from different directions with the point then being more accurately located within the triangle the three sight lines would form than would be achievable by using any one or two of them. In 1979 Jick mentioned the advantage of a triangulation approach in balancing any bias and errors from particular data sources, investigators, and methods (in Creswell, 1994, p. 174). Creswell (Creswell, 1994, p. 175), quoting from Greene et al (1989), summarizes five purposes of complementary combined methods in a single study including:

> Triangulation in the classic sense of seeking convergence of results; complementary, in that overlapping and different facets of a phenomenon may emerge (e.g., peeling the layers of an onion); developmentally, wherein the first method is used sequentially to help inform the second method; initiation, wherein contradictions and fresh perspectives emerge; expansion, wherein the mixed methods add scope and breadth to a study.

The decision to using such a combination of methods follows several of the reasons mentioned above. Initially, this study in some ways was aimed to measure and evaluate outcome performances of which some are less accurately measurable.

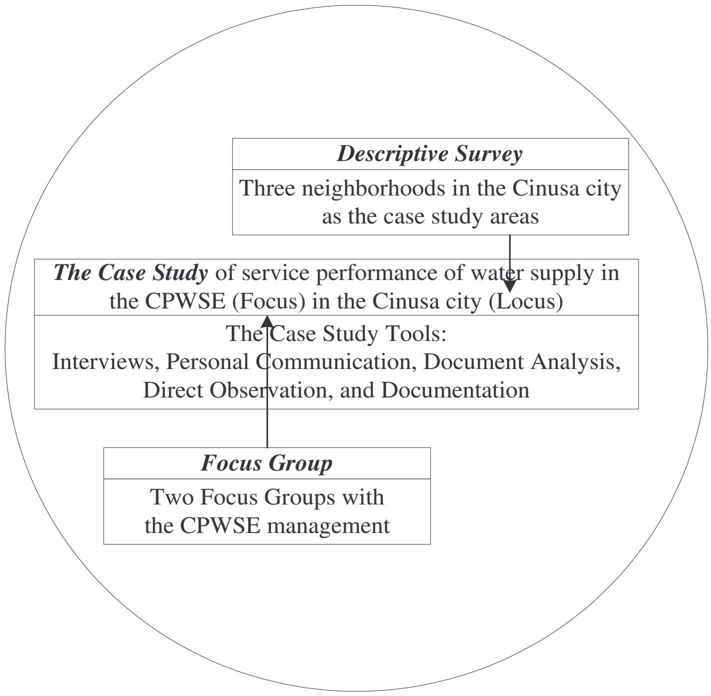
The researcher tried to eliminate, or at least reduce, bias that can come from individual methods and information sources by the use of complementary combined methods. For example, qualitative data about stakeholders' opinions on water quality reworded as opinions can be defined, collected and analyzed quantitatively, and can be combined with quantitative data from laboratory test results about water quality. Opinion about water quality can be gathered through qualitative methods (such as through non-quantified interviews with stakeholders and focus groups) and quantitative methods (such as surveys with quantifiable answer choices).

Secondly, information from multiple methods in this study complements each other. Investigation from interviews with stakeholders such in the case of cost inefficiency in this study is complemented with financial data analysis. Thirdly, the two methods of case study and survey are used first to identify service performance problems in water supply. The performance problems from the two methods are then summarized, and the information used as material discussion for focus group discussions as a further, third, method. Fourthly, this study perceives new ideas of stakeholders. Finally, this study is focused on the performance problems of water supply in the CPWSE. In investigating the service performance problems, this study enlarges the scope and the span of the case by using three research methods or strategies; case study, survey and focus group, for several reasons explained later (Diagram III.2).

This study is concentrated on the performance problem of water supply of the CPWSE as the case study focus. The study case locus (location) is in the Cinusa local government jurisdiction area portrayed as the inside circle area in Diagram III.2. The service performance problems are considered as the particular social phenomenon that is investigated in this study.

Diagram III.2:

Investigating Water Supply Performance of the CPWSE in the Cinusa city through Case Study, Survey and Focus Group



III. 4. Case Study and the Process of Data Collection

III. 4. 1. Case Study Method

Case study is aimed to present 'a richly detailed portrait of a particular social phenomenon' (Hakim, 1987, p. 61). This study investigation is not only concentrated on the water supply enterprise side, but also conducted on the government side as the owner of the CPWSE and on the society as the water users. The investigation of water supply service performance cannot be separated from its real context in which the society is being served by the CPWSE and the local government. A case study is considered as 'an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident' (Yin, 1994, p. 13).

A case study method can be considered a flexible design that allows the developing of a theory and model being investigated during the research process and using a triangulation approach in the investigation process. As Yin (1994, p. 13) states:

> The case study inquiry copes with the technically distinctive situation in which there will be more variables of interest than data points, and as one result relies on multiple sources of evidence, with data needing to converge in a triangulating fashion, and as another result benefits from the prior development of theoretical propositions to guide data collection and analysis.

Hence, this case study method is combined with survey and focus group methods in investigating the research focus. The model developed in Chapter II is a dynamic design that is interactively used to evaluate the real contexts of both the research focus and locus. The sequential findings from this research can be used continually to redevelop the model and practically reapplied to other similar cases.

This study selects a single case study of the CPWSE and the Cinusa Local government for several reasons mentioned below, but within this case three neighboring areas in this city were further selected as three case study locations for a survey for reasons explained in a later section. Firstly, the CPWSE was ranked at the highest financial performance among PDAMs located in city areas in 2000 by the Development and Financial Controlling Agency (BPKP, 2002). So, the CPWSE can be considered as one of the PDAMs which are in a position to potentially balance between the economic and the social and environmental goals of its water service provision. If the CPWSE has failed or cannot fully achieve the social and environmental goals, there must be some reasons that can explain its problems. So this study investigates the performance problems of the CPWSE.

Secondly, the city location was chosen for the case study because multiple stakeholders are found in the city area compared with among populations in village or rural areas. Another reason for this choice is that many PDAMs serving rural areas are unprofitable because the operational and maintenance costs for the rural PDAMs for serving every customer are relatively higher. The customers are distributed over wider areas which need higher costs for investing, operating and maintaining the water supply system. Economic recovery costs or economic goals are still the main concerns for the rural PDAMs. It does not mean that all rural PDAMs neglect the social and environmental goals but city PDAMs like the CPWSE which are profitable currently have more prospects to use their relative financial strength to deliver social and environmental goals of water service provision.

Thirdly, the Cinusa city is naturally granted plenty of water-supplying springs because it is surrounded by four big mountains with their tropical rain forests. So, the CPWSE is the only PDAM in Indonesia which does not use raw water from rivers or upper ground-water sources. This utility obtains most of its raw water from springs with a high water quality, plus a relatively small amount from deep bored wells. This means that its water treatment costs are relatively low, because the raw water quality is high. The potential profit is also high for the CPWSE. However, if the piped water is contaminated and polluted, the problem is entirely in the water distribution side for which the CPWSE is entirely responsible. Conversely, upper ground-water sources such as rivers and lakes need costly water purification and treatment processes, and the water is easily contaminated because it comes from open resources. The selection of the CPWSE as the case study was thus partly considering this condition, in which problems of water supply service such as water quality and contamination mostly come from the way this enterprise manages it.

Fourthly, selecting more than one local government as additional case studies was considered in the early stages of planning how this study should be conducted. However, if this had been attempted this study would still be far from completion because the other water supply enterprises that were expected to be involved rejected the requests to be so. They did not fully support this study even though confidentiality about their participation in this study was promised. Inaccessibility of information made available, such as particular financial reports, and limitation imposed by enterprises to access to only one person for interview created insurmountable difficulties to investigating and unfolding real phenomena in the field. As the consequence the inclusion of multiple cases would have been meaningless.

Another consideration was that selecting several case studies in different local governments would have prevented this study from exploring information maximally within the resources available. There is always a trade-off in conducting research between one case study with greater depth of the information collected and two or more case studies with relatively less and shallower information gathered about each case. In exceptional situations constraints of time and funds do not apply, but this study was limited in both. So this study selects one case study but then investigates multiple ‘sub-case’ studies in three case study locations within the overall location area to provide for exploring more detailed information by allowing comparisons of possible variations within the overall case.

The reasons given above are in line with Yin’s argument (Yin, 1994, pp. 4-8) that that there are three reasons for selecting case study as a research strategy.

Firstly, the case study is a useful means to address how and why research questions. As explained in the three reasons above, this case study investigates the service performance problems of water supply that can block social and environmental goal achievement. The why and how questions have been partly discussed in Chapters I and II in which views of scientists are considered as a part of the stakeholders' voice from the field of public administration, public policy and systems thinking. These are explored and developed. The exploration of thoughts and the development of the researcher's ideas in these chapters are dialectically discussed and compared with the research findings in Chapters IV and V.

Secondly, the researcher can not manipulate the actual behavioral events as an experimental research strategy usually does. This case study of water supply is not designed to test the behaviors of target groups or control groups as experimental research commonly does. This case study is aimed to get actual information about service performance problems of water supply from stakeholders who were involved in the study.

Thirdly, the case study focuses and examines relevant contemporary events occurring from 2000 to 2004, during the time of this study. However, useful data and information from previous years, such as financial and performance indicator reports from several water supply enterprises, are presented for a comparative purpose where their contribution will enrich the explanation of this case. As Yin (1994, p. 8) mentions, "the case study relies on many of the same techniques as a history, but it adds two sources of evidence not usually included in the historian's repertoire: direct observation and systematic interviewing". So, the past events can also be used for explaining and comparing the contemporary events investigated. As mentioned in the earlier explanation, the case study method is aimed at providing detailed explanation about the case or social phenomenon being investigated.

Furthermore, multiple sources of evidences and investigations can be used in the fieldwork of the case study including "the analysis of administrative records and other documents, depth interviews, larger scale structured surveys (either personal interview or postal surveys), participant and non-participant observation and collecting virtually any type of evidence that is relevant and available" (Hakim, 1987, p. 63). But authors such as Yin limits to six the sources of evidence for the case study strategy: documentation; archival records; interviews; direct observation; participant observation; and physical artifacts (Yin, 1994, p. 80).

This case study method uses data from five sources of evidences namely interviews; personal communication or email; document analysis; direct observation; and documentation. Interviews and document analysis are used in the first and the second stages of data collection, whilst personal communication, direct observation and documentation such as taking pictures and observing the water users are only used in the second stage.

III. 4. 2. The Progress of Data Collection

This study was started in February 2001. At that stage, the researcher was trying to understand the research concern through information from literature reviews and discussion with supervisors and colleagues. Some parts of Chapter I and II are the result of this beginning work. However, these chapters were continually developed as the researcher's understanding about the case study developed. Thus, interviews with some participants gathered from the second period of field research are now quoted in Chapter I. Some subsequent literature reviews in 2003 and 2005, at times when the researcher was in the case study location, have also been added to Chapters I and II. So a dynamic process of knowledge development is reflected in this report of the study.

The early plan was to investigate both water supply enterprises that were still managed by a public enterprise and those which had been transferred to the private management in a comparative study, with an intention of selecting at least three case studies. The researcher visited two PDAMs that have been privatized, one on Batam Island (a joint venture privatization) and one in Jakarta (a management leasing/ contract). Unfortunately in the first visit to these locations, the Batam water supply enterprise did not provide financial information about cost efficiency that was needed by the researcher for the evaluation work. This water company also limited interviews to only one manager, prohibiting any interview with other staff. In the other case, the Jakarta PDAM had its management transferred into two international enterprises. The management was contacted about its participation in this study but refused to participate in the study, after the researcher waited for its response for about one and half months.

Fortunately, the CPWSE, the PDAM located in and serving the city of Cinusa, was opened to this study, providing important information and data and allowing the researcher to interview all managerial levels in the company. The willingness of a PDAM (either privatized or not) to be involved in this kind of study is really dependent on personal decisions within the company. There are no sections in the current regulations as discussed in Chapter I that can enforce or punish a PDAM to be open and cooperative with elements of society such as students and researchers who want to investigate particular social phenomena. This experience can also serve as a critique of the weakness of the current accountability system that is not open to citizens.

By and large, the first data collection conducted between October 2002 and April 2003 contributed very useful data. During this time, the researcher (i) conducted interviews; (ii) participated in seminars and workshops related with water supply services; and (iii) collected data and information about PDAMs.

(i) First of all, interviews were carried out with several people whose selection was based on their availability for this study, thus using a convenience sampling technique (Henry, 1990, p. 18). Questions during these interviews were focused on aspects of the informant's (i) jobs and responsibilities; (ii) views and opinions on their enterprise's performances, problems and solutions; and (iii) expectation for performance improvements. Discussion topics could also extend to other concerns relevant to these aspects.

Most of these interviews lasted for between 30 minutes and 2 hours per individual and were recorded. Even though some interview results are not quoted or used in this thesis, the information from all interviews have developed the researcher's understanding about water supply performance and reshaping the research.

Some interviews can be considered as depth interviews as they involved two sessions of about 2 hours each. In the first data collection period there were two examples of these, one pair with a manager of the Batam water supply enterprise and the other with a technical director of the CPWSE. The other employees from the CPWSE interviewed once each were the managing director, the human resource manager, and one staff member of the financial department. Other stakeholders interviewed were from the society outside the enterprise, including the head of the consumer association in Cinusa city, a staff member of PERPAMSI, one from the Indonesian office of the World Bank, and an overseas consultant of the PDAM project. Also, a stakeholder interview is carried out with a member of staff from the Cinusa City Health Department.

(ii) Secondly, the researcher participated in a PERPAMSI seminar in Jakarta on water supply enterprises, a PERPAMSI workshop about PDAM benchmarking also in Jakarta, and a seminar organized by the Water Care Women's Forum about water supply concerns.

(iii) Thirdly, the researcher collected performance and financial information from PERPAMSI (the Indonesian Water Supply Enterprise Association), the Department of Home Affairs, the National Development and Financial Controlling Agency (BPKP); and the CPWSE itself. Data and information gathered from the first visits opened up and developed the researcher's understanding of the topic, and were used for developing the second research survey instrument as explained later.

The second period of data collection was between November 2003 and April 2004, and focused on the CPWSE in the Cinusa city. Data are collected from (i) interview, (ii) personal communication, (iii) document analysis, (iv) direct observation and (v) documentation.

(i) Firstly, the introductory questions and duration of interviews were similar to those in the first data collection, but then were followed by more detailed questions related to particular concerns being investigated such as tariffs and metering activities.

Interviews were conducted twice or more with several informants who were considered to be in a position to contribute particularly valuable information in these continuing discussions. Informants were selected based on using judgmental sampling on their ability to respond to the questions, thus using a purposive sampling technique (Singleton et al., 1993, p. 160).

The interviews conducted in this stage were not taped. The process of the interviews was similar to that in the first data collection period in which three basic questions were used as the central thread of the discussions, but the discussion materials were developed during the interview process. After an interview, the researcher wrote down its results. The participants were invited to share information about service performance problems of water supply with the investigator. They would be less likely to be worried that information that was not taped could be used as evidence to attack them in the future, such as in cases of exposed corrupt, collusive and nepotistic practices. Hence, the interview results are rich with information but a weakness is that without taping the researcher may lose some information from the interview. Some interview results are selected for presentation in this thesis report while some others are not, because this study is limited to particular concerns of water supply performance.

Interviews in this second period of field work were conducted with 28 employees of the CPWSE including all directors, all managers, some assistant managers and their staff. The other stakeholders from the Cinusa city government interviewed were the head of the City Parliament, the head of the government's economic department who was also acting as the secretary of the Controlling Agency for local public enterprises in this city, staff of the Indonesia Local Environmental Impact Management Agency (BAPEDALDA[5]), the Local Health department and the Local Bureau of Statistics. In addition, stakeholders from PERPAMSI such some of its staff and international experts were also interviewed.

[5] Badan Pengendalian Dampak Lingkungan Daerah

(ii) Secondly, one member of the Controlling Agency was interviewed through personal communication or email.

(iii) Thirdly, essential documents were collected from the CPWSE including water tariffs, policies, financial and performance indicator reports; and from governmental agencies under the Cinusa Local Government including water-borne disease reports, socio-economic statistical reports and environmental reports. Documents about socio-economic and environmental conditions of the three neighborhood areas of the three case study locations were also collected. News clippings about local water supply concerns which were documented by the CPWSE's staff from Indonesian newspapers were also a source of information for this study.

(iv) Fourthly, direct observations in the second field work period were conducted in several locations, including of water supply pipes, pipe leakages, pipe repairing activities, and household conditions such as wells and toilets.

(v) Many of these direct observations were documented by photos, a selection of which is attached as an appendix.

III. 5. Descriptive Survey, Process of Sampling and Data Collection

III. 5. 1. Descriptive Survey Method

A social survey method is used by asking the same questions of a certain group of people. A social survey is defined as 'a technique for gathering statistical information about the attributes, attitudes or actions of a population by administering standardized questions to some or all its members' (Buckingham & Saunders, 2004, p. 13). In this study, information from a survey was used for describing the respondents' behaviors, activities, and views related to water supply service, but were not used for testing any explicit theory or hypothesis. Buckingham and Saunders (2004, p. 13) consider this kind of survey as a descriptive survey.

Singleton et al. (1993, p. 246) mention three characteristics of a survey research:

> A large number of respondents are chosen through probability sampling procedures to represent the population of interest.
> Systematic questionnaire or interview procedures are used to ask prescribed questions of respondents and record their answers.
> Answers are numerically coded and analyzed with the aid of statistical software.

In this study a survey was conducted with a large number of water supply customers in three neighborhoods in Cinusa city as explained later. It was in a form of a 'survey with interviews' and contained closed and open questions. The survey answers were coded and analyzed with descriptive statistics by using the statistical software programs Excel and SPSS.

The survey used a sequence of, first, non-probability and, then, probability sampling methods. A sample is defined as a representation of the population (Henry, 1990, p. 11). In non-probability sampling methods, samples are selected based on subjective judgments of the investigator in selecting the samples while in probability sampling methods every member of the population has an equal probability of being included in the sample (Henry, 1990, p. 17). In this study, a triply-applied initial non-probability sampling was used as the first stage of the sampling process, selecting a sample of locations within the city, and then a probability sampling was applied with three steps in a second stage, choosing the samples of respondents within the population of each location.

III. 5. 2. Process of Sampling and Data Collection

The sampling process of the location samples was based on the 'most dissimilar' sample technique, one of the six non-probability sampling techniques mentioned by Henry (1990, p. 17).[6] The locations were decided based on judgments of 'dissimilar conditions' among all the locations in the city (Henry, 1990, pp. 17-8). Three neighborhood areas from three different sub-districts in Cinusa city were selected by three steps in this first stage of sampling.[7]

As the first step the three sub-districts, Cikole, Cilowok and Cisuku were chosen from the five in this city because of two factors. Cikole was the sub-district with the highest proportion of its population connected with piped water from the CPWSE (57% in 2002) and the lowest incidence of reported cases of water-borne diseases (7513 during January-October 2003) (Table III.1). In contrast Cisuku had the lowest coverage (36%) and the highest incidence (19014), while Cilowok was generally in the middle (45% and 10066 cases).

Table III.1:

Five sub-districts, 2002 water coverage levels and January-October 2003 cases of water-borne disease

Sub-Districts	Water Coverage (2002)	Reported Cases of Water- Borne Disease (Jan.- Oct. 2003)
Cikole	57 %	7513
Cikeke	47	10831
Cilowok	45	10066
Cibeli	40	18170
Cisuku	36	19014

Source: Summarized from the Cinusa City Health Department 2003 and the CPWSE 2002

[6] The other five non-probability sample designs are 'convenience' samples, 'typical case' samples, 'critical' samples, 'snowball' samples, and 'quota' samples (Henry, 1990, p. 17).
[7] Cinusa city has 5 sub-districts. These are Cikeke (12 townships), Cisuku (11 townships), Cikole (11 townships), Cibeli (11 townships) and Cilowok (11 townships).

As the second step, in the Cikole sub-district the Cibaren Township (the lowest in the lowest), the Cidino Township in the Cilowok sub-district (the middle in the middle) and the Ciputom Township in the Cisuku sub-district (the highest in the highest) were chosen on the basis of the number of reported cases of water-borne diseases on them (Table III.2).

Table III.2:

Three sub-districts, nine townships and water-borne disease cases, January to October 2003

Sub-Districts and their Townships			Water-Borne Diseases (Jan.- Oct. 2003)	
The Cikole Sub-District				7513
	1	Ciarjun township	3073	
	2	Ciramket township	2377	
√	3	Cibaren township	2063	
The Cilowok Sub-District				10066
	1	Cimojo township	5320	
√	2	Cinoy township	2789	
	3	Cikenda township	1957	
The Cisuku Sub-District				19014
√	1	Ciput township	9563	
	2	Cijanti township	5340	
	3	Cimulo township	4111	

Source: the Cinusa City Health Department, 2003.

As the third step, one neighborhood area from each township was chosen, on the basis of their coverage level and of other specific local factors. In the Cibaren Township, the Cigadis neighborhood was selected as its water coverage (70%) was the highest in the township (Table III.3). Also, its community is predominantly of families from the high and middle income classes categorized by the CPWSE as 'household customer group type IId' or 'IIc' (see Table III.4).

Table III.3:

Three townships, thirteen neighborhood areas and water coverage, 2002

Townships and Neighbors			Water Coverage in Percentage in 2002
Cibaren			
√	1	Cigadis	70 %
	2	Cisuko	66
	3	Cibar	53
	4	Cikasi	45
Cinoy			
	1	Ciketawa	77
√	2	Cidoyo	47
	3	Cimeri	33
	4	Cisumi	36
	5	Citogo	35
	6	Cituwul	20
Ciput			
	1	Cigada	83
	2	Cikebon	73
√	3	Ciloyo	18

Source: CPWSE

As a contrast, the Ciloyo neighborhood area in the Ciput Township had its lowest coverage level of 18% (Table III.3 above), people in this area are mainly from the low income class categorized as ‘household customer group type IIa’ (Table III.4) and this area is also one of the city’s neighborhoods with a high concentration of industrial activities. 51 industries were located in the Ciput Township[8]. The industrial wastes have been polluting the river and well water in the Ciputom neighborhood as explained later in Chapter V (see Appendix 1: Pictures of Poorer and Richer Households).

[8] As reported in this township’s monograph in 2001. The report divided them into 12 ‘big industries’, 34 ‘middle’ and 3 ‘small’.

The coverage level of the Cidoyo neighborhood area in the Cinoy Township was 47 percent, nearly in the middle between the lowest (20%) and the highest (77%) coverage levels in that Township in 2002, with mainly low income, 'Type IIa' or 'IIb', families (Tables III.3 and III.4). Many educational institutions are also located in this area.

Another reason for selecting Ciloyo was that this area is flat and served with a pumping system of water supply delivery whereas Cigadis and Cidoyo are located in hill areas, and served with a combination of the reservoir and pumping systems of water supply delivery. So, varieties or dissimilarities of their conditions were used as a base for selecting these locations for the next stage of the sampling process.

In this second stage a probability sampling method in three steps was used to select respondent samples from the three neighborhoods. Respondents were chosen through a proportionate stratified sampling technique[9] based on measures of the stratification of the populations in the locations selected. The respondents selected from these populations as the samples were proportionally distributed among the groups in the populations. The initial step was to calculate the proportion of respondents wanted from the total population of 3556 water supply customers in 2003 (620 in Ciloyo, 1440 in Cigadis, 1496 in Cidoyo) (Table III.4).[10]

The minimum total number of respondents that should be taken from the three locations to produce a sample with within 5% representation of the total population was calculated to be at least 360.[11] As a first step this total minimum of

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[9] The other probability sampling techniques are simple random sampling, systematic sampling, cluster sampling and multistage sampling (Henry, 1990, p. 26).
[10] The list of customers in the three townships was obtained from the CPWSE.
[11] The formula to calculate proportionate stratified sampling is:

$$Nr = \frac{Nc}{Nc\,(d)^2 + 1} = \frac{3{,}556}{3{,}556\,(0.05)^2 + 1} = \frac{3{,}556}{9.89} = 360$$

360 was then allocated proportionally to the three location sub-samples, resulting in a minimum of 63 from Ciloyo, 146 from Cigadis and 151 from Cidoyo.[12] The second step was to calculate the appropriate proportion of respondents within these local samples based on the locality's overall distribution of CPWSE customer classifications. In 2003 the CPWSE classified its customers into 5 categories most of which comprised several sub-categories. These were 'social customers' in customer group types Ia, Ib and Ic; 'household customers' in IIa-e; government customers in III; business customers in IVa-d; and industry customers in Va-b (see Appendix 2: the 2003 Tariff Customer Classification).[13]

In this study, the total number of household, type II, customers in each locality were separated into their a-e sub-groups and their proportions calculated. There were not enough customers in Types I, III, IV or V for this so only the totals for each of these were used, with IV and V combined (Table III.4).[14]

Notes: Nr = total of respondent sample; Nc = total number of population of customers (as water connections) in the three townships; d = precision, chosen to be 5 percent

[12] For Ciloyo = Np1

$$Np1 = \frac{Nt}{Nr} \times Nc = \frac{620}{3556} \times 360 = 63$$

Note: Nt = the total number of customers (as water connections) in one township.

For Cigadis = Np2

$$Np2 = \frac{Nt}{Nr} \times Nc = \frac{1440}{3556} \times 360 = 146$$

For Cidoyo = Np3

$$Np3 = \frac{Nt}{Nr} \times Nc = \frac{1496}{3556} \times 360 = 151$$

[13] a, b, c, d and e are customer classifications under each sub group.

[14] The calculation formula is: $Np = \frac{Ngc}{Nt} \times Nt$

Notes: Np = the proportion of customer number in each group classification; Ngc = the total customer number in each group classification; Nt = the total customer number in each township.

The last (third) step was to select respondents based on the street in front of their house. This was to get sample respondents distributed proportionately among street locations[15], not concentrated in certain streets in the three neighborhood locations but representing all streets in them.

Table III.4:

Numbers of Respondents Based on Townships and Customer Classification

Classification	Cigadis	Ciloyo	Cidoyo	Total
I	3	2	4	9
II a	19	38	86	143
II b	27	6	28	61
II c	28	2	5	35
II d	52	7	12	71
II e	2	1	5	8
III	2	1	1	4
IV & V[16]	14	7	11	32
Total	146	63	151	360

Sources: CPWSE, 2003 (recomputed)

As a consequence, the final respondent samples were increased as the initial calculations had produced a sampling of 1 in 10 customers but applying this proportionately at the street level would leave smaller streets with less than 10 water customers under-represented. In these cases a single customer was chosen randomly from the street. This increased the total sample from 360 to 398 (see Table III.5).[17]

[15] The CPWSE customer classification is based on the width of street in front of the house. For example, household customers in one street are generally grouped in one customer classification, unless some of them run businesses, in which case they are allocated to a business customer category.
[16] Business and industry customers are amalgamated into one group, because in Cigadis Township or downtown locations, industry customers were not available.
[17] Respondents are household members, especially wife or husband. For social, business, industry and governmental institution customer category respondents are staff members of these organizations.

Table III.5:

Respondents and their Customer Classification in Three Neighborhood Areas

Respondent Classification	Cigadis		Ciloyo		Cidoyo		Total	
	MT	SR	MT	SR	MT	SR	MT	SR
I	2	2	2	2	4	4	8	8
II A	19	25	38	48	86	90	143	163
II B	27	33	6	8	28	28	61	69
II C	28	29	2	5	5	6	35	40
II D	52	52	7	7	12	12	71	71
II E	2	5	1	1	5	5	8	11
III	2	2	1	1	1	1	4	4
IV&V	14	14	7	7	11	11	32	32
Total	146	119	64	22	152	59	360	398

Source: Primary data from the field (2004)
Notes: MT = Minimum Target; SR = Selected Respondents

The questionnaire for water customers was divided into sub-headings: general information and respondent backgrounds; social, economic and environmental condition of households; water price; water quantity; water quality; water continuity and pressure; customer relations; and water-borne diseases. Closed questions were predominantly used. The questions are mostly aimed to find information. Answer choices in the closed question varied from the simple 'yes' or 'no' to more complex ones with several options offered. Some of the questions were a combination between closed and open (see Appendix 3 and 15: Survey Questionnaire and an example of original questionnaire).

Thirty seven closed questions in the questionnaire were about the customer's perceptions on tariff, water quality, water quantity, water pressure, water continuity and customer relations. Answer choices in these questions were six items ranging from the most to the least condition such as:

(a) Very satisfied (b) Satisfied (c) Rather satisfied
(d) Less satisfied (e) Not satisfied (f) Very not satisfied.

The enumerators were trained to ask respondents whether they were ‘satisfied’ or ‘not satisfied’ with the service performance of water supply. If they answered ‘satisfied’, they were then asked again what levels of satisfaction: (a) very, (b) medium, (c) rather/low or ‘not satisfied’; or what levels of dissatisfaction: (d) less, (e) not/medium, (f) very.

The study also collected information from non-customers in the three townships. However, the numbers of questions in their questionnaire was only 59 as information about CPSWE’s water supply performance was not asked for, as they might not have experiences related to water supply service. If they were disconnected customers from this enterprise, some open questions in the questionnaire were provided to accommodate their experiences. These were related to their socio-economic and environmental conditions, and focused on information about water resources used by them in their daily life and business activities. Their opinions (such as the possibility of (re-)connecting with the CPWSE service) were also asked. Unfortunately, as the study time was limited there was not enough to explore the information obtained from these non-customers.

For the same reason customers’ views about some topics such as customer relations, although collected in the survey, were not explored or analyzed further. This unused information, as well as that from non-customers, was retained for consideration later on. However, customer relations identified from the results of interviews with the CPWSE management clearly having connections with water supply performance problems are included in the main analysis.

The other water concerns such as about water quantity, quality, pressure and continuity would be considered a more crucial to be evaluated, because these concerns have more important potential implications for people in terms of physical and mental consequences such as public health, meanwhile the implications of customer relations concerns is mainly mental consequences for the customer such as views and actions which could well be changed if the problems of water quantity, quality, pressure and continuity were overcome.

The survey data collection involved six research assistants who were employed and trained.[18] Five of those enumerators were undergraduate students in their final year at the public university in Cinusa City.[19] Two were journalism students and on the faculty newspaper and the other three were active in the student research centre. The other holds an undergraduate certificate from the university. The enumerators were briefed and trained on two days to make them familiar with the purpose of the research.[20] After that, the questionnaire was piloted with several people in a location outside the three township areas.

The first pilot interviews were tried out on 18 people with one enumerator. The enumerator team members and the researcher then discussed and criticized several ambiguous questions with some additional inputs from the pilot project participants. The researcher reorganized the questionnaire and added some new questions, increasing the number from the original 98 to 117. This questionnaire was then tried out on another 18 people and there was no new information from these people that needed to be considered for redeveloping the questionnaire. Five days later, the team questioned these second 18 people again with 37 of the closed questions to check the reliability these questions/answers. Comparisons of the two sets of answers demonstrated a very satisfactory test-retest reliability, particularly in

[18] There were two enumerators, a girl and a boy, in two of the locations. But for Ciloyo, both were male, because this location is considered a ‘Bronx’ or ‘red’ area in terms of safety.
[19] The researcher is a lecturer at this university.
[20] The enumerators already had experience with interviewing activities.

the first stage questions, such as ‘satisfied/dissatisfied’, answering but also with little variations in the subsequent stage, such as ‘degrees of satisfaction/dissatisfaction’, responses.

The interviews in the three sample locations were under the researcher’s close supervision. The choice of names and addresses was made by him[21], and then each enumerator was expected to interview five of these chosen respondents every day. The form of the survey with interviews was useful to overcome problems of misunderstanding that could come from the respondents, such as a few respondents asking the meaning of some questions that were unclear to them. In a few cases, respondents asked the enumerators to leave the questionnaire and asked them to come back later to pick up the questionnaire after they had filled it in.[22] In these cases, the enumerator checked the questionnaires for any blank answers,[23] and asked these questions again later. This could be at the time the enumerator picked up the questionnaire, or by setting another appointment or by phoning[24]. The enumerators were also trained to search for more detailed explanation on certain answers. For example, a question about a family income was sensitive for some respondents. In these cases, they would be asked to describe their monthly expenditures as an alternative to their monthly income. Then the enumerator predicted the income from this.

This survey was conducted in the second period of data collection between November 2003 and April 2004. Respondents were given a plastic bag of food

[21] However, in some cases respondents always not at home, so the researcher gave respondent alternatives along the target street. A general principle was to keep distances of about 5–10 households between respondents in one street location.

[22] Some respondents had other activities at the interview time. They filled in the questionnaire by themselves but also provided a sufficient time for interview later.

[23] Particularly, open questions were suggested to respondents to contribute their opinion.

[24] Most of the customers were likely to leave/write their phone numbers on the questionnaire.

including such as noodles, cooking ingredients, coffee and syrup (see picture in Appendix 4: a packet of food).[25] Most appreciated this gift, especially poorer households.

III. 6. Focus Group and the Process of Data Collection

A focus group is conducted with a certain purpose, therefore people who are involved in the group are usually selected to have characteristics in common so they can share information about a particular topic (Krueger & Casey, 2000, p. 4). Typically between 8 and 12 participants are involved in a focus group with a moderator who maintains the interaction and keeps the discussion within the topic (Stewart & Shamdasani, 1990, p. 10).

Two focus group discussions were conducted within the CPWSE in the second period of data collection. Focus group 1 was for non-technical employees, involving 14 participants, focus group 2 for technical employees, with 12 participants. Although the number in the first group was a little above the normal standard this could not be cut down because of the risk of thereby losing information which could be important as each of the contributing participants represented their own sub-departments.

All participants were at the levels of manager, assistant manager and head of unit. In the two focus groups, the materials provided for discussion had been summarized from information gathered during the previous survey and interviews with the various stakeholders (see focus group discussion materials and results in Appendix 5 and 6). These materials were distributed to all participants one day

[25] Each plastic bag cost about 10 thousand Rupiah, about 1.5 Australian Dollars

earlier. The focus group discussions were aimed to discuss items in these materials or lists of service performance problems, and the groups also discussed some possibilities for handling the problems.

Unfortunately, a number of targets had no date specified for addressing the issues located (see Appendix 5 and 6 the focus group with participants). Several participants in these focus group discussions had difficulties to set up dates of their job accomplishments. But they promised to fill in the detail dates later. The failure to create the target and failure to indicate how the matters could be dealt is mostly related with decision making skills of employees at managerial levels that need to be improved. Employment history in this enterprise was full of collusive and nepotistic systems which often do not support a merit system for recruiting the best performance of employee candidates (see Chapter IV. 3 unmerited recruitment system). A more practical training on decision making and leadership for those employees at managerial positions is useful to improve their skill and capacity.

III. 7. Data Analysis

Data collected from the various methods discussed above were analyzed and presented qualitatively and quantitatively. There were two sources of quantitative data in this study: (i) primary data (collected first-hand) from the survey and interviews; and (ii) secondary data (second-hand) from documents and reports.

Firstly, the quantitative data source from the survey was divided into two categories. The first was from open questions in the survey regarding information from respondents such as particular years and tariffs. The second was reported in percentages derived from qualitative data about respondent's views and opinions in response to closed choice questions in the survey which had been then quantified, coded numerically, using the Excel software program. This data was then transferred into the SPSS software program for further analyses using descriptive statistics. Correlation and regression tests were not used because this thesis was not aimed to test statistically any hypotheses/theories or any relationships among variables. Its purpose, as explained in Chapter I was to identify and indicate interconnections among indicators of service performance problems of water supply, and to develop a model of an outcome performance measurement web. Subsequent research can involve testing this model by correlation and regression statistics.

Secondly, the quantitative data from secondary sources, such as financial and performance indicators reported in some documents, were analyzed. Some of them were recalculated, summarized and displayed in tables.

Quantitative and qualitative data can be complementary, quantitative data backed up with qualitative data and conversely. Qualitative data selected, summarized, paraphrased or subsumed in a larger configuration are a part of the data reduction process (Miles & Huberman, 1994, p. 11). In this study, the qualitative data were mostly analyzed and explored in connection with the aims of the investigation into performance problems in water supply provision. The qualitative data reduction was therefore concentrated on summarizing some views of stakeholders about the performance problems.

As with the quantitative, qualitative data in this study was gathered from both primary and secondary data sources. The qualitative data from the secondary data sources, analyzed and summarized from literature reviews, are mostly presented in Chapters I and II, while the primary qualitative data, gathered from interviews (face to face or email), focus group discussions and open questions in the survey are generally discussed in Chapters IV and V.

Qualitative data are displayed in many forms. As Miles and Huberman (1994, p. 11) mention, there are several alternatives such as ‘many types of matrices, graphs, charts, and networks’. This study uses simple tables and network diagrams, presented in several tables and diagrams. The data analyses and displays are summarized in the conclusions, which were drawn and verified from both quantitative and qualitative data.

III. 8. Summary

This chapter establishes arguments for selecting the complementary combined methods and provides arguments for how the research was conducted. This kind of evaluation research, some would argue that triangulation is unnecessary such as some qualitative research, employed three research methods; case study, survey and focus group discussion, in order to back up information collected from one approach with the other approaches, as a form of triangulation. The case study method used five data sources including interviews, personal communication or email, document analysis, direct observation, and documentation. The triangulation was commonly used in validating the information used to test out the outcome performance measurement model. Combining the three research methods was expected to gather comprehensive and detailed information from the company, the government and society.

The focus of this study is service performances of the CPWSE water supply. Information about the CPWSE performance compared with other Indonesian PDAMs and international water supply enterprises was primarily collected from documents reported by organizations such as the CPWSE, PERPAMSI, BPKP and World Bank so a national and international comparison of this performance information could be used in this case study. Interviews and personal communication were used for inquiring into performance problems in water supply provision. Direct observation and documentation were used for witnessing the problems of water supply service in the field and contextual experiences of the customer.

The survey method combined with interviews was used specifically for collecting data from society or customers. Considering the high numbers of the respondents selected and the expected information gathered from them within a short period time of data collection using this survey method was expected to be efficient and effective. The locus of this study was the Cinusa city. Three neighborhood areas in Cinusa city were selected, and variations between the CPWSE coverage levels and cases of water-borne diseases in these three sampling neighborhoods were mainly used as the basis for the location selection. Respondents were selected proportionately based on their group stratification, as explained in the section on the research survey method.

The focus group method was used specifically for gathering data from the CPWSE management in response to problems of water supply services as summarized from the survey. Conducting two focus groups with the technical department and non-technical department in the CPWSE was to evaluate their responses and possible next steps in dealing with these reported water service performance problems.

The next Chapters IV and V present the result of the data analyses. Chapter IV discusses the performance problems of water supply in terms of cost inefficiency and price policy and their implications; Chapter V presents the same concerns but in terms of water quantity, quality, pressure and continuity.

Chapter Four

Cost Inefficiency and Price Policy

IV. 1. Introduction

This chapter analyzes interconnections between cost inefficiency (input) and tariff policy (output), and evaluates their implications for water users (intermediate outcome) and for social economic and environmental goal achievements (end-outcome/ impact) as described in the Performance Indicator Web of Cost Inefficiency and Water Tariff (see Diagram II.2. to in Chapter II) and in the research evaluation framework (see Diagram III.1 Nr 1-16, 23, 24, 26 and 33 to in Chapter III). In the case of CPWSE, a cost inefficiency analysis is focused on cost items that are not related to the production and distribution of output units of service. A decision to increase tariffs of a certain good or service can be influenced by an increase in the general costs of that good or service. However, an increase in costs and therefore tariffs due to collusive, nepotistic and corruptive practices is not totally ethical or fair for customers who pay these unnecessary costs. It is not ethical, because those who approve the tariff change and set the annually increased dividend are the local governments and parliaments who may be involved in those corrupt practices. It is unfair, because the lower income household customers who must pay a tariff at a rate which is profitable for the water enterprise paying for these profits worsens the already difficult situation of their living costs in relation to their income. Also, because of the additional price increase water users can also decide to use other water alternatives such as taking from wells which endanger the preservation of groundwater.

IV. 2. Cost Inefficiency in the CPWSE: analyzing the Efficiency or Operating Cost Ratio and cost allocation

Efficiency Ratio or Operating Cost Ratio (OCR) is a financial performance indicator comparing costs with income. It indicates how efficiently an enterprise is managing its resources to generate its income, as discussed in Chapter II. 6. The lower this ratio the higher the efficiency. In an international comparison (Table IV.1) the 2003 OCR of the CPWSE based on the World Bank calculation standard[26] was 0.68.

Table IV.1: Efficiency or Operating Cost Ratios of Water Supply Companies in Several Countries[27]

Financial Ind.	**Australia[a]**	**UK& Wales[b]**	**USA[c]**	***CPWSE[d]***	**Africa[e]**	**Indonesia[f]**
OCR	0.39	0.61	0.68	*0.68*	0.95	1.37

Sources: the World Bank 2004, the A Enterprise 2003, and BPKP 2002 (recomputed)
Notes:
a = 1 enterprise (1998 data)
b = 26 companies (2000)
c = 89 companies (1996)
d = (2003)
e = 1 enterprise in Benin, 2 in Nigeria, (1996); 7 in each of Burkina Faso, Cote d'Ivoire, Morocco, Namibia, Senegal, South Africa and Togo (1997)
f = 186 companies (2000)

[26] Excluding costs of depreciation, interest and debt services.
[27] The operating cost ratio for some of the water companies includes costs and incomes for both water supply and sewerage services but for most Indonesian PDAM, including the CPWSE, is only for water supply services.

This was the same as the 1996 average of 89 water companies in the USA, less efficient than the 2000 average of 26 water companies in United Kingdom and Wales at 0.61, much less efficient than that of an Australian enterprise at 0.39, but better than the 1996/7 average of several African companies at 0.95 and much better than the 2000 average of 186 Indonesian companies at 1.37.[28]

Looked at in the greater detail of its monthly financial reports, the score of the CPWSE operating cost ratio (OCR) worsened from 4 points out of 5 in 2001 to 3.1 in 2002 and 2.9 in 2003 (Histogram IV.1). The direction of the scoring of a OCR ratio is opposite to that of the ratio itself; the lower the ratio is scored the lower the efficiency, in other words, the higher the inefficiency.[29]

Although over the 2001-3 period the CPWSE scores of the financial indicators of ROS (return on selling), SOL (Solvency) and RLDR (return on long debt ratio) decreased in similar trends to that of the OCR, these three indicators were still in the 4-5 points top range of the scoring system, along with the other four indicators of ROA, DER, NFA and DCP that remained stable at these top point scores. The EWC score fluctuated, from 3.4 in 2001 up to 4.5 in 2002 then down again to 3.3 in 2003. The company liquidity (LIQ) increased, with its score increasing from 1.2 at the beginning of the period to 3 at the end.

So it can be concluded that the big challenge of the CPWSE is efficiency as this utility's OCR score decreased to 2.9 points over the 2001-2003 period, to be lower than

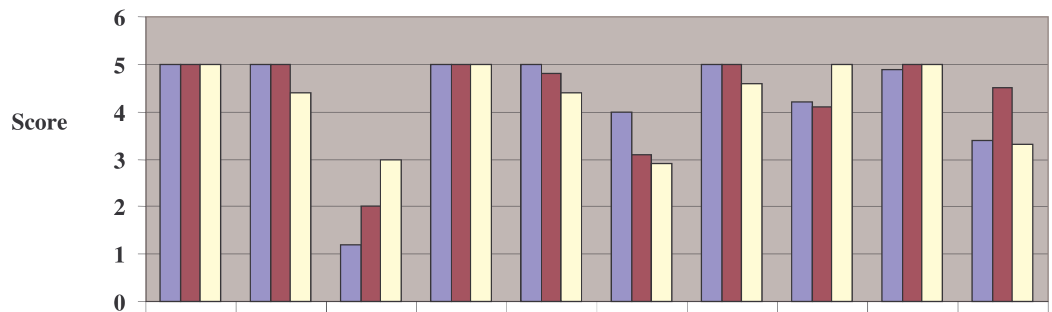
[28] This level of OCR is an alarming indicator meaning 186 PDAMs could only finance about 73 percent of their total operational cost on average, in other words 27 percent of their total operational cost was deficit (BPKP, 2002). 78 percent of 186 PDAMs were operating at a loss. The value of the total losses from this 78 per cent was about 92 percent of the value of the total benefit of the whole 186, thus the benefit value from the profit-making 22 percent of the 186 PDAMs produced only an 8 percent benefit overall from the aggregate total of all 186. The CPWSE was ranked at the second highest position among these 186 PDAMs.

[29] Possible scores range from 1 to 5. The most efficient working ratios are scored at 5 points if the OCR is equal or less than 0.5 followed by 4, 3, 2, and 1 points for the OCR if the OCRs are in the ranges of > 0.5 - 0.65; > 0.65 – 0.85; 0.85 – 1; and > 1 respectively (IHAD, 1999, p. 3), see also Appendix 7.

the scores of the other nine indicators. This study did not analyze all the possible connections among the 10 financial indicators as these were not within the aim of this thesis. The discussion is limited to the explanation of the OCR indicator in relation to only a few other financial indicators, such as the ROA as the indicator of profitability, and to analyses of cost structures: direct and indirect costs.

Histogram IV.1:

Ten Financial Indicators of the CPWSE in 2001, 2002 and 2003[30]



	ROA	ROS	LIQ	DER	SOL	OCR	RLDR	NFA	DCP	EWC
2001	5	5	1.2	5	5	4	5	4.2	4.9	3.4
2002	5	5	2	5	4.8	3.1	5	4.1	5	4.5
2003	5	4.4	3	5	4.4	2.9	4.6	5	5	3.3

Source: the CPWSE financial reports 2001, 2002 and 2003 (recomputed)
Notes:

ROA = Return On net fixed Assets;
ROS = Return On Selling;
LIQ = Liquidity;
DER = Debt Equity Ratio;
SOL = Solvency
OCR = Operating Cost Ratio:
RLDR = Return on Long Debt Ratio;
NFA = Net Fixed Asset ratio on water income;
DCP = Debt Collection Period;
EWC = Effectiveness of Water Charge Collection

[30] See Appendix 7: The scoring system of PDAM financial indicators from IHAD.

In the previous national and international comparisons the CPWSE seemed to be operated far more efficiently than the other Indonesian public water companies but this is shown to be misleading when another comparison is made, that of direct and indirect cost allocations. 'Direct costs' are those allocated which are directly related to the production and distribution of water while 'indirect costs' are those related to general and administrative activities.[31] During 2001-2003 more than half (53%) of the CPWSE budget was spent on indirect costs (Table IV.2). The CPWSE's proportion of indirect costs was much higher than the average of 31% for 184 PDAMs in Indonesia and just over double the 24.6% average for the 36 PDAMs sourcing their water from springs, as does the CPWSE[32] (BPKP, 2002; the CPWSE, 2002).

Table IV.2:

CPWSE Direct and Indirect Expenditure 2001, 2002 and 2003

Costs	2001		2002		2003		Ave
	Mill. Rupiah	%	Mill. Rupiah	%	Mill. Rupiah	%	%
Direct Cost	12,216	45.7	14,421	47.8	16,615	47.7	47.0
Indirect cost	14,496	54.3	15,780	52.2	18,241	52.3	53.0
Total	26,712	100	30,200	100	34,856	100	100

Source: Calculated from the CPWSE financial and performance reports 2001, 2002 and 2003

These figures also mean that the proportion of direct costs in PDAMs using raw water materials from springs is reasonably higher, because the difficulty in accessing these water resources located in distant hills or mountains will influence costs of production or direct costs. By and large, as also shown by the cost structure of Indonesian

[31] The direct and indirect cost terminology and allocation is also used in the CPWSE accounting system that follows the national accounting standard.
[32] The quality of the water raw material and the difficulty in accessing it from a river, spring or lake will influence costs of production or direct costs.

PDAMs, direct costs dominate the total cost. However, the CPWSE has a weighting, with the majority of its costs being indirect. Moreover, after a proportional drop from 2001 to 2002 its indirect costs increased relatively again from 2002 to 2003.

Additionally, during the 2001-2003 periods, the trend of the CPWSE's cost growth was not promising for a better condition. This utility's cost growth was higher 2 percent in the final year compared with the previous one (Table IV.3).[33] A similar trend is also found in the growth of indirect costs, which were 6.7 percent higher in 2002-2003 than in the previous year.[34] It can be concluded that this indirect cost growth contributed to the climb of the total costs during this period.

Table IV.3:

The Growth of the CPWSE Expenditure in 2001-2002 and 2002-2003

Costs	% of Growth in 2001-2002	% of Growth in 2002-2003
Direct Cost	18	15.2
Indirect cost	8.9	15.6
Total Average	13.4	15.4

Source: the CPWSE financial and performance reports 2001, 2002 and 2003 (recomputed)

The opposite trend is in the direct cost growth in 2002-2003 which was lower 3.2 percent than the prior period. The reduction of the direct cost growth can also be affected by the payment of some bribery costs for the neighborhood local government in 2001 as explained latter. These extra costs are used to obtain permission from this local government in where the spring located in this neighborhood regency supplies the highest

[33] In the CPWSE and PDAM, costs are divided into direct cost and indirect cost. The direct cost is an object cost that is directly related to water production and distribution activities. On the other side, the indirect cost is an object cost that is indirectly related to water production and distribution activities.

[34] According to Horngren et al. (1996, p. 28), the direct costs of a cost object are those costs that can be traced to the cost object in an economically feasible way. For the indirect costs, it has a reverse meaning from the definition above. Economically feasible means cost-effective that is, the benefits exceed the costs.

proportion of the CPWSE raw water materials. This is a part of the CPWSE's corporate plan in increasing its water production capacity.

The later section mentions three sources of cost inefficiencies in the CPWSE including corrupt, collusive and nepotistic practices that cause cost burdens in this utility. The explanation of the CPWSE's cost inefficiency in managing its resource cannot be separated with aspects of political interferences of the politicians and bureaucrats in the Cinusa local government to several key policies related water supply arrangements.

IV. 3. The unmerited recruitment system in the CPWSE: implications of collusive and nepotistic practices on costs

Wages are the largest component of the CPWSE's monthly expenditure, leaving relatively little capacity to invest in increasing its service performance. This high wage cost has not been based in the most efficient employment practices. According to the CPWSE human resource manager the recruitment of employees in the past was mostly through collusion and nepotism (interview, 15 March 2004). Two other staff made other pertinent claims:

> The CPWSE is a family enterprise. It is easy to know the history of somebody becoming employees here. The current managing director became an employee of this enterprise when his father was the military commander in this province. The current manager of water distribution is a son of the past general and administrative director. His older sister also works here as one of the unit heads in the customer relations division (interview, 18 March 2004).

> If someone who becomes a CPWSE employee does not have family relative connections here, she or he should have a capacity as an entertainer such as a singer and a dancer or as a sports player, especially a soccer player - as the Cinusa government in celebrating and assisting some events asks this utility's management to provide entertainment services for them and to support the Cinusa city soccer team. This is the reason why talented people in the performing arts and sports --- [as a collusive practice] --- are recruited in this enterprise' (interview, 18 March 2004).

In the case of the Cinusa city soccer team owned by the Cinusa local government, the CPWSE human resource manager said:

> It is the tradition that the CPWSE has acted as the donator or financer for the Cinusa soccer team for many years. The CPWSE also pays several employees who do not entirely work here. These employees are also a part of the Cinusa soccer team as this team's coach and players. Most of their time and energy are spent for this soccer team because they regularly travel to many locations across the country for the yearly national soccer tournament or competition. The management cannot do anything to these persons who hold work dispensation letters from the Cinusa Mayor as the owner of both: the CPWSE and this soccer team' (interview, 15 March 2004).

The CPWSE's unmerited recruitment system is a common phenomenon in Indonesian PDAMs. In the 2003 study field report of USAID-PERPAMSI about empowering 15 selected PDAM cases through stakeholders, the PDAMs from the Pekan Baru city and the Gowa regency mentioned that some influential officers in their local governments still kept instructing these PDAMs to recruit some new employees who they recommended; and the legislative assembly in Padang Panjang clarified that any kind of government intervention in the PDAM recruitment system ought to be stopped (PERPAMSI, 2003b, p. 5-22).[35] Stakeholders from 10 PDAMs, local governments and parliaments in this report sated that the recruitment process of their PDAMs' directors could not be based on a fit and proper test because this test had not been created (PERPAMSI, 2003b). Bureaucrats and politicians can manipulate the PDAM recruitment system for their private interests in the absence of clear, fair and transparent arrangements of this system.

In the CPWSE case the consequence of this previous employee recruitment system is that the employee numbers are overloaded. Based on the Indonesian Home Affairs Department performance measurement guidelines (IHAD 1999) the ideal number

[35] The field research for this report was conducted in 15 selected cases studies from 5 May to 11 June 2003.

of employees is 5 for every 1000 connections. In 2003 the CPWSE's ratio was 7 per 1000 (Table IV.4). Nevertheless, this figure is less than the 2000 Indonesian PDAM average of 11 per 1000 and a 1996/1997 sample of African companies with 12 per 1000. However, compared to the averages of United Kingdom and Wales water companies in 2000, American in 1996, and an Australian enterprise in 1998, with 2 or less per 1000 the CPWSE employee/connection ratio was at least 3.5 times higher (Table 1V.4).

Table IV.4:

Staff/1000 Connections of Water Companies in Several Countries[36]

Staff	UK& Wales	USA	Australia	*CPWSE*	Indonesia	Africa
Staff/1000 connections	1.5	2	2	*7*	11	12

Sources: Calculated from World Bank 2004, the CPWSE 2003 and PERPAMSI 2002
Notes: Companies are as in Table IV.1 except for the PERPAMSI 2002 Indonesian figure which refers to 189 water companies

Further analysis shows that the CPWSE employee cost, although proportionally decreasing slightly over the period, remained the largest component in the total operational cost during 2001-2003 even with a policy of retirements and suspension of new employment for the latter two years (Table IV.5).

Table IV.5:

The CPWSE Employee Cost and Operational Cost 2001, 2002, and 2003

Costs	2001	2002	2003	Ave

[36] For this comparison, sewerage staffs of water companies in UK and Wales, USA, Australia, and Africa have been excluded.

	Mill. Rupiah	%	Mill. Rupiah	%	Mill. Rupiah	%	%
Employee	10,962	41.0	11,731	38.8	13,110	37.6	39.2
Total cost	26,712	100	30,200	100	34,856	100	100

Source: Calculated from the CPWSE financial reports 2001, 2002 and 2003

Using the World Bank formula for calculation (excluding costs of depreciation, interest and debt services) the CPWSE's 2003 labour cost was 44.49% of its total operating cost. This is double the 1996-1997 average of African water companies, nearly double 1996 American figures and well above that for an Australian enterprise (Table IV.6).

Table IV.6:

Ratio between Labor Cost and Operational Cost in Several Countries

Ratio Between	Africa	USA	Australia	*CPWSE*
Labor cost and operating cost	22.34	27.17	32.62	*44.49*

Sources: Calculated from World Bank 2004, the CPWSE 2003
Notes: Companies as in Table IV.1.

From the CPWSE's annual reports, most (71.6%) of the employee cost can be allocated to indirect costs (Table IV.7). This is reflected in the labour composition, with about 54% of employees (295/546 people) designated as working in the non-technical department, about 32% (174/546) in the technical department number and the other 14% (77/546) across both (the CPWSE, 2003). The balance of this distribution is opposite to the national average. Across 156 Indonesian PDAMs in 2000 only 47% of the total labor forces of 24,630 were classified as non-technical with 53% working in the technical departments (PERPAMSI, 2000). It appears that the CPWSE places its 'surplus employees' in the non-technical department as an indirect cost in its cost structure.

Table IV.7:

Direct and Indirect Cost of the CPWSE Employees 2001, 2002 and 2003

Cost of Employee	2001		2002		2003		Ave
	Mill. Rupiah	%	Mill. Rupiah	%	Mill. Rupiah	%	%
Direct Cost	2,996	27.3	3,302	28.1	3,877	29.6	28.4
Indirect Cost	7,966	72.7	8,429	71.9	9,233	70.4	71.6
Total	10,962	100	11,731	100	13,110	100	100

Source: Calculated from the CPWSE financial reports 2001, 2002 and 2003

As shown in the figure above, in general more employees in the water supply business are allocated to the technical department, with a PDAM needing relatively fewer employees in its non-technical departments. For example, marketing employees as a part of non-technical departments in a PDAM are not really vital in this kind of monopolized water business which is totally different from highly competitive businesses such as insurance companies or banks requiring many employees for marketing their services. Employees in the water supply service are more required in the technical department as a PDAM needs many technical employees for ensuring their piped water is delivered to customers safely and hygienically.

The situation above is the indication that the past recruitment system should not be continued in the current situation as it has been carrying cost burdens in the CPWSE. These cost burdens of employees seem higher at the end of the 2001-2003 periods (Table IV.8). The employee cost growth in 2002-2003 was 5.45 percent higher compared with the previous year. Similar patterns of increasing growth also occurred in both direct and indirect costs of employees, higher at 7.2 percent and 1.5 percent respectively in the latter year compared with the previous one.

Table IV.8:

The Growth of Direct and Indirect Employee Costs in the 2001-2003 periods

Employee Costs	Growth in 2001-2002	Growth in 2002-2003
Direct Cost	10.2 %	17.4 %
Indirect cost	5.8 %	9.5 %
Total Average	8 %	13.45 %

Source: Calculated from the CPWSE financial reports 2001, 2002 and 2003

For these purely technical reasons, the CPWSE employee/customer ratio should logically be below the national average, perhaps closer to those of the British, American or Australian water companies referred to above. The number of this utility's employees, especially in the non-technical department, should be reducible. However, this is not politically easy and would raise strong opposition. According to the CPWSE managing director:

> Reducing employees in the current political situation has to be done wisely. The CPWSE reduces its employees gradually through pensions and has stopped adding new staff. A radical way through firing unproductive employees is a risky way to invite a labour strike. When a demonstration happens, a risk of losing his position will be faced by both this enterprise director and the Mayor as the owner. If the Legislative Assembly is involved in the situation it would become a political game to inquire whether the Mayor and this enterprise director still have the capacity to manage the situation. To cool down the situation would be costly and time consuming. It can be foreseen how much extra costs would have to be spent by the CPWSE to members of the Legislative Assembly (interview, 26 March 2004).

In the new era of governmental decentralization in Indonesia[37] local parliaments have more influence over Mayors than was in evidence previously, with the Cinusa

[37] Based on the National Parliament's Local Autonomy Law Nr. 22/1999.

Legislative Assembly now empowered to elect the (previously centrally-appointed)[38] Cinusa Mayor and to replace him if it twice rejects his fiscal year-end administrative report (Okamoto, 2001). A labour strike in the CPWSE could be used by the local parliament to attack the Mayor as the owner.

The previous recruitment system through nepotism and collusion has created a problem of over-employment for the CPWSE with employees having become its single largest cost each year. However, a significant reduction in numbers could invite a labor strike that both this utility management and the Mayor would like to avoid. As mentioned in the field research report of USAID-PERPAMSI, the Pekan Baru PDAM faced the same situation in which its management felt that recruiting employees was easy but firing unproductive employees was more difficult (PERPAMSI, 2003b, p. 18).

Firing or retrenching employees without their demonstrating may be possible if they are compensated adequately. Unfortunately, the CPWSE does not have the financial capacity for this (interview with a senior member of the management, 26 March 2004). The CPWSE management considers carefully the possible consequences from any kind of policies related to an employee retrenching process. For example, contracting jobs has been considered as an alternative, as mentioned by the technical director in an interview on 18 March 2003:

> There are too many jobs in the CPWSE outside the primary job as water production and distribution that must be handled by this utility employee. Secondary jobs such as repairing of vehicles, air conditioning machines and computers should be outsourced to professional hands, because this enterprise's employees are not prepared for these kinds of jobs. Having problems with these secondary jobs can suspend primary jobs being accomplished. For example, when the CPWSE computers had problems, it took time to fix them. This condition caused problems when customers paid their water bills. If this company computer system is outsourced to computer companies, we can ask them to replace directly the failed computers within a day as usually arranged in the contract

[38] The Home Affairs Minister formerly appointed the Mayor from 3 candidates proposed by the local parliament.

> agreement. If these outsourcing companies do not perform well, their contracts or services can be suspended or canceled. Two secondary jobs in the CPWSE including asphalting and gardening have been outsourced. In fact, outsourcing companies in these two cases perform well. The CPWSE pays less in comparison with these jobs conducted by our internal employees in the previous time. This company is not worried with problems related to labor strikes (interview, 18 March 2004).

This shows that the company management has been considering outsourced secondary jobs or non-core jobs of water production and distribution. It is also an indication that the CPWSE management has considered leaving the previously unmerited recruitment system. In the new era of the Indonesian democratic political system a fairer, more merit-based recruitment system is required.

However, there is a condition that is still maintained by this company management, which was mentioned in the focus group discussion on 25 March 2004:[39]

> Secondary jobs that are going to be contracted out are under the condition that the CPWSE employees who previously did these jobs can be reallocated into other job places. So, the outsourcing activities will not cause some of the employees to not have any job. In addition, job performances of outsider workers are required to perform much better and to cost less or be more cost efficient compared with if these jobs were done by this utility's own employees.

So contracting out some jobs in the CPWSE has been this company management's alternative if it considered that the situation was conducive. This enterprise also realizes the cost inefficiency from being overloaded with unnecessary employees but in the current political and financial system it is better for both the CPWSE management and the Mayor to maintain job numbers and to avoid reducing its employees.

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[39] This focus group involved the CPWSE managing director, the technique director and the other 10 employees from this utility technique department as managers, manager assistances and heads of unit. The material discussion in this focus group is focused on service performance problems of water supply (see Appendix 5).

IV. 4. Political Interference from Local Government and the Legislative Assembly into the CPWSE management: implications of corruption on costs

Two bribery cases that involve politicians are presented in this section. The first case is when the CPWSE management acquired permission to increase its water intake from the water spring located in the neighboring regency. The second case is when this company obtained permission to raise the water tariff.

Firstly, in 2001the CPWSE management was granted permission to take additional water from the spring in a neighboring regency at 500 litres per second. Raw water materials taken from this spring are the biggest proportion of all the water resources the CPWSE uses to serve the Cinusa customers, the source of about 70 percent from its total water production. The 500 litres per second of water-taking is a quite significant amount. The total CPWSE production capacity in 2003 was 1,249 liters per second (CPWSE, 2003) so this additional approved water-taking is about 40 percent of this total. Nevertheless, the granting of the permission was not without any cost. The CPWSE managing director mentioned:

> The permission was granted if only this neighboring legislative assembly agreed on the CPWSE's proposal to increase its water takings. Forty five members of this parliament member had rights to decide whether this utility plan would be accepted or not. The agreement process could be time-consuming, but the result would be uncertainty. To speed up the process and to obtain a 'yes' approval, this enterprise paid off 5 million Rupiah to each member of this local assembly in 2001. The CPWSE also paid off to high rank bureaucrats in this neighbouring local government. Otherwise, the permission would be far from their agreement (interview, 26 March 2004).

So the total amount of money spent can be estimated at about 225 million Rupiah for only the members of this neighboring parliament. This figure is close to the calculation in this study of an extra payment in the raw water tariff cost of 278 million Rupiah in 2001. The 53 million Rupiah difference between the two figures is predicted to be the amount used to pay off some higher ranking government officers in the neighboring governmental bureaucracy. The 278 million Rupiah cost is derived from the remarkable amount of water payment to neighboring government in 2001.

The average of the water tariff in 2001 at 21.4 Rupiah per m3 is questionable because this tariff was higher than the following two years' 16.3 and 18.4 respectively (Table IV.9). According to the CPWSE director of finance and administration:

> Two main considerations of water tariff have increased. Firstly, the tariff of raw water materials from the neighboring local government has gradually been raised every year. Secondly, the water tariff is also influenced by yearly inflation rates which were not more than 15 percent in the three years. So this utility's tariff is reasonably increased 2 Rupiah per year (interviewed on 18 March 2004)[40]

Table IV.9:

The CPWSE Water Levy and Production in 2001, 2002 & 2003

Year	2001	2002	2003
Water levy	851,611,980	618,755,086	710,285,125
Water production in m^3*	39,720,606	37,999,578	38,695,892
Water levy per production in m^3	21.4	16.3	18.4

Source: Calculated from CPWSE financial reports 2001, 2002 and 2003
Notes: *Water production from the area inside Cinusa is excluded from the calculation because this water-taking in the internal area of this city is without a charge.

In a normal situation, the raw water tariff in 2001 was basically about 14.3 Rupiah per m3. In fact, the CPWSE paid 21.4 Rupiah per m3 in 2001 (Table IV.9). The 7 Rupiah extra payment per m3 of water is suspected to be used for other costs, for paying the water charge to the neighboring local government, as in Table IV.9. It is predicted that this extra cost was used for paying bribes to politicians and bureaucrats there.

[40] As a comparison, the inflation rate in Cinusa in 2001 was 12.45 percent, then 9.75 percent in 2002 (Central Bureau of Statistics in Cinusa, 2001 and 2002).

If the extra 7 Rupiah is multiplied by the total water production in 2001, the total extra money paid in that year by the CPWSE was about 278,044,242 Rupiah. If this money had been used to paid laborers under the 2001 minimum salary standard in Cinusa city of 325 thousand Rupiah per month (Bromo Central Bureau of Statistics, 2001) it could have been used to employ 855 of them. So this extra money, which is quite significant in terms of the total amount, is an inefficient cost for the CPWSE which could ideally have been used to finance essential activities for improving the city's water supply services.

Secondly, the CPWSE's 2003 water tariff increase involved elements of corruption. According to the CPWSE managing director, one reason for the general increase at this time was that:

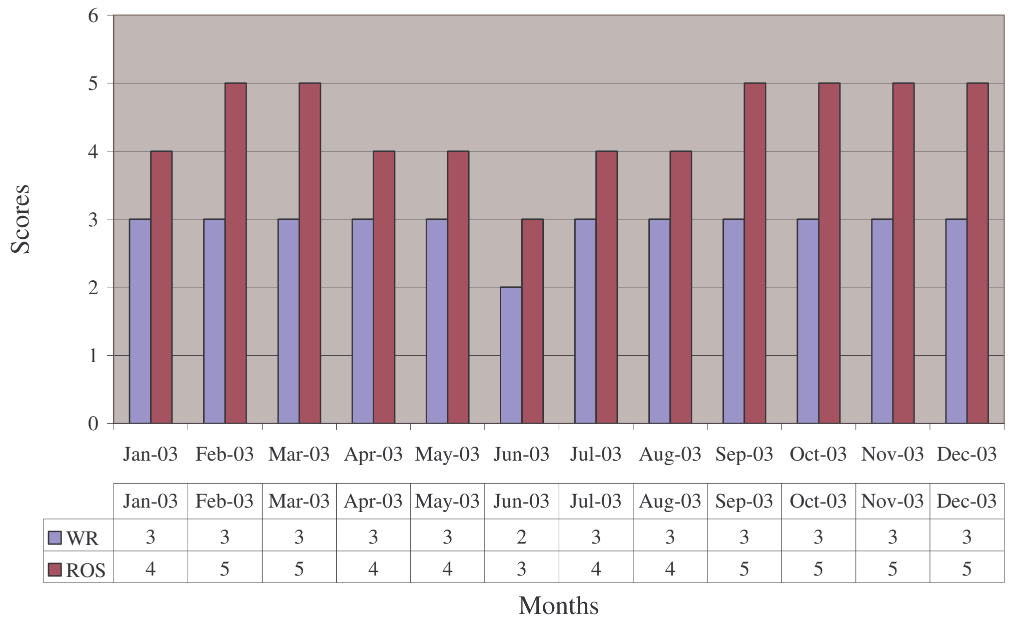
> In the last two years the CPWSE had not raised its water price. Another reason is that timing to get permission for a tariff change was politically effective. At that time, members of the Cinusa parliament were giving their attention to supporting their candidate for the Mayor's position in Cinusa. Politicians wanted some extra money to ensure the success of their candidate. To postpone the tariff climb until 2004 would be riskier because the new parliament election is in the beginning of 2004. So it would be more difficult to obtain approval of a tariff increase from the parliament when members of parliaments were trying to win sympathy from electors. To get approval from the parliament this enterprise paid off 5 million Rupiah for each non-high-ranking member of the Cinusa parliament. Parliament members who had a higher position in the structure were granted a bit higher than the average. As well, the CPWSE had to share some cash with higher rank officers in the local government (interview, 26 March 2004).

This informant also complained that in the past era of the authoritarian government of Soeharto the CPWSE only paid off a few people in the higher rank of the bureaucracy to get approval and did not need to deal with all politicians in the parliament (interview, 26 March 2003). This indicates that corruption has tended to increase in the new era of more local autonomy. In other words, a political cost from the new autonomy has been increased cost inefficiency in the public water enterprise.

For the CPWSE, the money paid to politicians and bureaucrats in the month before the price rise in 2003 was an extra cost burden so contributed to a lower financial performance of this enterprise. In the balance sheet this extra cost was allocated to monthly expenditure thus raising the total operational cost in that month. As the consequence, the CPWSE's working ratio was scored lower, at only 2 points, in June 2003 or one month before the price increase, indicating lowered financial efficiency[41], and causing the reduction of the enterprise's profit, that month's profitability ratio (ROS) decreasing to 3 points.

Histogram IV.2:

Scores of the CPWSE's Monthly Working Ratio in 2003



	Jan-03	Feb-03	Mar-03	Apr-03	May-03	Jun-03	Jul-03	Aug-03	Sep-03	Oct-03	Nov-03	Dec-03
WR	3	3	3	3	3	2	3	3	3	3	3	3
ROS	4	5	5	4	4	3	4	4	5	5	5	5

[41] As recorded in the CPWSE monthly financial reports for 2001-2003, based on the Indonesian Home Affairs Department's performance measurement standard (IHAD 1999) the WR of the month before the price rise in 2003 was 2 points, the lowest figure for the 2001-2003 period.

One of the CPWSE managers in an interview (15 March 2004) stated that such extra money was usually placed in the indirect costs as Other Unidentified Costs (OUC). The total OUC in 2003 was about 2.4 billion Rupiah (Table IV.10). As was mentioned in the interview with the senior member of the management, an ordinary member of the local parliament was given 5 million Rupiah with some paid more, plus some bribe money was also paid to several bureaucrats in the local government. Therefore, the total bribery cost for the price rise in 2003 can be roughly predicted to have been about 300 million Rupiah. This figure was only an eighth of the total expenditure for the year's OUC with the remainder of the total, much of it donations, still not fully accounted for.[42]

In 2003, the total for expenditures classified as OUC was 13.4% of the total indirect cost (Table IV.10). This was a higher proportion than for 2001 or 2002 and accounted for about 64% of the growth in costs between 2002 and 2003.[43] This should be a cost inefficiency signal for the CPSWE.

Table IV.10:

Other Unidentified Costs (OUC), Other Identified Costs (OIC) and Indirect Costs of the CPSWE 2001, 2002 and 2003

Costs	2001		2002		2003		Ave
	Mill. Rupiah	%	Mill. Rupiah	%	Mill. Rupiah	%	%
OUC	1,729	11.9	1,493	9.5	2,444	13.4	11.6
OIC	0	0.0	1,192	7.6	1,156	6.3	4.6
OUC+OIC	1,729	11.9	2,684	17.0	3,600	19.7	16.2

[42] On several occasions such celebrating New Year/ Christmas and Idul Fitri days, campaigning political elections, traveling for politicians, and serving guests of the Cinusa local government and assembly the CPWSE also grants money to politicians, bureaucrats, journalists, political parties, NGOs, community leaders and organizations. These findings cannot all be explained here.

[43] A comparison with the 2001 OUC is not appropriate because Other Identified Costs (OIC) in 2001 were not calculated as in 2002 and 2003 (see Table IV.10, Note).

Indirect cost	14,496	100	15,780	100	18,241	100	100

Source: Calculated from the CPSWE financial reports 2000-2003
Note: OIC in 2001 is not available because this cost was included in OUC. In the 2002 and 2003 financial reports OIC were separated out and presented in four cost categories: research and development; management consultants; transportation; guests and meetings.

The 2003 OUC was almost 2.7 times the total the enterprise allocated for investment in that year (about 918 million Rupiah, 15% of its total operating profit of 6.1 billion Rupiah). Obviously, minimizing the OUC would significantly save money that could be used to improve the CPSWE's service performance through increased investment and to compensate retrenched unproductive employees by funding an early retirement program.

As rent seekers (as explained in chapter I) in exchange for their discretionary powers the politicians and some bureaucrats are increasing the costs and so they reduce the efficiency of the CPWSE and thus its profit. The cases of corruption and unmerited recruitment practices reported above are the consequences of political intervention in some policies related to decisions on water arrangements. One international expert, acting as a consultant in PERPAMSI for the 2003 PDAM benchmarking project, mentioned that making improvements in the PDAMs' performance was difficult because of extensive owner intervention in their management system so separating PDAMs' ownerships and their management was the best alternative, through divestiture or non-divestiture strategies (interview, 19 November 2003).[44]

This kind of argument is reasonable within a corridor of the privatization movement, but a clear separation between PDAMs' owners and management does not mean that those PDAMs automatically perform well. In the absence of fair and

[44] This informant did not allow this study to mention his name.

transparent accountability of the PDAM performance to the public the PDAM management can misuse their extensive power for private interests as the local politicians do. So performance indicators are argued to be a means for holding stakeholders accountable in the early detection of misconduct in PDAM.

Misconducts of politicians, bureaucrats and the CPWSE management as discussed in the cases above do not only cause cost inefficiency, but also these actions are unfair and unethical. Politicians in the government and parliament also insist the CPWSE increases its yearly share of profit to the government as explained earlier in Chapter I.5 and the policy alternative to increasing efficiency chosen by this utility is through general increases in the price charged consumers for water, most recently in the revision of 2003. Poorer customers who must be subsidized under the Central government regulation as explained in chapter I have paid their tariff bill at profitable tariffs explained later. So, these poorer customers have partly financed cost inefficiencies in the CPWSE. The next section evaluates implications of price policy and subsidy schemes.

IV. 5. Price Policy and Subsidy Scheme: evaluating social economic and environmental implications

The last two tariff changes for water supply by the CPWSE were in 2001 and 2003, the same years as the two big cases of corruption in term of their numbers as investigated in the earlier section. There were obviously no official documents in this company mentioning that increasing costs because of bribery practices were the reasons the CPWSE management raised the water price. However, connections between tariff changes and the two cases of corruption are clear enough to claim that the tariff policies have been used by management to back up cost inefficiencies. The implications of a tariff policy change are quite significant, especially for poorer household customers as explained later. The further explanation concentrates on the 2003 tariff change.

Through the agreed price rise two of the three areas of the local governance system, the private and public sectors, were thus mutually supporting each other in satisfying each others' immediate needs but the third branch, society or the general public, weakly represented in the local system, can fairly be considered as a victim. Water policies related to the public are mostly designed and determined by the local company, local government and the local Legislative Assembly while the financial and social cost of tariff rises are borne by the public, especially felt by water customers.

Periodic price increases can maintain the sustainability of water companies as well as being one way for some to raise their profitability. Nevertheless, in terms of effectiveness and of equality the setting of price policy should consider implications for the poor.

In the case of the CPWSE, the newly increased water price of 21 US cents per cubic metre is higher than the average 2000 Indonesian PDAM tariff of 14 US cents. However, this enterprise's operational cost of 15 US cents per cubic metre sold is less than half the 31 US cents the national average was at that time as the CPWSE's water production and distribution costs are generally lower than other PDAMs'. For every cubic metre sold the CPWSE makes a profit of about 6 US cents, when the average of all PDAMs is minus 17 (Table IV.11). So a tariff increase for some PDAMs is a concern of sustainability for their existence while for the CPWSE it is a matter of profitability.

Table IV.11:

Average Tariff, Operational Cost/Cubic Metre Sold, Average Profit/Cubic Metre Sold and Profitability among Water Supply Companies in Several Countries

In US$[45]	**Australia**	**UK& Wales**	**USA**	**Africa**	***CPWSE***	**Indonesia**
Average tariff	1.47	1.8	0.97	0.47	*0.21*	0.14
Operational cost / m^3 sold	0.57	1.03	0.53	0.4	*0.15*	0.31
Average profit/ m^3 sold	0.9	0.77	0.44	0.07	*0.06*	-0.17
Profitability (profit/cost)x100%	158%	75%	83%	18%	*40%*	-55%

Sources: Calculated from World Bank 2004, CPSWE 2003 and BPKP 2002
Notes: Companies as in Table IV.1 with the exception of Indonesian water companies which use 2000 data from 137 companies (BPKP 2002)

However, other companies outside Indonesia can accumulate higher nominal average profits than the CPWSE. In 1998 one Australian water enterprise could get a surplus of 90 US cents per cubic metre sold in 1998 or fifteen times the CPWSE's 2003 figure which was also only a thirteenth of the 2000 average of the British water companies and a seventh of 1996 American levels. Ranking companies' relative profitability or rate of profit (profit/cost) shows a similar order but with much lesser differences (Table IV.11).

According to the CPWSE's 2003 financial data its total income per cubic metre of this enterprise increased 31.6% over the 6 months after the price rise in 2003 compared to the 6 months before it, by 5.75 billion Rupiah to 23.9 Billion Rupiah. This additional income is almost the same as the CPWSE's total after-tax profit of 6.1 billion Rupiah for 2003. This significantly added income suggests why this utility management prioritizes

[45] The conversion used for Indonesian currency is that on 5 December 2003: 1 US$ = 8,000 Rupiah (Central Bank of Indonesia, 2004).

tariff policy in increasing income.[46] The extra money given to politicians and bureaucrats to gain their permission for the most recent tariff revision was not without calculation of its cost-benefit effectiveness. The added income over just the first 6 months after the tariff is about 19 times the estimated 300 million Rupiah costs of the bribery cost. This additional income can be used to subsidize poorer households (Consumer Type IIA[47]) who is currently charged at a Break Even Price (BEP) if they consume 15 cubic metres or less water per month. If their water consumption is more than 15 cubic metres per month, the progressive tariff is applied and they are charged at a profitable price for all above 15 (CPWSE, 2003).

In the current CPWSE tariff revision, the BEP tariff was set at 900 Rupiah per cubic metre water sold. This figure was close to the World Bank's estimate of 1,078 Rupiah for this enterprise's 2003 BEP tariff as mentioned in the CPWSE report on the 2003 tariff revision prediction 2002. However, although the BEP tariff is non-profit-making there is no tariff level set below this, meaning that a subsidy scheme for the poorer or lower-income households is not available. The CPWSE does not subsidize these poorer household customers who have paid at the minimum cost recovery level or the BEP tariff, even though their minimum tariff is higher than the other household types but still lower than social customers (see customer classification in Appendix 2 and the

[46] Another income raising possibility for the CPWSE would be through further extending its number of customers in its potential market, estimated in December 2003 at about 35 percent of the total local population (see Chapter V). However, this company currently has insufficient financial capacity for a big investment in increasing its water production capacity, unless it be financed from debts.

[47] 'Customer type IIA, IIB and IIC', defined as households with the width of streets in front of their house less than 3 metres, between 3 and 6, and 6 and 9 respectively. 'Customer type IID' are defined as households located on primary, twin, protocol, secondary streets, and having other particular services of a high economic value with the width of streets in front of their houses from 9 meters up. This IID category also includes households in an elite housing complex and real estates with a high economic value with the width of streets in front of their house started from 6 metres up. 'Customer type IIE', defined as households which run a profitable business activity in their house with the width of streets in front of their house between 3 and 6 metres. This IIE category includes small shops in semi-permanent buildings with the width of streets in front of their house from 6 metres up.

2003 progressive tariff in Appendix 8). This is against the national tariff regulation and social mission of the CPWSE as mentioned earlier in Chapter I.

Generally, the average tariff for all CPWSE customer types excluding the social customer[48] in six months (January-June) after the price rice in 2003 is 1,718 Rupiah per cubic metres in average or over the BEP price (Table IV.12). The implication of this tariff rise is in the reduction of average water used by social, government and industry customers (Table IV.12).

Table IV.12:

Tariff on Water Sold and Water Use by Customer Type

Tariff in Rupiah per cubic metre water sold	Customer Classification						
	Soc.	Hh.	Gov.	Bus.	Ind.	Tank	Average
Six months before the price rise in 2003	527	1136	3557	3665	5157	566	1281
Six months after the price rise in 2003	844	1472	3861	4257	6931	970	1718
Cubic metres of water used per customer							
Six months before the price rise in 2003	127	24	295	41	80	57379	29
Six months after the price rise in 2003	105	25	275	41	68	60885	29

Source: the CPWSE monthly financial reports, 2003
Note: Soc.=Social, Hh.=Household, Gov.=Government, Bus.=Business, Ind.=Industry

Those relinquished customers together with non-accessibility population having other alternatives of water sources such as well water can decrease groundwater reservation, especially if their water-taking activities are uncontrollable (see Chapter V). Taking water from the ground is just as bad for the environment however; considering the

[48] Social customers comprise type I A: public tap, public toilet, and water terminal; type IB: social foundation, orphanage, disable foundation, and religious places; and type IC public schools; neighborhood meeting hall, and vocational job training hall.

average amount of water used by social and industrial customers in the six months after the 2003 price rise is relatively high at 105 and 68 cubic metres per month which were far from the total average of all customer water consumption at 29 cubic metres per month (Table IV.12).

In particular industrial customers mostly use bore well water. There were 45 CPWSE industrial customers in the six months after the 2003 price increase (Table IV.13) which is only 21 % of the 218 industries located in Cinusa[49]. High water tariffs along with other reasons including reliability and accessibility of the CPWSE piped water (see Chapter V) and a weak regulation of groundwater-taking (Chapter I) are the causes of some customers choosing alternative water from other resources. Tariffs for direct uses of underground water from bored wells should be set at a competitive level with this utility tariff. However, the arrangements for exploiting underground water are set up and priced by the provincial, not the local, government so coordination among the various governmental levels is important.

Table IV.13:

CPWSE Customer Numbers and Classification

(January and December 2003)

Customer Number	BWSE Customer Classification									
	Soc.	Household					Gov	Bus	Ind	Tank
	I	IIA	IIB	IIC	IID	IIE	III	IV	V	VI
Jan-03	1,710	28,297	24,227	13,003	7,661	592	363	2,828	48	1
Dec-03	1,509	28,529	24,385	13,108	7,867	621	536	2,864	45	1
Gap	-201	232	158	105	206	29	173	36	-3	0

[49] As reported in the 2002 Cinusa Central Bureau of Statistics

Source: CPWSE monthly financial reports, 2003

The industrial customer tariff should not be increased again or could be decreased to a certain level that can attract industrial non-customers into becoming customers. Those water users who are not served (non-customer) or not served maximally (CPWSE customers with supplementary water sources) are potential buyers who can increase the CPWSE's income. This loss of potential income can be overcome, if the CPWSE performs well in producing and distributing water (water quantity, pressure and continuity) as explained later in Chapter V. Performing at the maximum level of the CPWSE's production capacity and supply is not easy, because this utility needs extra money to improve its production capacity and repair its pipe condition. In fact, some extra money has been used to finance bribes and the other inefficient costs due to the past recruitment practices. So the socio-economic and environmental implications of the cost inefficiencies and the tariff policy are connected. Lower income household customers can be considered one among the customer groups who suffer from the situation above.

Opposite to the situation with the industrial customer, the higher-income household customer tariff has the potential to be increased. By and large the total average amount of water used by the household customer group increased by 1 to reach 25 cubic metres per month in the six months after the 2003 price rice (Table IV.13 above), but the water consumption of the lower customer customer-household group remained stable during these periods (Table IV.14). The lower income customers actually pay for some of their water consumption at higher, profitable price levels. The average consumption of the IIA customer group is 22 cubic metres per month (Table IV.14) and, in the CPWSE's progressive tariff scheme, after the 2003 tariff increase the monthly prices charged the lower income household categories Type IIA for the water they used above 15 cubic metres between 16 and 30 cubic metres per month are 1,132 Rupiah per cubic metre, thus over the BEP tariff and thus considered as a commercial, profitable tariff.

Table IV.14:

Tariff Water Sold and Water Use by Household Customer Type

Tariff in Rupiah per cubic metre water sold on average	Household Customer Classification					Ave. for all household customers
	IIA	IIB	IIC	IID	IIE	
Six months before the price rise in 2003	850	1009	1236	1910	1983	1136
Six months after the price rise in 2003	1132	1379	1633	2218	2157	1472
Cubic metres of water used per customer in average						
Six months before the price rise in 2003	22	23	26	34	26	24
Six months after the price rise in 2003	22	24	26	34	27	25

Source: CPWSE monthly financial reports, 2003-4

If the total amount of water used by customers under the IIA category is from 1 to 15 cubic metres per month, the lowest tariff for them is 900 Rupiah per cubic metre at the BEP tariff meaning they are not subsidized because this minimum tariff is under the cost recovery level of the CPWSE. Despite the fact that they pay at lower progressive tariffs compared with the other four household customer groups (see Appendix 8: the 2003 progressive tariff). This tariff condition is not really appropriate to the social missions of water supply provision explained in chapter I, such as the national tariff regulation of PDAM from the Home Affairs Minister Nr 2/1998 mentioning that the poor household customer should be charged under a subsidy scheme tariff.

On average, the household customer type IID, categorized as the higher- income household customer, consumed 34 cubic metres monthly during 2003 (Table IV.14 above). In fact, the average member of the IID household customer is 5.3 people per household which is less than the IIA average number of 5.61 members (Table IV.15). In many cases, the IID customer group consumes water for purposes other than only basic needs of drinking, cooking and bathing, such as for washing vehicles, gardening, and filling an aquarium or pool.

Table IV.15:

Family Members per Household

Family members per household	Hh A	Hh B	Hh C	Hh D	Hh E	Total
Average	5.61	6.15	5.56	5.35	5.85	5.68

Source: Survey data collection 2004
Note: Hh A = Household IIA, Hh B = Household IIB, Hh C = Household IIC,
Hh D = Household IID, and Hh E=Household IIE

The higher-income household customer can assume that the cost does not have a big impact on their monthly expenditure. Despite the price increases the average water consumption of this customer group, which was already about 55% higher than the lower-customer category[50], has remained stable over the six month periods before and after the tariff increase. It appears that the higher-income customers' inefficient attitudes towards water usage will not change unless much higher prices are charged than currently.

[50] On average the higher-income households consist of fewer family members than the poor households.

Another reason for charging the IID household customers much higher rates is that they receive a much better service. The higher-income housing areas are mostly located in the main streets along which the CPWSE's large primary and middle-sized secondary water supply pipes are usually located. Automatically, the rich housing areas are thereby granted a better service performance of water quantity, pressure and continuity as the smaller tertiary pipes connecting directly to customers are close to the CPWSE's primary and secondary pipes. Conversely, the connections to lower-income and poor housing locations from the primary and secondary pipes are mostly indirectly through other tertiary pipes from the rich area so they get a lesser service performance (see Chapter V).

Charging much higher prices to higher-income household customers will have several benefits. Firstly, the added income from these higher prices can be used partly in cross-subsidizing lower-income customers. Secondly, the income can be used for capital expenditure to improve service performance in the poor housing locations. Thirdly, in response to significant price increase for them, higher income customers may reduce their usage of water to be more efficient so their total bill payment remains stable but the water thus saved can be redistributed to poor housing locations currently receiving lower supply services of water quantity, quality and continuity, and to potential industrial customers who currently use groundwater. If this were done, the lower income customers could have a better water service performance instead of (or as well as) being subsidized.[51]

[51] With increased expenditure the CPWSE can reduce the major inefficiencies in its water production and distribution. In 2003 about 30% of the water in the system was declared lost as Uncounted for Water (UFW). Reducing UFW needs extra expenditure for such as improving the piping system, but the utility's investment capacity is limited.

The other reason for subsidizing the lower-income household customer is that the incomes of these customers are mostly low compared with the other household customer groups. About 21 percent of the lower-income households reported their income was less than half a million Rupiah compared to only 6 percent among the respondents from types IIB, C and D (Table IV.16). As a 2004 salary of half a million Rupiah had been set in Cinusa city as the cut-off point for being eligible for a subsidy, this means that about a fifth of the lowest household category of customers are reasonably subsidized because their income is lower than this basic salary standard.

Table IV.16:

Income by Household Customer Type (%)

Income in Rupiah	Hh A	Hh B	Hh C	Hh D	Hh E	Total
Less than 0.5 millions	*21.2*	6.3	5.1	4.1	0.0	12.2
0.5 < 1.5 millions	35.3	32.9	10.3	16.2	28.6	28.2
1.5 < 2.5 millions	22.9	25.3	17.9	18.9	28.6	22.3
2.5 < 3.5 millions	10.0	16.5	28.2	18.9	7.1	14.9
3.5 millions or more	10.6	19.0	38.5	*41.9*	35.7	22.3
Total	100.0	100.0	100.0	100.0	100.0	100.0

Source: Survey data collection 2004
Note: Hh A = Household IIA, Hh B = Household IIB, Hh C = Household IIC,
Hh D = Household IID, and Hh E=Household IIE

Overall slightly more than half of the respondents in household type A reported having a surplus in their monthly budget which was similar to the slightly lower proportions in households typed C and D, but well below the nearly two thirds from type B. Nevertheless, a small proportion, 2.4 percent, of the lower-income (A) household reported they could not cover all their monthly expenditure (Table IV.17).

Table IV.17:

Ratio between Income and Expenditure by Household Customer Type (%)

Ratio reported between income and expenditure	Hh A	Hh B	Hh C	Hh D	Hh E
Surplus	51.5	62	48.7	48.7	28.6
Break even	45.9	38	51.3	51.3	71.4
Minus	2.4	0	0	0	0
Total	100	100	100	100	100

Source: Survey data collection 2004
Note: Hh A = Household IIA, Hh B = Household IIB, Hh C = Household IIC,
Hh D = Household IID, and Hh E=Household IIE

So it appears that the income-expenditure problem of some lower-income households indicates that they need to be subsidized. The opportunity for subsidizing poorer households is caused by the fact that the additional six month income of the CPWSE is a significant amount and higher-income household customers can be levied higher in future.

Generally 65 percent (of 429 respondents) and 70 percent (of 428 respondents) felt that their water supply tariff and bill were high (Table IV.18 and IV.19).[52] Of the higher-income (D) and the lower-income (A) households almost identical proportions, 63.5 and 62.1 percent, mentioned the price was high (Table IV.18) and the same 69 percent of both stated the same thing about their monthly water bill (Table IV.19). Household types IIA or IID opinions about their tariffs and bills were similar to each others.

[52] 'Low' being the total answering 'Very Low', 'Low' and 'Rather low' to questions 46 (Table IV.18) and 50 (Table IV.19) in the questionnaire; 'High' the total of 'Rather high', 'High' and 'Very high'.

Table IV.18:

Respondent Groups and Customer Opinion about Water Tariff (%)

Opinion on tariff:	Soc.	Hh A	Hh B	Hh C	Hh D	Hh E	Gov.	Bus.	Ind.
Low	31.3	37.9	44.9	23.1	36.5	21.4	50.0	14.3	35.0
High	68.8	62.1	55.1	76.9	63.5	78.6	50.0	85.7	65.0
Total	100	100	100	100	100	100	100	100	100

Source: Survey data collection 2004
Note: Hh A = Household IIA, Hh B = Household IIB, Hh C = Household IIC,
Hh D = Household IID, and Hh E=Household IIE

Table IV.19:

Respondent Groups and Customer Opinion about Water Tariff (%)

Opinion on water bill:	Soc.	Hh A	Hh B	Hh C	Hh D	Hh E	Gov.	Bus.	Ind.
Low	46.7	31.2	34.6	23.7	31.1	14.3	50.0	14.3	29.9
High	53.3	68.8	65.4	76.3	68.9	85.7	50.0	85.7	70.1
Total	100	100	100	100	100	100	100	100	100

Source: Survey data collection 2004
Note: Hh A = Household IIA, Hh B = Household IIB, Hh C = Household IIC,
Hh D = Household IID, and Hh E=Household IIE

The views of 285 respondents who gave responses to the open question number 55 in the questionnaire can illuminate their reasoning about the water tariff and bill. Customers' opinions in this open question can be ranked from the extreme/contra to tolerant opinions about the current price. 43 percent (of 285 respondents) stated strongly that their monthly water price and bill was too high and had to be decreased. 30 percent of these respondents were more tolerant about the current tariffs but demanded the tariffs would not increase again. 15 percent of them criticized the appropriateness of the water tariff structures and practices. Few of them accepted the new tariffs.

Three reasons were given by respondents for decreasing the current tariff or stopping the next tariff rise. Firstly, water is considered to be a public good by several respondents, and so it is a governmental responsibility to provide this clean water to society. Some even proposed the water supply service be free of fees or subsidized. Four opinions were:

> My suggestion is the water tariff is reevaluated again, and for community welfare this tariff should be decreased. This public aim of water concerns is mentioned in the 45 Constitution sections 33-3.
>
> We beg that the water price is not too high and expensive, please consider us as poorer citizens with very low income. As well, water is a public good and is used for societal prosperity.
>
> Water tariff must be cheap because water as a basic need is vital for all citizens. Human beings need water from when they are born.
>
> Land, water and all inside these natural resources are owned by citizens so they must be made free for people.

Secondly, some respondents demanded their tariffs be reduced, as they felt that their monthly income was low but their expenditure continually increased due to the escalation of their living costs. Several comments from them are:

> Water tariff should not be increased because salary does not increase but many prices of daily living goods and services increases.
>
> Please do not increase the water tariff, because other prices have been increased such as electricity and telephone.
>
> We find it very hard to pay our monthly water bill because we are poor, and we ask for a reduction of our levy.
>
> One time I complained to the CPWSE office that as a retired person this company ought to give a reduction of my water bill, but there was no response from this company.

Thirdly, some respondents were tolerant about the price increase as long as their water service performance improves. Some of them asked for tariff reduction and punishments if the water supply service is not improved and stoppages averted as mentioned in their comments:

> Tariffs must be returned back to the old tariffs because these new tariffs rise without improvements of the water supply services.
>
> The current tariff is expensive compared with the water supply service which is not maximal.
>
> Tariffs can be increased but water fluency must be increased.
>
> If we pay our bill late by one day, we get fines. If the water supply stops, our monthly water bill is still same as the previous months. We suggest if the water supply stops, the water company must be punished and we get a reduction of our water bill in the month when the water supply does not flow regularly.

This tariff change has brought implications for some customers. They had changed their attitudes towards water use and prepared for future action if the tariff is increased again. Two of them stated:

> The water tariff is high, if possible please cut it down. Our family cannot use this tap water for bathing, because our monthly bill will increase and become very expensive. So this way, we use well water for taking a bath.
>
> If this water tariff increases again, I will drill a well at my home.

Moreover, respondents' criticisms about the water tariff structure and practices were related in several aspects. Firstly, some respondents disagreed with the progressive tariff system but one mentioned the benefit of it:

> Progressive tariffs are aimed to discipline water customer's behaviors towards water uses. If customers do not want to pay high costs, they must use water efficiently.

Secondly, for some the system of grouping customers into tariff categories was not being done appropriately. Being categorized as customers at a higher level customer tariff had disadvantages for them. Two mentions of this were:

> How come this house is categorized in the big industry customer group?

> Since I had become a CPWSE customer my house was categorized as a IID customer until last year my customer category was changed to be IIB, actually because neighboring households along my house street were grouped as IIB customers. Please do a survey based on the real customer conditions and categorize customers appropriately.[53]

Thirdly, the monthly minimum water consumption for social and household customers is 15 cubic metres per month, but is 25 cubic metres per month for business and industry customers. Some customers were consuming less water than these two minimum standards, but they must still pay for these minimum amounts. Some of the respondents felt that this is not fair, as reflected in their comments:

> The minimum water consumption at 15 cubic metres per month is not fair. We are being forced to pay for these cubic meters of water quantity, although our monthly consumption is often less than this amount.
>
> Please do not apply the monthly minimum water consumption. It is strange that customers must pay for water that is not entirely used by them.

Fourthly, water metering registers were also criticized. Some customers claimed their monthly water consumption remained stable but their water bills fluctuated. Water registrars who do not come regularly every month to register water used by customers were considered to be the cause of the problem. So the amount of monthly water used was not the same as reported in the bill, and caused problems to some customers who paid higher in December because of an accumulation of water used but not registered in previous months. The progressive tariff system also increased their water bills in this month. Three comments are:

> It is good if our monthly water bill remains stable and matched with the amount of water used. However, our bill payment sometimes increases sharply in this month, but next month's bill decreases steeply.

[53] The IID household customer categorized as the higher-income household is charged higher than the IIB household customer as the lower-income household.

> Water bills are always fluctuating. This month's payment increases but the next month's bill decreases because water metering registrars sometimes skip their monthly registering job. As the consequence the amount of water used is predicted and the gap is added in the following months.
>
> Normally the total amount of water used in my house in one year is 300 cubic metres. Last year the water registrars did not come regularly to write down the amount of water used by my family. I checked the water metering equipment in November - only 116 cubic metres. The amount of water reported used by the family increased to about 200 cubic metres in December. It was hard for me to pay this December bill.

Fifthly, it was suggested that tariff changes need to be discussed with customers and this tariff increase negotiated and publicized through public meetings before it was implemented. Some of their relevant comments are:

> Any change in tariff increase should be negotiated with the customers.
>
> Please do not increase the tariff sharply and let customers know first before the price is increased.
>
> The CPWSE must be open with customers about tariff changes. I was never invited by this company, such as in public meetings, to discuss this tariff concern.

Finally, it was suggested that monthly garbage collection levies that are included in the monthly water supply bills should be separated:

> Please do not include the monthly household garbage retribution in the water bill because my neighborhood organization (Rukun Tetangga-RT) also takes a monthly garbage levy. So I pay double.

The work of garbage collection in Cinusa city is conducted by a cleaning service unit under the Cinusa local government. This policy demonstrates that this local government considered the CPWSE management is not separate from it. Moreover, some customers also think that the CPWSE is a unit of the Cinusa local government:

> There is no reason we as marginalized people can be heard by this governmental institution (referring to the CPWSE), particularly if our suggestion will decrease this government's income.
>
> We are not protesting our government's rules. We always follow them as long as these rules are honestly created and do not cause problems for us.

The various degrees of acceptance or compromise underlying the behaviors of some customers are the realities that can influence their satisfaction about water tariffs. Feeling dissatisfied with the CPWSE water supply service can be interpreted as complaining against the government. The monopoly right of the CPWSE in water supply distribution also makes this utility's position strong vis–á-vis its customers. Disconnection of water service by the CPWSE is a big problem for households who live in high density housing locations or the lower-income (II A) household areas, because their well water is mostly contaminated (see Chapter VI). Another reason can be caused by the fact, mentioned above, that many respondents were tolerant about this recent tariff change, as indicated in the overall two-thirds (66.4 percent of 425 respondents) who reported feeling satisfied with their water bill. Of the social and the household IID customers respectively 80 and 76.1 percent of them the two highest proportions among customer categories, reported themselves to be being satisfied (Table IV.20).[54]

Table IV.20:

Respondent Groups and Customer Satisfaction about Water Bill (%)

Satisfaction on water bill:	Soc.	Hh A	Hh B	Hh C	Hh D	Hh E	Gov.	Bus.	Ind.
Satisfied	80	67.1	55.8	56.4	76.1	64.3	50.0	74.3	66.4
Not Satisfied	20	32.9	44.2	43.6	23.9	35.7	50.0	25.7	33.6
Total	100	100	100	100	100	100	100	100	100

Source: Survey data collection 2004
Note: Hh A = Household IIA, Hh B = Household IIB, Hh C = Household IIC, Hh D = Household IID, and Hh E=Household IIE

[54] 'Satisfied' being the total answering 'Very satisfied', 'Satisfied' and 'Rather satisfied' to question 52 (Table IV.20) in the questionnaire; 'Not satisfied' the total of 'Rather not satisfied', 'Not satisfied' and 'Very not satisfied'.

In responses to the problems related to cost efficiency and tariff problems, several next steps were concluded from the CPSWE senior staff focus group discussion on 24 March 2004.[55]

First of all, early retirement programs for employees will be offered as a strategy to reduce the employee's cost.

Secondly, working performance standards have to be developed and used as a basis for job promotions and rewards.

Thirdly, the CPWSE management is expected to be more independent, and the government intervention should be limited.

Fourthly, the current progressive tariff system and customer classification will be improved, with consideration of inputs from customers. It was concluded that the progressive class tariffs be wiped out but the minimum tariff differences between customer categories maintained. The minimum amount of water assumed used by customers was also to be deleted from the policy. However, improving the basis of customer categories by including their income as well as their house location and width can not be conducted in the short term, because data about all customer incomes are not available, and obtaining the data and calculating the categorization needs extra jobs, time and money.

Fifthly, mapping the current customer classification was felt to be crucial by this focus group and will be conducted. Some misplacing of customer categories is expected to be resolved by this activity.

[55] This focus group involved the CPWSE managing director, the non-technical or general and administrative director and another 12 employees from this department; managers, assistant managers and heads of units. The material for discussion in this focus group was focused on service performance problems of water supply.

Sixthly, excluding garbage collection levies from water bills is also to be conducted.

Finally, training for water metering registrars will be conducted. This focus discussion concluded that the water metering unit needs additional employees, but contracting out of two metering locations to outside companies was considered as the alternative solution. Metering work of these outside companies will be regularly evaluated and compared with the corresponding work conducted by the internal employees.

IV. 6. Summary

A problem is that water performance arrangements have not been set with members of the public community. Representatives of the community or public have not legally and institutionally been granted legitimate participation or a significant role in the governance process of water performance arrangements. Concealed political intervention from politicians and bureaucrats in the governance process of price policy without the knowledge and direct influence of community representatives can be cost inefficient as well as ineffective and unjust for the public, especially the lower-income customer.

This chapter shows some connections between inefficiency, ineffectiveness and inequality. The corrupted governance system has contributed to financial inefficiency in the CPWSE which has however increased its profitability by its latest tariff revision and so increased its profit share to the Cinusa local government. This chapter argues that cost inefficiency and a general price rise policy carry disadvantages for the poorer customer. It is unjust for the poor or lower-income customers, because the tariff calculation is not entirely based on validly justifiable minimum costs. Cost inefficiency was caused by politicians and bureaucrats who decided the tariff policy without public customers being represented in the policy governance process. The public becomes the victim, burdened with the extra costs from past and current mismanagement due to corruption, collusion and nepotism. The price policy is ineffective and rather than following the national Regulation on pricing to protect poor customers through a cross-subsidy scheme in fact these customers are paying for the cost inefficiency and are subsidizing locally generated revenue.

It will be important to regularly monitor several cost items that may indicate cost inefficiency, especially those classified as indirect costs and unidentified costs, with any savings invested for service improvement programs or for supporting an early retirement program. In price policy, it will be important to exercise a cross-subsidy scheme and monitor the implication of price changes for customers. Coordination with various levels of government and community groups should be maintained, including the regulation and enforcement of the exploitation of underground water.

Lower-income customers who currently pay at profitable tariffs should be subsidized as an aim of water supply provision. The additional income from the current tariff change demonstrates significant amounts of money that can be used to subsidize the poorer households or to improve the service performance of water supply, as explained later in Chapter VI, or do a mixture of both. This latest tariff increase has provoked rejections by some respondents asking for the cancellation of the tariff policy on several grounds, including that water is a public good, that many customers have a low income and high expenditure, and that there should be a balance between tariff increases and services improvements.

Moreover, six criticisms identified from customer respondents were related to: the progressive tariff system; inappropriate customer categories; the minimum charged water consumption assumption; the metering register system; a lack of socialization of tariff policy; and the combining of garbage collection levies with water bills.

In response a senior staff focus group discussion proposed seven future steps to be planned and conducted: offering early retirement programs, developing working performance standards, limiting governmental interventions in the CPWSE management, reforming the current tariff progressive system; mapping the customer categories; excluding garbage collection levies from water bills; conducting training for metering registrars; and contracting out some locations of metering areas.

The next chapter evaluates service performances of water supply in relation to water quantity, quality, continuity and pressure. These aspects of water supply services bring performance implications related with their accessibility, availability and reliability to various customer groups as explained later.

Chapter Five

Water Quantity, Quality, Pressure and Continuity

V. 1. Introduction

This chapter evaluates the service performance of the water supply.[56] Performance indicators and measures signaling how the company carries out these activities can be used as tools of analysis to understand performance problems. The overall water supply performance is the result of the linkages made by the company between the various factors, which can be classified as performance inputs (13-21), performance outputs (5-12), intermediate outcomes (2-4), end-outcomes/ impacts (1).

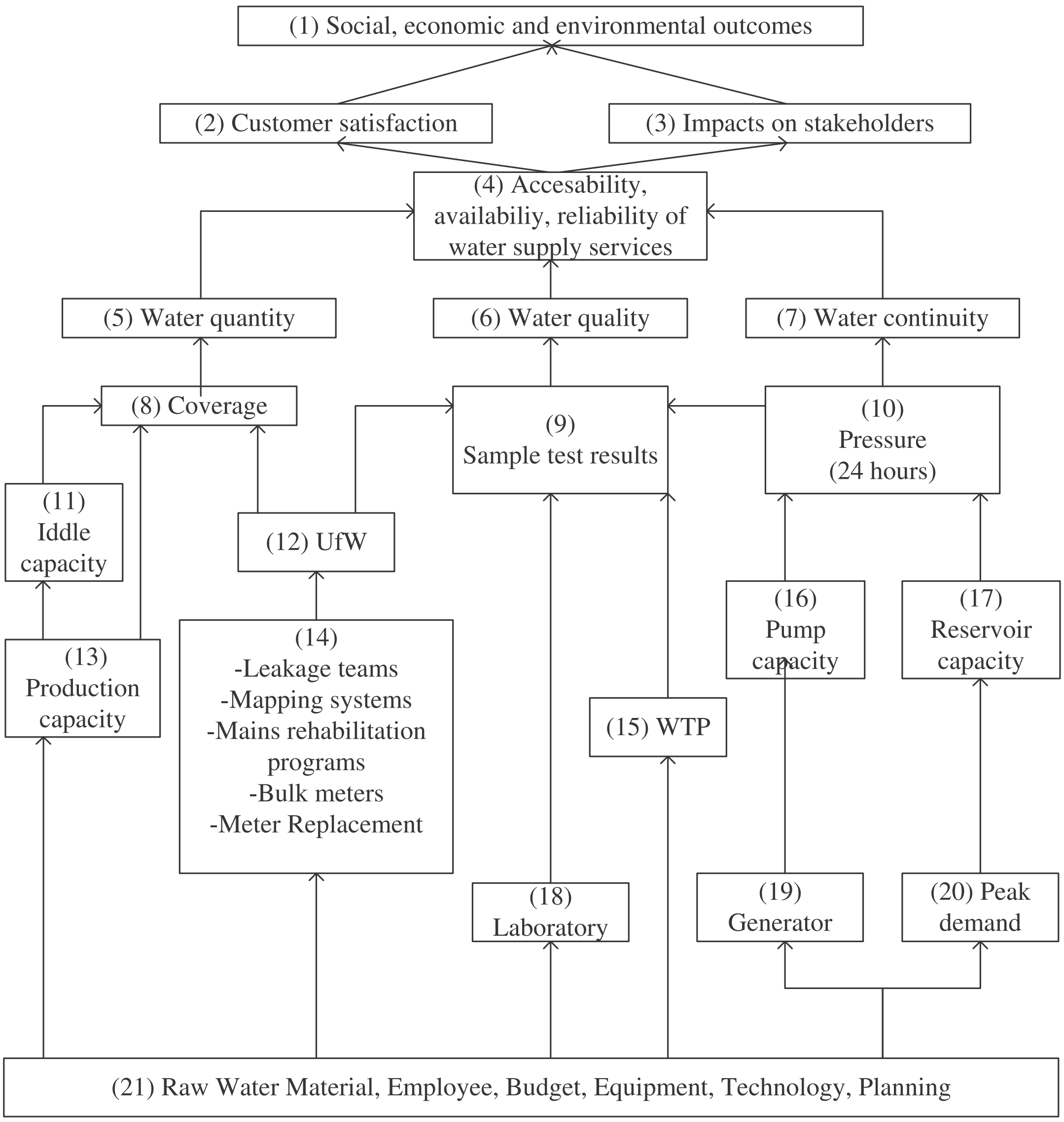
However, it should be noted that this diagrammatic flow chart is simplified in that several of the links shown are not simply one-way steps but involve combinations of feedback loops and is incomplete as factors both inside and outside the water supply company influence its water service performance.

In the following account the performance output factors of water quantity (18), quality (19), pressure (17) and continuity (20) will be used as the section headings.

[56] The topics in this chapter within the overall context of this research evaluation is presented in Diagram II.1 as numbers 1-7, 17-23, 25-32, 34 and 25 (see Chapter II). Interconnections of performance indicators in the input, output, intermediate outcome, and end-outcome/ impact are described in the outcome performance indicator web in Diagram II.3 (see Chapter II). However, a more specific and detailed indicators for evaluating water quantity, quality, continuity and pressure are presented in Diagram V.1.

Diagram V.1

Evaluating Water Supply Service Performance



Note: UfW = Unaccounted-for Water; WTP = Water Treatment Plant

There were found to be performance problems in the organization within the CPWSE, in its service delivery to customers, and within the government or public sector. Findings also demonstrate that the service performance varied between customer classifications. Customers classified as lower-income households (type A) generally suffered lower provisions of water quantity, quality, pressure and continuity compared to others, especially those classified as higher-income households (type D). Performance indicators and measures signaling how the company carries out these activities can be used as tools of analysis to evaluate performance problems and their implications.

V. 2. Water Quantity

Findings in this section demonstrate that problems in the level of water supply to cover customer demand involve linkages between performances in inputs, processes, outputs and outcomes that can carry social, public health and environmental implications for water users, especially the lower-income customer, and economic implications for the Company or the Government as the owner. A low performance in maintaining a high level of water coverage is related to performance problems in water production and unaccounted-for water (UfW). The Company has not used its water production capacity maximally or managed its UfW properly.

The case of UfW from water pipe leakage was analyzed specifically, by evaluating two factors inside the CPWSE. It was found, firstly, that a low performance of human resources combined with a lack of equipment and technology in fixing up pipe leakage problems caused a low performance in supplying water quantity, continuity, pressure and quality while, secondly, an apparent indifference at managerial levels in dealing with problems of UfW and pipe leakages carried health risks.

Factors outside the organization also contributed to the problem of pipe leakage, in particular the lack of synchronization between the development of other city infrastructure and the Company's pipe network which increases cases of pipe leakage problems and UfW.

A consequence of this situation is that actual and potential customers have not been fully served with tap water, thereby losing potential sales for the Company towards the profits it would share with the Government as the owner. In this city water users who get an inadequate quantity of water or do not get any water connection from the Company look for another source of water, especially well water. In the previous chapter, it was reported that city industries mostly use bored well water instead of the Company's reticulated water to better ensure quantity, reliability and relative cheapness of supply. However, the well water quality is low (see next section) and this combines with the problem of contaminated and polluted water in an explanation for a high case of water borne disease found in the areas with a low level of coverage by the water supply service.[57]

V. 2. 1. Coverage Level

The Company's service performance in providing a water supply to the entire city population is not maximal. In 2003 only 67 percent of the city population was covered (Table V.1), lower than the 100 percent reported in Australia, UK and Wales, and USA,[58] and also lower than in neighboring Malaysia where, in 2000, about 90 percent of its total population was served with a reticulated water supply.

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[57] This was a reason in choosing the three neighborhoods as the case study locations, as described in Chapter III Research Method.

[58] Tynan and Kingdom (2002) in the World Bank website stated the best practice of coverage level for water supply companies in developing countries, based on the top 25 percent of water utilities, is also 100 percent.

Table V.1:

Water Coverage Performance Indicator in Several Areas

Performance Indicator	Australia	UK & Wales	USA	Malaysia	Cinusa	Africa	Indonesia
Coverage (%)	100	100	100	90	67	39	23

Sources: Calculated from the World Bank 2004, the CPWSE 2003, and PERPAMSI 2002[59]

The water coverage performance of the Company is well over the Indonesian national average of only 23 percent (Table V.1) and, in general, over those of other PDAM located in Indonesian city areas, 52 percent on average (Table V.2). Nevertheless, as reported in PERPAMSI handbook 2002, it is below that of six of these city PDAMs with two of them, in Cirebon and Pematang Siantar, providing a coverage level of more than 100 percent by also servicing the population outside their city jurisdiction areas.[60]

Table V.2:

Water Coverage Performance Indicators in Several Indonesian PDAMs

PDAM	Cirebon	Pematang Siantar	Cinusa	All Ind. Cities
Coverage (%)	110	107	67	52

Source: Calculated from PERPAMSI 2002

[59] The World Bank data are taken from one company in Australia (1998), 26 companies in UK & Wales (2000), 89 companies in USA (1996), and 10 companies in Africa including 1 in Benin and 2 in Nigeria (1996), one companies in Burkina Faso, Cote d'Ivoire, Morocco, Namibia, Senegal, South Africa, Togo (1997). The Malaysian coverage level (2000) is cited from Samad (2003, p. 2). Data on Indonesian water companies are 2001 figures cited from PERPAMSI Directory (2002).
[60] Usually from neighboring regencies

A coverage service performance of 100 percent is feasible[61] although in the Indonesian national standards for water coverage the highest evaluation score for PDAM located in city areas is awarded for a coverage level of 80 percent or more (IHAD, 1999).[62] This figure was occasionally mentioned in interviews during data collection by stakeholders from the local government, the local legislative assembly and the Company.[63]

Additionally, problems in reliability of coverage can be detected from the customer views on the service during the wet and dry seasons given by respondents to the questionnaire survey[64]. Reports of incidents of lesser water quantity were higher in the dry season than in the wet. 88.6 percent (of 431 respondents) mentioning that the tap water quantity is enough for them during the wet compared to only 55.6 percent (of 429 respondents) during the dry (Table V.3).

Moreover, there were differences in reliability of supply reported between socioeconomic categories of households with richer households (types D and E) at 95.9 and 100 percent in the wet season and 74.3 and 64.3 in the dry (Table V.3) but poorer (A and B) 86.5 and 84.8 percent in the wet and only 54.8 and 49.4 in the dry season. This is further considered in section V.3 about water pressure and continuity.

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[61] Getting 100 per cent water coverage level in regency (rural) areas is relatively more difficult than in city areas as distances between villages and other community housing are wider so costs of the pipe installation investment are also high, rural communities' ability to buy a water supply is lower than that of city people and, as well, water quantity and quality from alternative, non-contaminated, sources such as wells and rivers are relatively high enough.

[62] This 80% standard is different from the 60% for PDAM located in regency areas for the reasons mentioned in the previous footnote (based on the Home Affair Ministerial Decision No. 47/1999 about principles of performance evaluation of PDAM).

[63] In interviews with the managing director of the Company on 26 March 2004, the head of the legislative assembly on 19 March 2004, and one member of the local government's Controlling Agency in personal communication on 1 June 2004.

[64] See Appendix 3. As mentioned in Chapter 3, on methodology, there were a total of 431 respondents with only very minor variations in numbers answering each question.

Table V.3:

Respondent Groups and Water Quantity in Wet and Dry Seasons (%)[65]

Water quantity	Soc	Hh A	Hh B	Hh C	Hh D	Hh E	Gov	BI	Total
In wet season									
Enough	81.3	86.5	84.8	87.2	95.9	100	100	91.4	88.6
Not enough	18.8	13.5	15.2	12.8	4.1	0.0	0.0	8.6	11.4
Total	100	100	100	100	100	100	100	100	100
In dry season									
Enough	37.5	54.8	49.4	30.8	74.3	64.3	75.0	77.1	56.6
Not enough	62.5	45.2	50.6	69.2	25.7	35.7	25.0	22.9	43.4
Total	100	100	100	100	100	100	100	100	100

Source: Survey data collection 2004.
Notes: Soc = social, Hh = household, Gov = Government, BI = Business and Industry

Respondent satisfaction on water coverage level followed the pattern on water quantity. Overall 87.7 percent reported themselves satisfied with the amount supplied in the wet season, but just 58.3 in the dry (Table V.4). Of the richer (D, E) households 94.6 and 100 percent were satisfied in the wet and 78.4 and 57.1 in the dry compared to only 85.2 and 83.5 percent in the wet and 55.4 and 54.4 in the dry among the poorer (A, B).

The Cinusa local government insists the Company fully covers the City's water supply need to at least 80 percent coverage (the highest national standard level) but it has not yet achieved this. Many water users suffer from a low or non-existent supply[66] service from the Company, with water availability lower in the dry season and with poorer household types generally getting a lower level of coverage.

[65] 'Enough' being the total answering 'Very enough', Enough' and 'Rather enough' to questions 60 and 62 in the questionnaire; 'Not enough' the total of 'Less than enough', 'Not enough' and 'Very not enough'.
[66] For an explanation about non-supplied customers related to cases of contamination of well water see section V. 2 about water quality.

Table V.4:

Respondent Groups and Customer Satisfaction about Water Quantity in Wet and Dry Seasons (%)[67]

Satisfaction on Water quantity	Soc	Hh A	Hh B	Hh C	Hh D	Hh E	Gov	BI	Total
In wet season									
Satisfied	87.5	85.2	83.5	87.2	94.6	100	100	88.6	87.7
Not satisfied	12.5	14.8	16.5	12.8	5.4	0	0	11.4	12.3
Total	100	100	100	100	100	100	100	100	100
In dry season									
Satisfied	37.5	55.4	54.4	33.3	78.4	57.1	75.0	74.3	58.3
Not satisfied	62.5	44.6	45.6	66.7	21.6	42.9	25.0	25.7	41.7
Total	100	100	100	100	100	100	100	100	100

Source: Survey data collection 2004.

The problem of coverage could be solved through increasing production capacity and reducing UfW. Production capacity can be increased through the extension of the production installation but this needs a huge fund and its feasibility is dependent on viability of funding. In this case, the CPWSE's financial capacity is limited and dependent on borrowing money from financial institutions (as discussed in the previous chapter). The other way of increasing production capacity (discussed in the next section) is through the reduction of currently idle capacity. Ideally, a combination of both ways would help the Company to achieve 100 percent coverage considering the city population tends to go up with more people needing clean water every year.

[67] 'Satisfied' being the total answering 'Very satisfied', 'Satisfied' and 'Rather satisfied' to questions 61 and 63; 'Not satisfied' the total of 'Less than satisfied', Not satisfied' and 'Very not satisfied'.

V. 2. 2. Idle Capacity, Production Capacity and Raw Water Quantity

Water production capacity in the Company has not been utilized maximally. On average over December 2001, 2002 and 2003 only 83.36 percent of the installed capacity was used (Table V.5), with mean production during those months of between 1,296 and 1,255 litres per second from the installed maximum capacity of 1,514.

The idle capacity was thus about 250 litres per second in average during the period. This is enough to serve at least 15,000 new customer connections,[68] about 19 percent of the total number of actual connections, or 11 percent of the total Cinusa city population in December 2003. [69] Reducing idle capacity of the water production installation to zero would be fruitful, increasing the coverage level from the current 67 to 78 percent which would be close to the local government stakeholder's demanded performance target, previously mentioned, of 80 percent.

Table V.5:

Performance Indicators in Productivity of Production Installation Capacity in December 2001, 2002 and 2003

Performance Indicator	2001	2002	2003	Average
Production capacity (litre per second)	1296	1235	1255	1262
Installation capacity (litre per second)	1514	1514	1514	1514
Functional productivity of production installation (%)	85.63	81.58	82.88	83.36

Source: Calculated from F Company 2001, 2002, and 2003

[68] This estimation is based on the interview with the CPWSE technical director on 18 March 2004. He mentioned that water debit at 240 litres per second could be used to serve 15,000 customer connection. This information was then calculated against the number of customers and population to give the percentage (secondary data from the CPWSE).

[69] The total number of customer connections and the population in December 2003 were 79,427 and 827,157 respectively. As the assumption in calculating coverage level used by the Company is that one connection serves 6 people (based on Home Affair Department 1999), 15,000 new connections mean 90,000 additional people in the population would be provided with the water supply.

A 100 percent performance of the water production installation is quite possible. 17 of 138 PDAMs have achieved this, 10 in city areas (BPKP 2002). Decreasing idle capacity would be efficient in terms of optimizing the current production installation and also effective in achieving the coverage level target. As communities in Cinusa who haven't yet been covered with the water supply service could be served through this improved utilisation of the existing production capacity this would be potential income for the Company which could be used to cross-subsidy poorer consumers so the Company would fulfill social and economic missions.

A problem is that the regulated allocation for production costs is low at only 10 percent from the total profit,[70] for example providing only about Rp. 619 million Rupiah from 2003 for production expenditure in 2004 (CPWSE, 2003).[71] Although another budget post, that of investment or general reservation and allocated 15 percent of the prior year's total profit, may also be used for production costs this is in competition with other departments and their priorities. Nevertheless, as discussed in the previous chapter, there are concerns about reducing cost inefficiencies in the Company with potential savings which could be redistributed into production expenditures to increase capacity utilisation.

Achievement of full performance in the production capacity would also need an improvement in the current distribution system and an adjustment of customer behavior in water consumption (explained in the later section V.3 on water pressure and continuity).

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[70] Based on the local government Regulation No. 11/1974, 15 percent of profit is to be allocated for investment or general reservation, with only 10 percent for production, pension and charity, social and education.

[71] As a comparison, one water pump donated to the Company from the local government cost about Rp. 800 million (interview with the managing director on 18 March 2004). So the entire annual budget allocation for the production sector may not be enough even to buy a single water pump.

The next section discusses the water distribution concerns of unaccounted-for water and pipe leakage which reduce performance in water quantity as well as in water pressure and continuity.

V. 2. 3. Unaccounted-for Water, Leakage Problems and Organizational Resources

Unaccounted-for Water (UfW) affects water coverage performance. In 2003, UfW in the CPWSE was 33 percent, 2 percent higher than the 2001 average reported for Indonesian PDAM (Table V.6). UfW reported for several companies in Africa, USA, UK and Wales, and Australia was below; often well below, 20 percent (Table V.6) and this apparent gap between Indonesian and other water supply companies would be even wider if the same formula were used.[72]

Table V.6:

Performance Indicator of Uncounted for Water in Several Countries

Performance indicator	Australia	UK & Wales	USA	Africa	Indonesia	CPWSE
Unaccounted-for water (UfW)	8	13	15	19.5	31	33

Sources: Calculated from World Bank 2004, PERPAMSI 2002, and F Company 2003
Notes: Companies are as mentioned in footnote to Table V.1, excluding Malaysia

[72] There is a different way in calculating UfW between World Bank and Indonesian PDAM. In the World Bank, UfW is calculated from water production, while in the Indonesian PDAM, it is counted from water distribution. In fact, there is usually some water missing between water production and distribution. So, the gap between PDAM and other countries mentioned in the Table 4 will be higher, if UfW in PDAM is computed from water production.

In the Indonesian national standard UfW performance is given the highest score if a PDAM limits it to 20 percent or lower (IHAD, 1999).[73] 24 PDAM reached this standard in 2001 (PERPAMSI, 2000), but only 1 of those was in a city area, namely Probolinggo. For reasons explained later it is obviously hard for a city PDAM to achieve this standard.

Reducing UfW would be worthwhile. The 25,052,635 m^3 of water sold in 2003 (Table V.7) served 67 percent of the city's population (as mentioned earlier) thus the 12,541,796 m^3 'missing in distribution' UfW could potentially have been used to serve the unserviced 33 percent. This additional coverage level would be even more, at about 37 percent, if UfW calculations started from water production rather than only from distribution with any surplus potentially available for distribution outside the city jurisdiction border.

Table V.7:

UfW from Water Production and Distribution in the Company in 2003

	Water Production	Water Distribution
Water Quantity	39,573,086	37,594,431
Water Sold	25,052,635	25,052,635
UfW	14,520,451	12,541,796
Percentage	37	33

Source: CPWSE, 2003

Cases of UfW caused by pipe leakage are useful to consider for several reasons mentioned in the 2001 CPWSE pamphlet.[74] Firstly, a low performance in handling

[73] Tynan and Kingdom (in World Bank 2002) stated the best practice of UfW for a water company in developing countries, based on the top 25 percent of developing country utilities, is 23 percent.
[74] Two causes of UfW are technical and non-technical aspects. The technical factors are divided into operational and non-operational activities. Operational activities include installation draining, installation maintenance, air drainage in pipe, entering water in new pipe network, and other maintenance/repairmen jobs. The non-operational activities include pipe damages, water-metering damages, pipe accessories/fitting

leakage problems implies a low service performance and potential contamination of water to customers, raising public health concerns. Secondly, leakage problems are related to other managerial decisions in the Company such as about human resource arrangements, mapping systems, rehabilitation programs, tools and equipment. Unsynchronized decision-making between managerial levels in dealing with leakage problems do not provide a supportive environment. Thirdly, leakage problems are linked with development policies from government institutions. An unsynchronized plan of city infrastructure development between the water company and the city planning agency brings disadvantages for the pipe network system.

Water pipe leakages contribute to a low performance achievement in water quantity and to a degradation of water quality. They are caused by a combination of the age of pipes and pressures on them.[75] According to the maintenance manager a common cause of broken pipes is overloading pressures from vehicles on the street over them. This is caused from a mismatching of infrastructure development between the water company and the city development agency. Previously the pipe position was beside the road but then roads were extended over them with the consequence that they are broken from the pressure from heavy vehicles such as trucks (see pictures of pipe leakages in Appendix 9). Tree roots are another cause of external pressure on pipes causing leakages.

Every month several pipe leakage cases remain unsolved. The maintenance manager said that “the total numbers of employees in the pipe leakage department is 42. They are distributed into 2 locations: east and west service regions. 22 employees divided

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damages, overflow in reservoir, and evaporation. The non-technical problems are inappropriate metering register, predictive water consumption, water stealing, watering city parks, and water for the fire extinguisher team.

[75] Pressures from tree roots can make pipes break.

into two groups serve the east region which is served through a pumping system, and 20 people divided into two groups serve the west region which is served through a gravitation system" (interview, 12 March 2004)[76]. This means that each group must repair about 80 pipe leakages on average every month or 4 cases every working day. In fact, they did not complete about 10 jobs a month on average in the first six months of 2003 (Table V.8). This reality supports the result from 2004 survey data obtained in three locations that the company response on customer complaints took 14 days on average.[77] The head of customer association in Cinusa also mentioned that "customer complaints are mostly related with a slow response of the CPWSE management in fixing up problems of water discontinuity" (interview, 12 February 2004).

Table V.8:

Pipe Leakage Reports from January to July 2003

Pipe Leakages	January	February	March	April	May	June	July	Average
Total Reported	353	297	345	313	262	320	356	321
Finished Job	346	284	330	306	260	310	344	311
Unfinished Job	7	13	15	7	2	10	12	10

Source: Calculated from secondary data in CPWSE 2003

One implication of a slow response in fixing up a pipe leakage problem is that water inside the pipe system can be contaminated through the broken pipe during the time waiting for repairmen. Another is a weakening in level of service performance of water

[76] A further investigation into the leakage team design and capacity building would be useful to improve its work performance.
[77] This complaint response was derived from question number 110 in the questionnaire although it was not specifically about water pipe leakages. 52 percent (222/431) mentioned that they have experience in complaining to the Company, with 61 percent of complaints responded to.

continuity with reduced or no flow to several customers. About 29.5 percent of respondents to the survey reported experiencing discontinuities of water supply every day (Data Survey 2004). During these water discontinuities, water pressure inside the pipe is nil or low, enabling particles and organisms to contaminate the water system.[78] As further considered in the next section V.3 on water pressure and continuity there were more cases of lower water pressure and continuity reported in poorer household (types A and B).

Several hindrances to the leakage teams optimizing their performance were identified by the maintenance manager (interview, 12 March 2004). Firstly, dissimilarities between the past and the current equipment technology prevent the teams performing their job well. According to him, pipe equipment used was a mixture of 18th and the 20th century technologies[79] with sizes and dimensions of old pipes not matched with new pipes and equipment so it took more time and effort modifying tool and pipe equipment to fix up the old broken pipes.

Secondly, the teams have problems in detecting exactly where the pipe leakage locations are. The maintenance manager described the ground condition in the city as an upper layer partly covered by hard materials such as road pavement or concrete and a lower soft layer where the pipe systems were. The ground structure in the hilly Cinusa City is also undulating. Additionally, a map of the tertiary pipe network was not

[78] For example, in the recent experience of one respondent, water continuity had been good for the last two months but was not before that period. Tap water often stopped then, when it started to flow again the first water from the tap carried sediments and the water color was brown yellow. (Comment derived from question number 99a in the questionnaire.)

[79] Most primary pipes and some secondary pipes are from the colonial era, while tertiary pipes are from the current pipe dimension technology. Primary pipes are pipes to connect water installation production and reservoirs or pumps. Secondary pipes are pipes to distribute water supply from reservoir and pump systems to customer locations/areas. Tertiary pipes are pipes to distribute water supply to customer households or places.

available. These conditions made it difficult to predict the location of pipe leakages. When a pipe was broken, the water spread around the ground location with some of the water moving up and naturally flowing to the ground surface uncovered by concrete or pavement. In a wavy location, a source of water leakage into a lower area could come from a higher area. The leakage teams sometimes had to dig in several areas until they could finding the exact point of a leak and this made a negative impression on customers who thought that the Company did not work professionally.

Thirdly, when the repairmen were working on a leakage, ideally water in the pipe system ought to be stopped. However, valves from the old pipe system could not be fully closed as these now-fragile valves would be broken if they were pushed hard enough to stop the water flow. So the water still flowed when the job was being done which makes the work more difficult (see Appendix 10, Pictures 8 and 9). Also, particles and organisms could possibly enter the pipe network system during the repair job. Consequently, tap water to several customers brings waste sediment and accumulation of waste sediment in the pipe network which blocks the water continuity.

Unfortunately, not all water pipe leakages can be detected. According to the maintenance manager a detection tool for water pipe leakages was expensive, and the company did not want to invest its money for this machine. Water from pipe leakages that came to the surface could be detected and fixed up but some that flowed into the earth were not so the quantity of unaccounted-for water is still high (interview, 12 March 2004). It also means that the water supply system will continue to be liable to continued contamination (particularly in poor housing areas) as long as its current pipe system is not rehabilitated and renewed.

Renewing pipe networks and buying high technology such as a detection tool for a pipe leakage has not become a high priority for the managing director mentioning several reasons for that. The fund allocation for maintenance was limited. Pipe replacement was done in cases of detected pipe leakages. Buying a detection leakage tool was risky when employee discipline was low as the tool was easily broken and expensive (interview, 25 March 2004). So there were different priorities between managerial levels. The final decision maker did not put as high a priority on replacement of the current pipe system and modernization of the equipment technology as did the maintenance manager. However, as described later, the results of tests of water quality by the health department on several samples of tap water prove that some tap water was contaminated with e-coli bacteria, signaling that handling the leakage problem is urgent for securing the water quality from contamination.

V. 3. Water Quality

This section demonstrates interconnections among the performances in inputs (raw water material), processes (water distribution, testing and treatment), outputs (tap water) and outcomes to water customers, especially in poor housing locations. Originally, the Company's raw spring water materials are of good quality. However, its water distribution (as discussed earlier) and water treatment process (explained later) degrade the tap water quality until it does not completely meet the standards of bacteria, physical performance and chemical standard set up by the government.

Tap water is contaminated during its delivery process, and over-loaded in its treatment process. Test results from the health department laboratory prove that some water samples from taps and wells have been contaminated with bacteria. As well, a chlorine substance to sterilise water from bacteria has been used over-heavily due to combinations of low human resource skills and a diversity in knowledge about chlorine impact among managerial levels. The CPWSE management commonly understands that a low performance in handling pipe leakage problems can cause contaminated water **as explained earlier in Chapter V.2.3** but the response is to add more chlorine to kill water-borne bacteria although chlorine over-doses can cause health problems for the human body.

The other major cause of contaminated water is customer behaviors that contribute to the degradation of water quality. Connected pumping and pipe systems which mix tap and well water still operate in some customer's places but are not recommended because the tap water can be contaminated with unhygienic water from wells. Based on laboratory test results, well water is generally poor in comparison with tap water.

Well water in congested housing areas, normally of poor housing, has been contaminated with sewerage. Also chemical substances from industrial wastes contaminate tap water through old, corroded and broken water pipes. In the Ciloyo case study location, well water in a poor housing area has been contaminated with industrial wastes so there customers and non-customers are highly dependent on and need access to tap water from the Company. If not, a social and health implication that has already been detected will continually increase.

V. 3. 1. Bacterial Standard

Testing bacteria in water supplied from the CPWSE and other alternative sources is conducted by the Cinusa City Health Department. Findings in this section support a phenomenon described earlier where it was explained that one reason for selecting the case study locations was linked with health phenomena in Cinusa. It was found the lowest number of water-borne diseases (7513 cases) was in the Cikole sub-district where many high income families live and which also has the highest percentage of water supply coverage level (57 percent). Conversely, the highest number of water-borne diseases (19,014 cases) was found in the Cisuku sub-district which includes much poor housing and the lowest proportion (36 percent) of families with a water supply connection thus with a higher use of well water as explained earlier in Chapter III (information gathered from the Health Department 2003 and the CPWSE 2002). Bacteria test results from the city health department record that the quality of water samples from the Company is generally higher than well water.

Nevertheless, even though tap water quality in terms of bacteria is generally higher than in water from wells, the tap water from this water supply company has not achieved a maximal standard. Only 71.3 percent of 1302 water samples tested from 1 May 2001 to 27 February 2003 met the clean water standard (Table V.9).[80] It is even worse in terms of the drinking quality standard with only 59.2 percent of those samples indicating that the water can be consumed directly.[81] The technical director did not

[80] Based on the Health Minister Decree No. 907/2002 the Cinusa City Health Department routinely tests water quality from various resources, and food and beverages from home business and industry. In testing water quality, samples were taken from water taps of households/places representing all customer area locations. The water samples were selected randomly (interview with a water tester from the Health Department on 12 March 2003).

[81] Based on the Ministerial Decree the Health Department laboratory tests include aspects of bacteriological, chemical, radioactivity, and physical performance measures. However, all tests could not

support water customers drinking the tap water directly because water samples were collected and tested only occasionally and beyond these testing periods he did not give a guarantee that the tap water was free from contamination. The Company did not have water control equipment to monitor the water quality continuously to ensure that the tap water it supplied was always ready to be consumed directly. It should also be remembered that water pressure and leakage problems were still high (interview, 27 February 2003).

Table V.9:

Bacterial Test Results of Water Quality from the Company

Water Quality Test	Clean Water			Drinking Water		
	Within Standard	Outside Standard	Total	Within Standard	Outside Standard	Total
Sample	928	374	1302	771	531	1302
Percentage	71.3	28.7	100	59.2	40.8	100

Source: the Cinusa City Health Department (2003)

As previously mentioned the water supply can be contaminated through a low performance in handling pipe leakage problems. In one example of low work performance in a packed housing location, the maintenance worker tied up the broken pipe with a rubber band (see a picture in Appendix 11). According to a local household customer this had been done in the last six months but had already come untied several times and had been tied up again by members of the local community. During rain dirty water fell from a gutter onto this tied-up break in the pipe, potentially contaminating it

be conducted by the laboratory because of funding and equipment limitations, so it carries out only several of the important tests including pH, chloride, and e-coli bacteria while some other items are controlled by the Company laboratory.

with bacteria and other dangerous micro organisms. Moreover, the water pressure to customers was weakened because some water still leaked out from the break (interview, 17 February 2004).

Customers themselves can also contribute to the contamination of tap water. The technical director said that some customers connected pipes between tap water and well water with a pumping system and this bring contamination from the lower quality well water into the system (interview, 27 February 2003).

Recently, only 28.4 percent of 1302 water samples from wells and other underground sources[82] met the bacterial standard for clean water, and just 10.3 percent for drinking water (Table V.10). Although still not sufficiently high the results taken from piped underground sources such as bored wells (UW-WP) were proportionally higher than for the others at 37.5 and 16.7 percent respectively (Table V.10). Because this water is directly taken with a mechanical system from a deeper underground location and distributed directly through a pipe system it is better protected from contamination than if simply taken from dug or pumped wells.

Table V.10:

Bacterial Test Results of Water Quality from Several Alternative Water Sources

Water quality test	DW-WP		DW-NWP		PW-WP		UW-WP		Total	
	Sample	%	Sample	%	Sample	%	Sample	%	Sample	%
Clean water										
Within Standard	31	22.6	10	28.6	3	27.3	18	37.5	179	28.4

[82] According to (IDEMR, 2000), "Underground water" is all water under the land surface located in underground water-containing layers and includes underground water coming up naturally to the land surface (Indonesian Department of Energy and Mineral Resources, the Ministerial Decree No. 1451/2000, Chapter I, article 1 number 12 about the technical guide for conducting governmental works in underground water arrangements).

Outside	106	77.4	25	71	8	72.7	30	62.5	452	71.6
Total	137	100	35	100	11	100	48	100	631	100
Drinking water										
Within Standard	13	9.5	2	5.7	1	9.1	8	16.7	65	10.3
Outside	124	90.5	33	94.3	10	89.9	40	83.3	566	89.7
Total	137	100	35	100	11	100	48	100	631	100

Source: F City Health Department (2002)
Note: WP = water is distributed through a pipe; NWP = water is not distributed through a pipe; DW = dug well; PW = pumped well; UW = underground water (from bored well and piped directly to the surface)

Generally less than 30 percent of water from dug wells and pumped wells is inside the bacterial standard for clean water and less than 10 percent inside the standard for drinking water (Table V.10), whether the water is distributed through a pipe with a pumping system (PW-WP) and electricity (DW-WP) or a non-piped system (DP-NWP) (see Appendix 12, Pictures 11 and 12: wells with electricity, pumping and pipe systems). Based on the Health Minister’s Decree No. 907/2002 the quality standard for drinking water requires nil e-coli bacteria per 100 ml sample. For the clean water standard, the earlier Health Minister’s Decree No. 416/1990 requires a level of 10 or less e-coli bacteria per 100 ml sample for water distributed through a piped system, and 50 or less for water circulated through a non-piped system (Bacteriology test report, the Cinusa City Health Department 2003).

A low performance of water quality from the water supply company is not good for its customers and non-customers or for society as a whole where it can be identified as a governance problem. Members of society who have less or no access to water from the Company are in more risk of experiencing diseases related to water as they have to search for water from other alternative sources, especially lower quality well water in the case study area.

Respondents' opinions also give tap water a higher hygienic quality than well water. 49.4 percent of 235 respondents felt that well water is worse than the tap water (Table V.11), only 13.2 percent preferring well water[83]. As mentioned earlier, only 10 percent of well water samples tested compared to about 60 percent of tap water met the drinking quality standard (Tables V.9 and V.10). But 6.4 percent of respondents did not have an opinion about a quality difference (Table V.11). The public is not told about the bacteriology testing results.

Table V.11:

Respondent Answers about the Hygiene of Well Water Compared with Tap Water[84]

Respondent Answer	Frequency	Percentage
Better	31	13.2
Same	73	31.1
Worse	116	49.4
Don't know	15	6.4
Total	235	100

Source: Survey data collection 2004

Moreover, 31.1 percent of the respondents thought that there is not much difference in hygiene between well and tap water, apparently using their own experience of physical indicators rather than directly bacteriological testing. For example, one wrote that:

> Water quality can be tested with tea. I put tea water into well and tap water and wait for a minute for the reaction. The water quality is high if the color of the combined water is a

[83] Possibly these have experience of higher quality water from their wells and lower quality from their taps.
[84] Some respondents who answered this question (number 40) are those with experience of well water even though some of those wells have since been closed.

gold yellow. But the quality is low if its color is dark or black red. My test result shows that both water qualities are good.

So, in general, the quality of tap water based either on bacteriological testing or on respondents' opinions is considered to be higher than that of other sources of water in this area, even though, with only 59.2 percent of samples above the regulated drinking water standard, this quality is not yet maximal or reliable.

The government with its regulatory function is responsible for safeguarding public safety. A comprehensive approach involving stakeholders from the government, the private company and the community is needed in solving this health concern. A low quality of water is a main driver among other factors that can cause diseases related to water. Water treatment and distribution systems are also implicated in the water supply quality being degraded, as explained later.

V. 3.2. Chemical Standard: the case of chlorine and contaminated water

This sub-section discusses two problems: human capacity and water contamination. In the human capacity problem, a lack of employee skills and numbers in the CPWSE water quality control unit can decrease water supply quality. In the interview with the head of water quality control in the CPWSE (interview, 12 March 2004) it was mentioned that human resource skills in her unit were low. Only one in five operators was sent for training to learn about disinfectants and measuring doses of disinfectant for water supply. It was expected at least one water quality control operator would stand by and monitor the doses of chlorine added in the water processing installation but it was not possible with the situation of employees in this unit. 5 disinfectant operators were not enough to control disinfectant works in 9 places every day.

A lack of skill in disinfecting water meant that employees did not undertake the water quality control work to the highest standard.[85] A gap in the knowledge across managerial levels is another problem. The production manager mentioned that chlorine does not have a hazardous effect on the human body (interview, 17 March 2004) although the head of water quality control mentioned that inappropriate doses of water disinfectant, especially chlorine, are hazardous for human. She stated that the tolerance standard of chlorine residue in tap water was between 0.2 and 0.5 milligram per litre. If the chlorine residue was between 0.5 and 1 milligram per litre it would cause a human respiration problem or dried breathing.[86] If organic compounds were united with the chlorine dangerous organic compounds called trihalometans were produced that could cause cancer disease.[87] Organic compounds such as ammonia and nitrite could be found in artificial fertilizer and industrial waste including leather, food and wood industries.[88] These organic compounds could contaminate the tap water through the water pipe system when the pipe was broken and repaired and the water pressure inside the pipe was low (interview, 12 March 2004). The technical director stated that the water could be contaminated, because the water pressure inside the pipe was not constant 24 hours per day, in particular the water in several pipe networks was stopped at the peak hours when many customers used the water (interview, 27 February 2003).

[85] See discussion in Chapter IV about the imbalanced placement of employees in the Company.
[86] The types of chlorine substances used by the Company are chloride gas and sodium hypo chloride.
[87] Trihalometans (THMs) are compounds formed as a side product of the chlorine process in a reactive result between organic compounds and halogen inside chlorides and bromides. THMs include dichlorobromometan, chloroform and bromoform. Chloroform has been known as carcinogenetic or a typical compound that can cause cancer, especially in animals. Intolerant doses of Chloroform and bromoform for a human body are 630 mg/kg of human body weight and 100 mg/kg of human body weight (Water quality training handbook 2003)
[88] Generally, the existence of organic substance in water is caused through water contamination including from fertilizers, pesticides, insecticides, fungicides, organic solvents, oil, industry residues (chemical, medicine etc.) which are not present as naturally occurring components of water (Water quality training handbook 2003)

In the water contamination problem, the possibility that the tap water is polluted with chemical substances is high as the water leakage proportion is high and the leakage team competencies in handling pipe leakage problems are still low as explained earlier. Water supply pipes for a poor housing area in the case study location of Ciloyo can get waste pollution from 51 local industries (Monograph on Case Study 1, 2001)[89]. The industrial wastes flow into the stream in this area and some of the Company's water supply pipes are placed in this stream. The tap water can be contaminated since the pipe is old and corroded:

> A leather industry as I know throws away its industrial waste into the stream in front of my house. This waste makes a terrible smell. As well, water pipes from the CPWSE in the stream are corroded. I feel that the water tap has been polluted with the industrial waste.

When the CPWSE was asked about this possible contamination, the head of water quality control answered that the company's laboratory unit regularly tested tap water samples, but was not allowed to report these test results publicly (interviewed on 12 March 2004). It was commented that this case could be easily politicized by some politicians and individuals in the media or society and this situation would be very costly to manage as another case of contaminated water in one of the springs had been highly politicized and costly to handle (interview with the managing director, 25 March 2004).[90] The CPWSE management carefully deals with the contaminated water in Ciloyo because

[89] Classified as 12 big industries, 34 middle industries and 3 small industries.
[90] The other case of contaminated water was described by the head of the City Health Department. Water from one of the CPWSE springs suspected was contaminated with pesticide from apple and orange farming located on the hill above the spring as reported in the *Jawa Pos* on 29 August 2002 (Tyo, 2002). At that time, apple and orange trees were attacked by leaf diseases and fruit flies so farmers increased doses of pesticide to save their farming from the attack to 3 and 4 times higher than the usual dose. The overdoses of pesticide were implicated in contaminating the Karangan water source (*Cinusa Pos*, 29 August 2002).

this situation can be used by some opportunists with their rent-seeking behaviors to get private benefits.

An indication of well water being contaminated in Ciloyo is a low well ownership from customers in Ciloyo. In the three case study locations, almost a half (45.4 percent) of 427 respondents mentioned that they have wells in their house as well as a tap water connection, but only 16.3 percent of respondents in Ciloyo had wells in their house compared with 44.9 percent in Cidoyo and 58.9 percent in Cigadis (Table V.12).

Table V.12:

Respondents, Case Study Location and Well Ownership (%)

Well Ownership	Location			Average
	Ciloyo	Cidoyo	Cigadis	
Yes	16.3	44.9	58.9	45.4
No	83.8	55.1	41.1	54.6
Total	100	100	100	100

Source: Survey data collection 2004

Most of those respondents without wells in their houses are low income households. In the poorer (A) category of household a lower percentage (36.7) have their own wells compared with the next two categories (B, C), each with about 60 percent. The two richest categories (D, E) were between these proportions with 47.9 and 50 percent (Table V.13).

Table V.13:

Respondent Groups and Well Ownership in Their House (%)[91]

Well	Soc	Hh A	Hh B	Hh C	Hh D	Hh E	Gov	B & I	Total
Yes	31.3	36.7	59.5	61.5	47.9	50.0	50.0	37.1	45.4
No	68.8	63.3	40.5	38.5	52.1	50.0	50.0	62.9	54.6
Total	100	100	100	100	100	100	100	100	100

Source: Survey data collection 2004
Note: Soc=Social, Hh=Household, Gov=Government, B&I=Business and Industry

So, respondents in Ciloyo who are mostly the lower income category of household (see Chapter III) are more dependent on their supply of water from the CPWSE compared to the other respondents from the other two locations.

A low percentage of well ownership by the type A or lower income households is partly caused by the fact that well water has commonly been contaminated with sewerage as the distance between their houses is too close. 47.3 percent of respondents in A households live on 80 m2 or less land, 41.9 percent on between 80 and 180 m2. By comparison, 75.7 percent of D category household respondents live on more than 180 m2 land (Table V.14). The high density of lower income households also makes difficulties for them to have wells in their houses (see Appendix 1: pictures of lower income households).

[91] "Social customers" get a cheaper price than other customer categories, some being granted free water every month. Respondents from the Social category also have a low level of well ownership compared to the other categories. Respondents in the Business category are mostly dependent on tap water for their water consumption but industries ordinarily use underground water, particularly from bored wells, because they consume lots of water (as discussed in Chapter IV).

Table V.14:

Respondent Household Groups and House Land Area (%)

Land Area	Soc	Hh A	Hh B	Hh C	Hh D	Hh E	Gov	B & I	Total
<=80 m2	18.8	47.3	22.1	5.1	10.8	21.4	25	17.1	27.9
>80-180	18.8	41.9	57.2	41	13.5	64.3	0	25.7	37.8
>180m2	62.5	10.8	20.8	53.8	75.7	14.3	75	57.1	34.3
Total	100	100	100	100	100	100	100	100	100

Source: Survey data collection 2004
Note: Soc=Social, Hh=Household, Gov=Government, B&I=Business and Industry

Respondents living in a high density housing area are at higher risk to get their well water contaminated with the sewerage as the sewerage system in the case study areas, as in the Cinusa city generally, uses an individual septic soakage tank for each house. 83.5 percent of 430 respondents in these three locations used this kind of sewerage system (Table V.15).

Table V.15:

Respondents, Case Study Location and an Individual Septic Soakage Tank Ownership (%)

Location	Individual Septic Soakage Tank Ownership		Total
	Yes	No	
Ciloyo	53.1	46.9	100
Cidoyo	91.7	8.3	100
Cigadis	89.4	10.6	100
Total	83.5	16.5	100

Source: Survey data collection 2004

Well water gets more chance to be contaminated from this individual sewerage system rather than an integrated system, because the integrated sewerage system used for many households is located on one site, and protected from the housing area. In the Ciloyo location an integrated sewerage system in this area has been introduced by the local government and now only 53.1 of the respondents in this area used an individual system, most of the rest were joined to the integrated system.[92] The local government's action in installing the integrated sewerage system in Ciloyo shows its awareness that well water in this high density housing area can be easily contaminated if they continue to use individual septic soakage tanks. So the problem in this location is that well water can be contaminated from individual septic soakage tanks as well as with industrial wastes.

Individual sewerage systems are more likely to contaminate well water when the distance between wells and septic soakage pits is too close. Of the 165 respondents answering the relevant question, overall 46.7 percent had their wells and individual sewerage pits less than 8 metres apart (Table V.16),[93] 61.2 percent among the A households then decreasing for B to D.

Table V.16:

Distances between Wells and Individual Sewerage Systems (%)

Distance	Soc	Hh A	Hh B	Hh C	Hh D	Hh E	Gov	B & I	Total
< 8 M	33.3	61.2	59.1	33.3	24.1	40.0	50.0	25.0	46.7
8 and < 14 M	33.3	32.7	36.4	57.1	69.0	60.0	0.0	66.7	46.1
> 14 M	33.3	6.1	4.5	9.5	6.9	0.0	50.0	8.3	7.3
Total	100	100	100	100	100	100	100	100	100

[92] The other place to throw away human faeces is the river but few households in the three survey areas still maintain this system.
[93] Some respondents closed their wells because water from them could not be used any more.

Source: Survey data collection 2004

Provisions of safe tap water for customers in the poorer households living in the higher density housing are more critical because they are absolutely dependent on their water supply from the Company. Originally, people in this area used well water for their daily life but then the increase of inhabitants and house buildings contributed to a packed and jammed housing land condition so the well water became more contaminated, making customers in this type of housing area highly dependent on the supply of tap water from the Company.

Furthermore, the other problem is that the water supply coverage level in Ciloyo was only 18 percent in 2002 (see Table III.3). 82 percent of people in this area without the CPWSE water supply service mainly use well water. The report of the research done by the city government's local environmental impact control body, Bapedalda, mentioned in the *Jawa Pos* (16 February 2001) that water quality in Ciloyo was very bad (War, 2001). This water condition was even worse, because a drainage system of industrial wastes in this area did not meet the quality standard.[94] Additionally, the community organization Ciloyo Environmental Control Communication Forum stated in the *Cinusa Pos* (1 February 2001) that wells in Ciloyo did not meet the water standard. Water from wells was contaminated with organic chemical substances from industrial wastes. Organic chemicals from the wastes discharged into the stream in this location infiltrated and then contaminated well water in housing communities living all along the stream side. Laboratory tests showed that the calcium parameter in the well water was over the

[94] Bapedalda is 'Badan Pengelolaan Dampak Lingkungan Daerah'.

standard (see Appendix 13, Pictures 13 and 14: Industrial wastes in the stream in Ciloyo). As two respondents among others in Ciloyo state:

> Previously, well water was very clean, but now the water has been contaminated with industrial wastes from leather industries.
>
> A smell from leather industrial wastes is in my well, and my well water color is yellow now.

People living in Ciloyo, a high density housing area, are mostly low income families in housing situations not greatly different from those of other lower income families living in the other two case study areas or in the other poor housing areas in the Cinusa city. Two other poorer customers who live in the other two high density housing comment:

> The well water quality is different. In past the water was very clean, reliable, and easy to get, but now the well water quantity is decreased, and its color is moldy and brown. Since the last 30, 20 and 10 years my well depth was continually dug down from 7 to 10, 18 metres. My well depth now is 23 metres which is the distance to access groundwater.
>
> The clarity of my well water was very good, and the well depth was only 8 metres in the last 30 years, but currently the well is 17 metres, but the water is still colored and contaminated.

These comments demonstrate that well water has been contaminated, and the groundwater has been degraded. This is an indication that increasing the coverage level is critical for preserving the groundwater and preventing both customers and non-customers from consuming contaminated well water that can endanger their health. A 71.6 percent incidence of water-borne diseases was reported among respondents living in the poorer housing areas in Ciloyo, whilst 42 and 28.2 percent were found in Cidoyo and Cigadis respectively.

Table V.17:

Ratios between the Number of Water Borne Diseases and Respondents in Each Neighborhood Location (%)[95]

Ratio between the Number of	Ciloyo	Cidoyo	Cigadis
Water Borne Diseases/ Respondents in Each Neighbourhood Location	71.6	42	28.2

Source: Survey data collection 2004

So, respondents who stay in a high density or poorer housing area such as the Ciloyo area are more likely to get infected with water-borne diseases compared to those respondents living in a low density and richer housing area such as the Cigadis location. Lower income people who are customers and non-customer of the water supply are more highly at risk to get infected with water-borne diseases. As reported in the Chapter III a low coverage level of water supply from the CPWSE is found to be associated with high cases of water-borne diseases.

V. 3. 3. Water Physical Performance

Respondent comments in the open question on tap water physical characteristics performance (based on survey data collection in three neighborhood areas) mostly referred to the smell of the water (97 comments), followed by taste (48), purity (47) and sediment (18).

Water smell was also the problem more often reported in responses to the closed question in the survey related to respondents' experience with water physical

[95] Kinds of water-borne diseases seen by staff from the Cinusa City Health Department include diarrhoea, hepatitis A, cholera, worms, typhoid, kidney stones, skin disease and allergy, and trachoma. This information is summarized from question number 114 in the questionnaire (see Appendix 3)

characteristics performance, 82.4 percent of respondents reporting it. This can be compared with the 58.2 percent of respondents reporting having experienced problems with water taste and the 49.4 percent having had water clarity and sediment problems (Table V.18).

Table V.18:

Respondent Experiences with Water Smell, Taste, Clarity and Sediment[96]

Respondent Experience	Water Quality			
	Smell	Taste	Clarity	Sediment
Never	17.6	41.8	50.6	50.7
Ever	82.4	58.2	49.4	49.3
Total	100.0	100.0	100.0	100.0

Source: Survey data collection in 2004.

97 of the complaints about tap water smell mentioned that the smell of chlorine was overwhelming, 5.9 percent mentioned "fishy" odours, 4.5 percent "medicine" and 0.8 percent "mouldy" (Survey data collection 2004).[97] Other kinds of smell in the tap water identified by respondents in the open-ended question item are as follows: "corroded, iron, earth and mud smells".

Chlorine smell was the main concern and was also supported with responses from respondents to the open question 85 in the survey about desired improvements in tap water quality. 115 respondents referred to reducing the smell and taste of chlorine, including:

[96] All 431 respondents gave responses to question number 73 on water smell, all but one on taste, all but two on clarity and all but three on sediment. 'Ever' is the total of the choices 'not often', 'rather often', 'sometimes', 'often', and 'always' (that is, all except 'never') given to the questions 70 (clarity), 73 (smell), 77 (sediment) and 80 (taste).
[97] Summarized from survey question 74.

> Please decrease the chlorine in the tap water. When it is used for drinking and cooking, the water taste is terrible.

> The chlorine smell in the tap water must be reduced. The smell is too strong. When the water tap is used for cooking rice, the chorine smell is still in the rice.

> Please reduce smell of chlorine in the tap water, because it is used for drinking. When this tap water used for making a tea, the chlorine smell is still there in the tea.

Respondents felt uncomfortable with the smell and taste of the tap water although they still use it, because the water quality from alternative sources, particularly from well water, is low and buying bottled mineral water is expensive for them. Even though the chlorine is highly-flavored some respondents consumed it without any further process. But others find ways to improve the tap water before it is used, for example:

> The current water quality should be increased. Water from the CPWSE is smelly. But, if it is stored in a 'Gentong' for 2 days, the chlorine smell can go.

Storing the tap water in a 'Gentong' or large earthenware bowl for water is inefficient in term of time management for customers, but this helps them to eliminate the chlorine smell (see a picture of 'Gentong' in Appendix 14). Another way to clean the tap water is to filter it:

> The water quality from the CPWSE is not good. It does not meet the water quality standard based on the test result from a laboratory, as I ask the laboratory staff to do a test on my tap water. The water also contains moss/algae, and its color is muddy. The chlorine taste is very strong. So, it needs a water filter to reduce the chlorine taste and smell in the water. After that, it must be boiled until the chlorine smell gone. As I use it for drinking, especially for my baby. Please increase the quality of the tap water. Because water from my well is even worse for drinking, and bottled mineral water is too expensive for me.

Tap water quality has not satisfied all respondents. As discussed above responses and comments from many respondents were related to the water's low quality performance. However, although the problem of water quality in this area is commonly related to the water distribution and treatment, it is unlikely to be correlated with the quality of the raw water material because tap water in this area is supplied from a spring in which the water quality is generally good.

Some who can afford to buy bottled mineral water decided to use it as the replacement of tap water for drinking. Several respondents were worried by the effect of chlorine on the human body.[98] They claim this chemical substance causes a problem in the respiratory system. For example:

> The taste of tap water is acidic due to overwhelming chlorine inside it. So, we are not brave enough to boil the tap water for drinking, we drink bottled drink water.
>
> Please consider the effect of chlorine to a human health, because customers do not know its implication in the future.
>
> The composition of chlorine in the tap water is too high. When it is used for watering my fish aquarium, the fishes directly die. So, this tap water is dangerous, if it is consumed by a human being.
>
> Please reduce the chlorine composition in the tap water. The smell is too strong. It causes a breathing problem, and the taste is not good for drinking.

The last comment indicates that a chlorine substance has been used at a concentration over the standard, which can be explained in terms either of the capacity of the CPWSE employees in maintaining and controlling the tap water quality (as explained earlier) or that this is necessary to compensate for the leakages and in the pipes which contaminate the water.

So, water smell and tastes reported above have been being sharply criticized by respondents. Some tacit and indigenous knowledge from local customers in responding to the problems of the water supply physical performances are mentioned such as the ways they use local technology and knowledge to test and improve the water quality.

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[98]In the survey results, 39 written comments were related to the water hygiene, 41 insisted the tap water meet the clean water standard and 18 wanted the tap water to be directly consumable.

V. 4. Water Pressure and Continuity

This section proves the interconnection between the performances in inputs (water demand), processes (pump and reservoir capacity), outputs (water pressure and continuity), and outcomes (customer opinion and satisfaction). Gaps between high peak water demands and low reservoir capacity, and between low capacities of pumps and generators contributed to a low performance of water pressure and continuity. A further consequence was a low evaluation from customers on the water performance. Demands for water are commonly high in the peak hours (early morning and early evening), when people prepare to go to work and study in the early morning and arrive back home in the early evening. Pump and reservoir capacities during these peak hours cannot accommodate water demand. As a consequence, water supply in some areas does not flow, or the water pressure is low.

A scorecard for water utilities in developing countries states that 24 hour continuity of water service is the target performance (World Bank, 2002). Also, in the Indonesian national government principles of performance evaluation of water supply enterprises, water continuity is defined as water that continually flows to customers for 24 hours per day. Temporary disturbances that stop the water flow are not counted in this definition, such as repair jobs for pipe leakages (IHAD, 1999).

In this study, 70.5 percent of all respondents stated that water flows 24 hours per day in their house, for the others that it did not (Survey data collection 2004, question 86). Of those reporting less than 24 hours of water flow, the average was 15.4 hours per day (survey data collection 2004, question 88) which is just below the 16 hours stated (in a 2003 paper by its technical director) to be the CPWSE's minimal standard service for its customers. This minimal standard should be forced by stakeholders considering the inappropriate impacts on those customers who receive a lower performance of water supply service, such as:

> In the last one year, water supply from the CPWSE only flowed late at night from 1.30 am to 4.30 am. After that, the water would not flow any more. So, I must wake up every night to store water and to wash clothes.[99]

Many customers wanted water to be available 24 hours per day, particularly in the dry season. Some of these felt that it does not matter if the water pressure is low as long as the water kept flowing. For example:

> Water continuity needs more attention in the dry season. Water is needed all the time. But, for water pressure, it does not matter as long as the water flows fluently 24 hours per day.
>
> For a dry season, a medium pressure of water supply is alright. The important thing is the water keeps flowing.[100]

Respondents expected that water in the dry season can flow as well as in the wet season. One stated that it was good if we could use water in the dry season as fluently as in the wet season. Another mentioned that in the dry season the tap water was absolutely needed, because the well water was dry. Customers with and without a well facility in their house have the same problem of water scarcity during the dry season, often needing to wake up in the evening to store water, because the tap water does not flow during the day:

> In the dry season, please improve the water continuity and pressure. So, in the night, I do not need to store water to the tub. If I neglect to store the tap water, I will not take a bath during the day.

---

[99] Respondent's comment to question 99a in the questionnaire
[100] Respondents' comments to question 99a.

> In the dry season, the tap water often does not flow from 7 am until 4 pm. It usually starts to flow from 10 pm until 4 am. So, I need to wake up in the night to store the water. Otherwise the water is insufficient for daily needs. [101]

Water continuity is closely related to water pressure. If water pressure is low, water continuity is also down or even stopped. Water pressure was reported as being higher in the wet season than in the dry. 86.7 percent of respondents felt that water pressure is high in the wet season but only 46.5 percent also in the dry (Table V.18). During the wet or rainy season several activities (including watering gardens or yards and washing vehicles) rely on tap water. In the dry season they rely on rainwater. Water consumption for drinking commonly increases during the dry season. Therefore, water customers feel that water pressure is lower in the dry season because they are consuming more tap water during this period.

Table V.19:

Respondent Groups and Water Pressure in Wet and Dry Seasons (%)[102]

Water pressure:	Soc	Hh A	Hh B	Hh C	Hh D	Hh E	Gov	BI	Total
In wet season									
High	75.0	85.8	81.0	89.7	93.2	92.9	75.0	91.4	86.7
Low	25.0	14.2	19.0	10.3	6.8	7.1	25.0	8.6	13.3
Total	100	100	100	100	100	100	100	100	100
In dry season									
High	31.3	41.2	35.4	30.8	65.8	64.3	50.0	74.3	46.5
Low	68.8	58.8	64.6	69.2	34.2	35.7	50.0	25.7	53.5
Total	100	100	100	100	100	100	100	100	100

Source: Survey data collection 2004
Note: Soc=Social, Hh=Household, Gov=Government, B&I=Business and Industry

[101] As in previous footnote.
[102] Information presented in this table V.17 is derived from answers to questions 92 and 94 asking about water pressure in the wet and dry season respectively. All but two responded to question 92, all but one to 94. In this table 'High' is the total choosing 'very high', 'high' and' rather high'; 'Low' the total of 'rather low', 'low' and 'very low'.

Customers who live near the end of service pipes or at the end of water supply connections are more likely to have a water pressure problem. The problem is more serious if their house position is higher than others. Some of them can only open one of their water taps, and their water consumption is dependent on the behaviors of their neighboring households. Problem of water pressure was evident in several comments:

> Please improve the water pressure in my house, because water is vital for my family. Water pressure is too low. Getting water from the tap is taking lots of time and the water is not enough. I can only open one of the water taps in my house. If I open two water taps, the water stops.
>
> Please improve the water pressure system, so water taps can be opened at the same time with a water flow. Only one tap opened will have a flow.
>
> Our house location is on the end of the street. So, the flowing of tap water in my house is dependent on my neighborhood households. When they open their taps, the water supply in my house is small or stopped. It is only a water tap in my house connected with the supply pipe under 1 meter of its height from the ground that can flow the water. The other water taps in my house are stopped in this situation.
>
> Please find a way that households located in the higher land position can take the tap water flow fluently.
>
> It is good, if at afternoon time the water can flow in the second floor, because washing activities are on this floor.

A more serious problem is faced by people who live in the poor housing area. In this packed housing location, the numbers of households double while the water supply pipes are limited. So, a single pipe connection from the water supply company in this area is used for many households. As a comment given by a customer in the packed housing area mentioned, "in my house water pressure and continuity was good enough, but other households behind me have a problem. They often could not receive water, and the water pressure was low. The connection pipe was over capacity. The pipe with 0.5 decimeter was used for 15 customer connections".[103]

Especially in the dry season and in the peak hours (early morning and evening) water customers compete for water. 58.8 percent of respondents in A household customers stated that the water pressure is low during the dry season in comparison to 34.2 percent of respondents from D household customers, with a similar pattern for during the wet season.

The water pressure condition influences the water continuity. Water supply in a wet season is more reliable than in a dry season. Overall, 85.8 percent of 430 respondents felt that water continuity was high over 24 hours in the wet season but only 45 percent of them felt this was true during the dry (Table V.20). In the higher income, D household, areas 93.2 percent of respondents reported high continuity during the wet season, only 57.5 percent during the dry, as compared with 82.4 percent and 40.2 percent respectively of household respondents. This indicates that respondents in a poor and packed housing locations experience a lesser continuity of water service.

People who live in the poor housing location tended to receive a lower performance of water pressure and continuity. This location is at the end of the water supply service. In other word, they are served last. Additionally, water pipe sizes generally follow streets' classifications. Primary and secondary water pipes or large and medium sized pipes are usually located in primary and secondary streets, whereas a tertiary or small pipe is located in tertiary and small streets. Some respondents understood this

[103] Respondent comment to question 99a.

Water supply pipes have to be rearranged. It is not fair that houses with the location far from a big street get a smaller diameter of water pipe. Automatically, they get a small water supply.

Table V.20:

Respondent Groups and Water Continuity in Wet and Dry Seasons (%)[104]

Water continuity:	Soc	Hh A	Hh B	Hh C	Hh D	Hh E	Gov	BI	Total
In wet season									
High	81.3	82.4	84.8	92.3	93.2	92.9	100.0	80.0	85.8
Low	18.8	17.6	15.2	7.7	6.8	7.1	0.0	20.0	14.2
Total	100	100	100	100	100	100	100	100	100
In dry season									
High	31.3	40.2	39.2	30.8	57.5	57.1	75.0	68.6	45.0
Low	68.8	59.8	60.8	69.2	42.5	42.9	25.0	31.4	55.0
Total	100	100	100	100	100	100	100	100	100

Source: Survey data collection 2004
Note: Soc=Social, Hh=Household, Gov=Government, B&I=Business and Industry

In comparison rich housing areas and productive grounds for business activities are mostly located in the main streets. One respondent commented that "it was good that my house was located on the primary street where the primary water pipe was distributed. So, water continuity was not a problem here". Correspondingly, some customers who live in tertiary streets or small streets know that they are at the end of water supply service:[105]

I hope customers like me --- (*from household category A*) --- can be given more priority for water supply service, because water is very important. Please do not always overlook (us) for customers from big categories --- (*household type D and E, and from business and industry*).

---

[104] Information presented in this table is derived from answers to questions 96 and 98 asking about water continuity in the wet and dry seasons respectively. All but one answered 96, all but two 98. In this table 'High' is the total of those choosing 'very high', 'high' and 'rather high'; 'Low' the total of 'rather low', 'low' and 'very low'.
[105] Respondent comments to question 99a.

> Please look after customers in the small streets, because water supply in my area is usually low. The water proportion has been taken a part from other locations.
>
> Please improve the water supply condition in my house located in the small street. The tap water has been going. Customers from big streets have been consuming it first, before the water reaches my house.

The Company's big and middle sized primary and secondary water supply pipes are mainly located in the main streets where most rich housing areas are located. In these streets the smaller tertiary pipes used to connect directly to customers are close to the primary and secondary pipes so they receive a high performance of water quantity, pressure and continuity. In contrast, the tertiary pipes in a poor housing area (typically located in a tertiary street or small street less than 3 meters wide) are mostly connected to other tertiary pipes from the primary and secondary street locations. Therefore, they receive a lower performance of water quantity, continuity and pressure because they are at the end of the service.

The other problem of water pressure and continuity is that there are not enough reservoirs to cover the service. The Company needs nine additional reservoirs each of 1000 m3 capacity. The Company's technical director stated that the total aggregate reservoir capacity to fully cover all current customers was 16,000 m3 but the company's current reservoir capacity was only 8,000 m3. However, the investment needed for each 1000 m3 capacity would be about 1 Milliard Rupiah (interview, 18 March 2004).

The reservoirs have a function to balance water needs 24 hours per day as water supply pipes have a limitation when many people open their taps, particularly during the peak demand hours of early morning and early evening. Ideally, the primary and secondary pipes going and coming out from a reservoir are not used to serve customers, who ought to be served through tertiary pipes. But, in the case of this Company, that ideal has been broken. Several customers have been supplied by connections directly through primary and secondary pipes. Automatically, the function of the reservoir to balance water in and out does not work as the reservoirs are never full.

The technical director stated that a misunderstanding happened when other managerial levels thought that as the reservoirs were not full they were sufficient and not a problem. The previous approaches to solve under-performance were through the enlargement of primary pipes that distributed water into reservoirs. As discussed previously, the other approaches were through the increases of production capacity and handling leakage problems.

However, customers can also create a problem of water availability, pressure and flow. Some customers use an electrical water pump to draw water from the supply pipe. This illegal activity brings a benefit for them as they receive a better service of water continuity and pressure but other households in their neighborhood get lesser service. As reported by a respondent, "the CPWSE needed to conduct sweeping more regularly and gave a hard sanction for customers who used a water pump to pull water supply, especially in the dry season".[106]

Ways for solving under-performance of water pressure and continuity can also come from water customers. Customers who are willing to establish a small reservoir in their houses can overcome the problem of water pressure and continuity. As the technical director mentioned, the Company needs reservoirs with 9,000 m3 of water capacity. If 9,000 customers each build a reservoir with one m3 of water capacity, this will solve the problem of reservoir and shift the cost from the Company to customers. 21.1 percent of 408 respondents mentioned that they had a water tank in their houses (Table V.21).

[106] Respondent comment to question 99a.

Table V.21:

Respondent Groups and Water Tank Ownership (%)[107]

Tank ownership	Soc	Hh A	Hh B	Hh C	Hh D	Hh E	Gov	BI	Total
Yes	43.8	10.5	15.8	34.2	30.1	14.3	25.0	37.1	21.1
No	56.3	89.5	84.2	65.8	69.9	85.7	75.0	62.9	78.9
Total	100	100	100	100	100	100	100	100	100

Primary source: survey data collection 2004
Note: Soc=Social, Hh=Household, Gov=Government, B&I=Business and Industry

However, incidents in lower performance of water pressure and continuity mostly occurred in the poor housing area. Customers in this location are commonly a low income family. Their houses are also packed and there are generally no spaces to build a reservoir in them. With a rate of only 10.5 percent respondents in A households were among the customer types who are lower in term of tank ownership, in comparison with the 30.1 percent of D households.

From the situation above, some customers are not satisfied and want improvements. They also compare the water service performance and the cost paid by them for the service:

> Please do not stop the water supply often. In the last two months, the tap water only flowed from 1 am to 4.30 am. As a consequence I could not sleep in the night, because I must fill my water basin every night. In the last month, the water did not flow for one week. Why does not the company give me compensation? In fact, if I am late to pay the water bill in one month, the company gives a fine.
>
> The water pressure must be increased. We pay expensively for this water. It is fair enough to deserve a better service. The water supply is frequently stopped; so we have to get well water from our neighborhood households.

[107] This information is summarized from answers to question 41 in the questionnaire.

Generally, respondents are satisfied with the water supply pressure in the wet season at about 86.3 percent of 430 respondents but less so in the dry, at just 53.7 percent. The numbers of respondents from household types A and B who were satisfied with the water supply service were lower than those from household types D and E during both seasons, 85.3 and 79.7 percent compared to 93.2 and 92.9 respectively during the wet season dropping a long way to 48.8 and 46.8 percent compared to the less reduced 76.7 and 71.4 respectively during the dry (Table V.22).

Table V.22:

Respondent Groups and Customer Satisfaction on Water Pressure in Wet and Dry Seasons (%)[108]

Satisfaction on water pressure:	Soc	Hh A	Hh B	Hh C	Hh D	Hh E	Gov	BI	Total
In wet season									
Satisfied	81.3	85.3	79.7	92.3	93.2	92.9	75.0	85.7	86.3
Not satisfied	18.8	14.7	20.3	7.7	6.8	7.1	25.0	14.3	13.7
Total	100	100	100	100	100	100	100	100	100
In dry season									
High	37.5	48.8	46.8	35.9	76.7	71.4	50.0	65.7	53.7
Low	62.5	51.2	53.2	64.1	23.3	28.6	50.0	34.3	46.3
Total	100	100	100	100	100	100	100	100	100

Source: Survey data collection 2004.
Note: Soc=Social, Hh=Household, Gov=Government, B&I=Business and Industry

Respondent satisfaction on water continuity was not far from their evaluation patterns on water pressure. In general, 87.6 percent of 429 respondents were satisfied with the water continuity service in the wet season, but just 52.7 of them were in the dry.

[108] Information derived from answers to questions 93 and 95 asking about respondent satisfaction with water pressure in wet and dry seasons respectively. In this table ‘Satisfied’ is the total of those choosing ‘very satisfied’, ‘satisfied’ and ‘rather satisfied’; ‘Not satisfied’ the total of ‘rather low’, ‘low’ and ‘very low’.

The number of respondents satisfied with the water continuity was lower in the A and B than in D and E households for both seasons, 87 and 79.7 percent compared to 94.5 and 92.9 respectively for the wet and 48.8 and 47.4 percent compared to 69.9 and 50 respectively for the dry season (Table V.23).

Table V.23:

Respondent Groups and Customer Satisfaction on Water Continuity in Wet and Dry Seasons (%)[109]

Satisfaction on water continuity:	Soc	Hh A	Hh B	Hh C	Hh D	Hh E	Gov	BI	Total
In wet season	(429 respondents)								
High	87.5	87.0	79.7	92.3	94.5	92.9	100.0	85.7	87.6
Low	12.5	13.0	20.3	7.7	5.5	7.1	0.0	14.3	12.4
Total	100	100	100	100	100	100	100	100	100
In dry season	(429 respondents)								
High	37.5	48.8	47.4	33.3	69.9	50.0	75.0	74.3	52.7
Low	62.5	51.2	52.6	66.7	30.1	50.0	25.0	25.7	47.3
Total	100	100	100	100	100	100	100	100	100

Source: Survey data collection 2004.
Note: Soc=Social, Hh=Household, Gov=Government, B&I=Business and Industry

In response to the performance problems of water quality, quantity, continuity and pressure as discussed above several next steps were suggested by the CPWSE management in the second focus group discussion on 25 March 2004. These are essentially presented here (see all focus group discussion results in Appendix 6).

[109] Information derived from answers to questions 97 and 99 asking about respondent satisfaction with water continuity in wet and dry seasons respectively. In this table 'Satisfied' is the total of those choosing 'very satisfied', 'satisfied' and 'rather satisfied'; 'Not satisfied' the total of 'rather low', 'low' and 'very low'.

Firstly, practical training about disinfectant jobs and water quality tests are required for improving the employee skills in the CPWSE water control unit. Secondly, a wider authority for taking and testing samples is crucial for investigating the water quality in all parts of the pipe network systems. Thirdly, an educational learning program about the chlorine impact on human consumption is to be arranged. This is important for both the employees and customers in narrowing the perception gap between them. Fourthly, problems of pipe leakages are to be overcome by establishing a water control unit, modernizing tools for detecting water leakages and maintaining pipes, replacing old pipes, and upgrading information about pipe locations, especially tertiary pipes in the pipe network information system (PNIS). Fifthly, training for improving employee' skills about the PNIS is needed for a quick response to pipe leakage cases. Sixthly, discontinuity of water could be overcome by zoning the areas of customer services into 22 parts. The current pipe network systems are all connected and not worked properly, especially during the peak time of water use. In zoning systems, areas of services are separated and more controllable. Seventhly, a reservoir is also planned to be built to overcome problems of water discontinuity and low pressure. Eighthly, coordination between the CPWSE and the Cinusa development and planning agency has to be institutionalized for overcoming mismatching of plans of their infrastructure development programs. Finally, outsourcing of secondary jobs in CPWSE or jobs not directly related to water production and distribution should be continually evaluated and conducted.

V. 5. Summary

The findings above demonstrate problems of water supply service performance. Problems are interconnected and carry implications for water users, the Company and the Government. Performance problems were detected in these three sectors. A low performance in providing water quantity carries problems in water quality, pressure and continuity.

Calculations elaborated earlier mentions of potential benefits which the company can take from increasing the efficiency of its production capacity and the reduction of unaccounted-for water. The income benefit from this improvement capacity is potentially usable for reinvestment programs and cross-subsidy programs for the poor. The coverage level can be increased. It also means the Company can achieve the government demand and supply water to people that have not yet been served. Non water customers that normally use well water are at greater risk from water borne disease as well water quality is lower than tap water. A high number of water borne diseases was also found on customers located in poorer housings or Ciloyo. This shows that improving water quantity, quality, continuity and pressure in these poor areas is essential. Also, uncontrollable taking of well water endangers the underground water preservation.

The poor suffer from inadequate water supply services. Water customers in the poorer areas were more dissatisfied with the water supply service performance than the customers in the higher income, less dense areas. Particularly, a low service performance was more frequently experienced in the dry season rather than in the wet season. The poor are more dependent on the Company's water service as the conditions of household and neighborhood environments in the poorer areas are not supportive for getting good quality water alternatives, with well water polluted and contaminated. Improvements of water supply service performance in the poorer area are more critical.

Nine desirable inputs for improving the CPWSE performance results were proposed in the second focus group discussion. This chapter demonstrates an evaluation of the problems of water supply as summarized from stakeholders' views in the three governance sectors: the company, the society and the government. A part understanding or even misunderstanding of certain concerns not only occurred across the three governance sectors but within each governance sector, such as amongst employees in the utility management. So stakeholders' involvements, especially by those who are at the receiving end of service delivery, particularly the poor who are in the majority, are essential in the process of water supply provision and governance.

The local government and parliament ideally act as the facilitator to accommodate demands from the water customer. However, pressure groups such as non-governmental organizations, community groups and media should also take a responsibility to overcome the water issues. A network among them can effectively be used to push the government and the water company to improve the water delivery service.

Chapter Six
Conclusion

Performance measurement which stresses that the organization serves the water community, and that the function of water as a public good should be prioritized. Performance measurement should not be just within the boundaries of the organization. It serves the community and the environment. One of the ways to do this is to include the service users in the accountability process. Thus performance measures need to be accountable to the government, the corporate managers and all the people they serve and will serve. Hence, an outcome performance measurement web as developed in this study can be used as a means to evaluate accountability. This performance measurement model is potentially used for two reasons. First Mayors are directly elected by citizens and keen to perform their best performance for their citizens in the new era of local government election system (Law Nr 32/2004). Second, the application of outcome based budgeting has been instructed by the Ministry of Finance that will push agencies to use such this kind of outcome performance measurement system (the Financial Ministerial Degree Nr 571/PMK.06/2004).

The study considers the implications of service performance, and the problems and goals of water service delivery. Water as a public good should be used efficiently and effectively by balancing the economic, social and environmental goals of a water supply service. Findings in this research prove that a low service of water supply provision brings social and environmental implications including social injustice for the poor, and concerns about public health and environmental protection.

It is not only in the local public enterprise's interests to save money by being more efficient and to use the savings to supply water at a subsidized price, because water is a public good. Findings in this case demonstrate the usefulness of a comprehensive performance measure, and show how (if it were applied more widely than in one of the top performing companies) the poor pay for or subsidize inefficiency. The poor could be better served if the savings were allocated to subsidizing services for them. This situation needs some obligation that can push the water utility to act in terms of performance indicators.

In the evaluation of cost inefficiency, an operating cost ratio (OCR) as an efficiency indicator can generally indicate how efficiently a company uses its resources. However, evaluating efficiency based solely on this OCR indicator can be misleading. The 2003 OCR of the CPWSE was much better than the 2000 average of 186 Indonesian PDAMs and the 1996/7 average of several African companies, but the CPWSE's OCR score declined to 2.9 points over the 2001-2003 period and was worse by the end of this period than the other financial indicators in the CPWSE.

Over 50 percent of the CPWSE budget was used on indirect costs or costs not directly related to water production and distribution in the 2001-2003 period. This is unusual compared with the national average of 31 % for 184 PDAMs. The CPWSE's unmerited recruitment system in the past through collusion and nepotism enlarges the number of this utility's employees, because their recruitment is not based on the needs of this company. 39.2 % of the CPWSE's total operational cost was spent on the employee budget and about 71.6 % of this budget was allocated to indirect cost that is the general and administration department meaning that most of this utility's workers are employed in this department.

The growth in CPWSE indirect costs also almost doubled from the 2001-2002 period to the 2002-2003 period. In 2003, the CPWSE's management paid off politicians and bureaucrats with their 'rent-seeking behaviors' in the Cinusa local government and parliament to get their approval for the 2003 tariff increase. The decline of the OCR and ROS of the CPWSE in June 2003, one month before the tariff escalation, to the lowest points of these two indicators in 2003 is the indication for inefficiency. This 2003 extra budget charge was placed in the indirect costs as the OUC (other unidentified costs). This situation explains the rise of the indirect cost growth in the 2001-2003 periods.

In contrast, the CPWSE's direct cost growth decreased during these two periods. In 2001, the CPWSE's management paid extra money to politicians and bureaucrats from the Cinusa neighboring local government and parliament for acquiring their permission to increase its water intake in this neighboring regency by about 40 percent of the CPWSE production capacity. This 2001 extra budget charge was placed in the direct costs, and explains the decline of the direct cost growth in the 2001-2003 periods.

So combining the OCR indicator with the ratios of direct/indirect costs and identified and other unidentified costs is useful for early detection of cost inefficiency problems in the water supply enterprise. Inefficient costs should be cut down and used for more valuable activities such as subsidizing poorer household customers or improving water supply service performances. Cost inefficiencies are burdens for accomplishing social goals.

A profitable public company like the CPWSE is expected to deliver social and environmental goals instead of only economic ones, but this utility uses its monopoly power in the local water supply business to maximize its income. The CPWSE's income increased by 5.75 billion Rupiah in the six months after the CPWSE's 2003 tariff increased. This amount of money, which is close to the CPWSE's total after-tax profit of 6.1 billion Rupiah for 2003 or 19 times the estimated 300 million Rupiah costs of the bribery cost for the 2003 tariff change, can be used to subsidize lower income or poorer (IIA) households or improve service performances of water supply or do a mixture of both.

In this new tariff, poorer (IIA) households have paid a profitable tariff, as their 2003 average water consumption was 22 cubic metres per month so their average tariff was 1132 Rupiah per cubic metre. This tariff is over the BEP price and thus considered a commercial price. The 1998 National Tariff Regulation specifying a tariff subsidy for poorer households has not been followed by the CPWSE or by their local government and parliament who hold the power to legitimize or refuse this price change. In the post-1999 decentralization era, some Indonesian local governments like the Cinusa city local government may interpret that following a national regulation is only one alternative rather than an obligation.

An indication that the poorer household customer type II A should be subsidized can be seen from the average income of 21 percent of poorer household respondents in the 2004 survey being less than half a million Rupiah per month or below the 2004 minimum household income/ salary standard for living in Cinusa city. Tragically, 2.4 percent of them could not cover all their monthly expenses. It is unjust for the poorer customer households who are paying for cost inefficiencies from corrupt, collusive and nepotistic practices and are subsidizing locally generated revenue. It is also unfair that the CPWSE management and politicians in the Cinusa local government and parliament who are involved in briberies are also the actors who decided and approved the 2003 tariff escalation. These politicians regularly insist on increasing the total value of the 55 % share of CPWSE's net profit which is paid to the local government every year. So this tariff rise does not generally accommodate social goals of water service provision by subsidizing the poorer customer.

A different situation is for richer households that are reasonably charged much higher. Their total average amount of water used at 34 cubic metres per month remained stable over the six months before and after the 2003 tariff rise. This amount of water is 9 cubic metres higher than the total average consumption of all household customer groups. The average number of family members in richer households is close to the other household customer groups at about 5 to 6 people per household. The tap water is not only used by the richer households for basic needs such as drinking, cooking and bathing but also for several inefficient usages of water such as watering gardens and washing vehicles.

Charging higher income customers much higher costs is expected to meet two possible scenarios. The first scenario is that their inefficient attitudes toward water usage could be changed so that they consume less water, but the total income expected from this customer type remains stable, because their household tariff could be increased. The amount of water saved from this strategy could be redistributed to poorer housing locations which commonly receive lower service performances of water quantity, pressure and continuity, because of their households' positions in the end-service of the CPWSE pipe network systems. Small sized tertiary pipes are all that are located in the small streets where the poorer households live. In contrast large primary and middle-sized secondary water supply pipes are generally placed in the main and secondary streets where the richer households live and thereby are provided with a much better service. This indication of a lesser continuity of water supply service is also supported by the respondents' opinions. In the poorer (II A) households, 40.2 percent of respondents reported low water continuity during the wet season and 82.4 percent during the dry, as compared with 57.5 percent and 93.2 percent respectively of the richer (II D) household respondents.

Additionally, the amount of water saved can also be allocated for new customers. As mentioned in Chapter III, cases of water-borne diseases are higher in areas with lower coverage level of water supply. The bacterial test results in the 2001-2003 periods from the Cinusa health department prove that about 90 percent of 1302 water samples from wells and other underground sources of water in Cinusa did not meet the drinking standard and about 72 percent of these samples were outside the clean water standard. Well water quality is much lower than the tap water from the sampling test results. Respondents also felt that tap water quality was higher than well water. So supplying tap water to un-serviced population expected can reduce the cases of water borne diseases in un-served population.

Improving water supply services in poorer housing locations is also urgent. Regularly discontinuity and low pressure of tap water in these areas such as Ciloyo left the customers using another water alternative or contaminated well water. This Ciloyo location showed a high proportion of water borne diseases at 71.6 % of their total respondents compared to only 28.2 % of those respondents in the Cigadis richer housing locations.

The second scenario is that the potential income may be higher so it can be allocated for more subsidies in terms of the amount of money or the numbers of household categories receiving cheaper tariffs. However, it is also possible that the potential income will decrease drastically because the richer customers may reduce drastically their water usage and may also quit from the CPWSE service. They will use alternative water such as well water. So this way, a slight tariff rise for the richer households would be more tolerated rather than a dramatic increase that may get a strong reaction.

From the findings it appears that the tariffs for industrial customers should be reduced. The indication is quite clear in that the CPWSE only serves 21 percent of the 218 industries located in Cinusa. The other 79 % of them are a loss of potential income for the CPWSE. Bore well water which is relatively cheaper is more attractive for them. As well, the average amount of water used by industrial customers reduced drastically by 12 cubic metres per month and three of them quitted the CPWSE service after the 2003 price rise. Their water-taking activities are often uncontrollable because, as explained in Chapter I, groundwater control responsibility is held by the provincial government with its limited capacity to supervise all districts and regencies in this province. A reduction of groundwater levels is indicated by several respondents in the survey reporting that they continually dig their wells deeper, in order to get water. So the tariff change raises economic, social and environmental concerns such as a loss of potential income, a subsidy for the poor and ground water preservation.

Given the circumstance that well water quality is low and groundwater-taking attitudes are uncontrollable supplying tap water to all society in Cinusa is crucial for both public health and groundwater preservation, as the groundwater level declining is detected from the depth of wells needing to be deeper over the years. In 2003 about 33 percent of the Cinusa city population was not covered, a far lower coverage than those of the two city PDAMs in Cirebon and Pematang Siantar which were providing a coverage level of more than 100 percent. If the CPWSE production capacity can be improved and its UfW can be decreased, the numbers of the city's population being served can be increased.

About 17 percent of the installed capacity that was not used during the 2001-2003 period could be allocated to serve at least 15,000 new customer connections or 11 percent of the total Cinusa city population as of December 2003. As well, the 12,541,796 cubic metres 'missing in distribution' UfW in 2003 could potentially be used by the CPWSE to serve the 33 percent of its city population that has not been served. The additional income from the 2003 tariff rise can partly be used to build water reservoirs and pumps for improving the installation capacity and to replace old and broken pipes for reducing UfW.

New customers recruited should be prioritized for the poor located in high density housing areas such as the 82 percent of population in the Ciloyo neighborhood area that have not been served. Their well water is entirely contaminated with the sewerage from individual septic soakage tanks and industrial wastes as most industries are located in this location. 61.2 percent of the lower-income (II A) household respondents had their wells and individual sewerage pits less than 8 metres apart compared to only 24.1 percent of the higher-income (II D) household respondents.

Water pipe leakages are the critical aspects contributing to a high level of UfW. This situation is caused by several factors including a low performance of the CPWSE resources (employees, equipments and technology, age of pipes) in handling leakage problems, unsynchronized decision-making between managerial levels and an unsynchronized plan of city infrastructure development between the CPWSE's and the city planning agency's managements.

Additionally, particle and small organisms can contaminate water in the pipe network through the water pipe leakages, because water continuity for some customers does not cover 24 hours per day and water pressure is often low. About 30 percent of all respondents mentioned that water does not flow 24 hours per day in their house, averaging only 15.4 hours. 53.5 percent of respondents felt that water pressure is low in the dry season but only 13.3 percent said this was a problem in the wet season.

Problems of a low water quality are also derived from low employee skills and numbers in carrying out chemical treatment of the water. Chlorine smell and taste in tap water were the highest complaints by 115 respondents in the survey asking the CPWSE to reduce the chlorine composition in the water.

A low water quality is unsafe for public health. As reported by the Cinusa City Health Department, about 41 percent of 1302 water samples tested during the 2001-2003 period did not meet the drinking quality standard in terms of bacteria. So a multiple governance approach (see McIntyre-Mills, 2003) involving all stakeholders from the company, the government and the society is essential to overcome problems of pipe leakages and UfW, because a combination between the reduction of UfW and the escalation of the CPWSE production capacity could not only increase its coverage level to more than 100 percent, but also increasing the coverage level would improve public health.

So a price change and a management improvement of water production and distribution should be considered problem-solving opportunities of water supply. The current price policy is up to the elected local government to decide, with tariff differentiation within National/Local policies and regulations to be transparently discussed and decided with advice from the company. But society has to be involved in that process through public hearings and openly access to that decision making process. By advocating performance measurements to be a required practice legislated by government and by advocating that compliance is checked by enabling the society to have a say in whether accountability standards have been achieved, perhaps better corporate governance can be achieved. The three governance sectors: the government, the company and the society should be given legitimate roles and share accountability and control of water service provision.

Accountability crucially requires transparency, open voting on policies and sanctions if policies are infringed, but also protection for objectors or competing organized opposition groups or rival claimants to be community or consumer representatives who raise complaints and issues. However, a democratic atmosphere for better governance needs to consider possibilities that principles of social, economic and environmental justice will run up against or conflict with principles of democratic local decision making. Locally influential wealthy could use democratic process to have accepted unjust tariffs or usage policies. Protection for disadvantaged people in the society needs definite arrangements in legislations as well as law enforcement.

The performance measures are not off-the-shelf measurements; they are based on a process of involving the stakeholders in accountable governance. This thesis provides an example of how it could be done. Perhaps it would be useful to work with the PDAM to show how money could be saved. Of course it is unlikely that it would act or implement the savings unless there is a strong commitment among the governance sectors (the government, the water utility and the community) to improve efficiency and effectiveness of the water service delivery system. Their commitment should be protected by legislation for ensuring accountability. Openness and scrutiny by the service users could be a requirement for all PDAMs.

Modifying existing regulations also requires public reporting. Transparency necessitates i) making all relevant operational (including tariff policy) information publicly available to those who request it (rather than wasting resources producing and distributing large numbers of copies which most will not be interested in or read), ii) putting it on a website would be a cost-efficient way of doing it (as well as being part of a more general provision of governance transparency). Reports from the public company should be provided only to the local government which should then make them public (without editing) or provided to the public as well as to the government.

A positive response of the CPWSE on inputs from stakeholders is essential. Its management and policy should accommodate the needs of society. For example, six of the demands for water tariff policy reforms from survey respondents as CPWSE customers should be positively addressed by the CPWSE management alongside with the local government and parliament. These demands include: inappropriate customer categorization; the minimum charged water consumption assumption, the metering registrar system; a lack of public discussion of tariff policy; and the combining of garbage collection levies with water bills.

Six recommendations were made in the CPWSE management focus group's first discussion as this utility's response to cost inefficiency and tariff problems. Those about an earlier retirement program, development of working performance standards, revalidation of customer classifications, conducting training for metering registrars and contracting out of some metering jobs were solely within the CPWSE's authority. However, other suggestions for reforming the current progressive tariff system, excluding garbage collection levies from water bills and reducing the local government intervention need to be negotiated with the local government and parliament.

Similarly, recommendations from the CPWSE management focus group's second discussion in response to problems of water quantity, quality, continuity and pressures can be directly put into practice by the CPWSE management, such as training and programs, widening the authority of water sample testing and an establishment of new units, area zoning systems, facility developments and outsourcing; but coordinating infrastructure plans and developments have to be discussed with the Cinusa development and planning agency.

This thesis makes a contribution because it develops more than a systematic or linear approach and instead develops a systemic approach (Midgley, 2000; McIntyre-Mills, 2003). Measuring outcome performance in terms of economic, social and environmental justice is difficult, as stated by Elkington (1997) it is still in ‘black boxes’, but this study makes the outcome measuring process feasible. The proposed outcome performance measurement web can be considered as an improvement of the balanced scorecard model (Kaplan & Norton, 1992) about balancing financial and non-financial measurement scorecards in the public sector, specifically in a local public enterprise for water supply service.

In addition, governance studies such as Kooiman (2003), Rhodes (2003), (Fredercikson and Smith, 2003), Bevir and Rhodes (2003); and Kettl (2002) have been developing models, but a practical means as proposed in this outcome performance measurement web model has been less developed for evaluating performances across the three governance sectors. A complementary combined method for research that combines three research methods (case study, survey and focus group) and both qualitative and quantitative approaches is helpful for making this model measuring process work effectively. The measures utilized in this study are not intended to be always imposed in a uniform top-down manner, but need to be assessed and adapted to meet the varied contextual considerations in the urban and more regional areas of Indonesia. Nevertheless, the measures will always take into account the needs of diverse service users within the diverse environments in which they live.

This study recommends further research investigating a supreme network system (the second order governance) and proper norms (the third order governance) for water supply provision in which a water function as a public good is prioritized, and economic goals can be balanced with social and environmental goals. This study, which was mostly investigating the first governance order or problem identification and opportunity creation, provides a basic model and knowledge that might be used by relevant parties for addressing issues related to water service problems.

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