CAUSES AND SOLUTIONS TO THE LACK OF WATER SUPPLY IN INDONESIAN URBAN

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ABSTRACT

This study aimed at finding key factors which cause lack of water supply in Indonesian urban and develop the key factors which solve it. Relevant literatures bearing on the issue of urban water supply were studied. The city of Jakarta was taken as representative of Indonesian urban. For the purpose of finding the causes and developing the related solutions, relevant data bearing to the city's water supply system were analysed. It was found that the lack of water supply in urban areas manifests in the exceeding of water demand over supply, low piped-water coverage, and intermittency of water supply; whereas poor governance and low water tariff are the root factor which cause them. Consequently good governance and higher water tariff were proposed as the solutions to the problem. It also showed that the perception that urban poor cannot afford to pay water at full price, is but mythical.

Keywords: good-governance, poor-governance, key factors, water demand, water supply, water tariff, transparent management, urban water supply system

Indonesia which is situated across the equator is a country endowed with abundant rainfall. Average annual rainfall is estimated to be 2.7 x 10^6 mm (INACID, 1999). Alongside the rainfall it has approximately 6% of the world's fresh water resources which is equivalent to about 2,500 km^3 (2.5 x 10^{12} m^3) of annual renewal water resources. Most these are supplied by surface water system of nearly 5,500 rivers (The World Bank, 2001). With a population of 215 million in 2004 (ADB, 2004), annual water demand will only be at the order of 2.15 x 10^7 m^3, which is just a small fraction of that of the resources. This undoubtedly gives impression that the country should not run into shortage of water, and that it will have no problem with water supply. In reality however, this is far from being true.

In reality, throughout the country, most of the populations are in lack of access to piped-water. According to The World Bank (2001), at the end of 1994, of a population of 192 million, 63.9% are not covered by piped-water distribution system. The percentage of population without access to piped-water even grew to the level of 80% of a population of 215 million in 2004 (ADB, 2004). An unpleasant outlook might still be confidently predicted for the future.

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If we look more closely at the capital Jakarta, which in this context may be regarded as representing Indonesian urban, we will come upon similar situation. As most of Indonesian urban, Jakarta has on one side, abundant water recourses, while on the other it has low water distribution coverage. Annual rainfall of the city is 2973 mm (Naik, Sinukaban, and Kadri, 2006), and the city is situated on river plain of 13 rivers (Soesono, 2006). Total water resource throughout Jakarta is 3151 billion m^3 per year (Naik, Sinukaban, and Kadri, 2006). These figures by themselves suggest an amount of water resources which is large enough to supply for the demand of its 7.5 million urban populations (DUKCAPIL, 2006). However, in reality this is far from being true. Most of the city's populations are in lack of access to clean-piped water. Until 2001 the overall coverage of piped-water in Jakarta is only 51% (McIntosh, 2003), leaving almost half of its population without access to piped-water.

Having large quantity of water resources on one hand and lack of water supply on the other, points to the existence of problems in the management of urban water supply, which hinders the available quantity of water from being conveyed in acceptable and proper manner to water consumers. Since leaving considerable part of urban population without access to sufficient and potable water will certainly deteriorate public health, growth, and economy of an urban area, lack of urban water supply is critical, and needs immediate attention. Immediate and thorough study should be taken to get the knowledge of the causes and subsequent solutions should be developed to be implemented. The pressing problem in relation of urban water supply therefore is to find out what are the key causes to the lack of urban water supply, and to develop appropriate key steps to solve it, once the thorough knowledge of those causes has been attained.

This study therefore aimed at finding out causes of lack of urban water supply in Indonesian urban, and developing the appropriate solutions for the lack of water supply. It studies relevant literatures to find out the causes and related solutions to the lack of urban water supply. It limits its scope on the city Jakarta as a representative of Indonesian urban and confines its understanding of the lack water supply as it is manifested in the exceeding of water demand over supply, low piped-water coverage, and intermittent water supply.

ANALYSIS

Manifestation of the Lack of Urban Water Supply and Their Causes

General ways by which the lack of urban water supply is manifested are the exceeding of water demand over the capacity to supply, low piped-water coverage, and intermittency of water supply. Two important points are worth mention before progressing any further to finding out factors which cause these manifestations. The first is that these manifestations are interrelated to each other. Each of them doesn't exist in isolation. The second is that each of these manifestations is caused not by a single factor but by several interrelated factors forming a chain. One manifestation is caused by a factor which is caused by other factor which in turn is caused by still another factor, and continues in likewise manner to the root causing factor. In the following section we will trace each manifestation through the chain cause to arrive at its root cause(s).

The Exceeding of Water Demand over the Capacity to Supply

Let us begin with the exceeding of water demand over the supply capacity. At first instance, it seems that the exceeding of water demand over supply capacity is the result of rapid population growth which in the main, is caused by urbanization. This however is not always true. Owing to the fact that most of Indonesian urban has plenty of raw water resources which in the whole is large enough to support its whole population had they been effectively utilized and properly conveyed to all population, urbanization by itself shall not be the chief factor which causes the lack of water supply. There is another cause which is evident but often escapes the attention of those who are in charge of managing urban water supply, namely the inefficient use of water on the part of water users.

The inefficient use of water wastes water and therefore unquestionably contributes to the rising of the demand over the supply capacity. Inefficient use of water is made evident if we compare Jakarta's domestic consumption with that of average domestic consumption in European cities. By the year of 2005, Jakarta's maximum domestic consumption is estimated at 200 liters per capita per day (Shofiani, 2003), while average domestic consumption in European cities is only 130 liters per capita per day

(McIntosh, 2003). Inefficient use of water on the part of water consumers therefore stands as a factor that causes the exceeding of demand over supply capacity.

Inefficiency of water usage is in turn, caused by the unawareness on the part of the consumers that water is scarce. In Jakarta, as in most Indonesian urban, water is regarded as everybody's property, and as free item that belongs to all. Wasting water therefore, is regarded as nothing lost. It is common to see in most Indonesian urban, water is being wasted at standpipes and through pipe breaks. Water wastes through poor plumbing in homes, leaks in distribution system, and overflow of storage, send no water-conserving-alarm to users as well to those who are in charge of urban water management. In most of Indonesian urban there is little attempt to conserve water through retrofitting water-using-device and no awareness at all to conserve it by reuse.

Unawareness to conserve water is in turn caused by low tariffs imposed on urban water consumers. Average water tariff in Jakarta, as per year 2003, is very low around Rp. 400 per cubic meter (Shofiani, 2003) which is equivalent to 0.05 USD per cubic meter. Pricing water at such a low level undoubtedly creates the impression that water is plentiful and nothing is lost when it is wasted. Low-pricing of water therefore causes the unawareness for conserving water.

Furthermore, low-pricing of water by government/public authorities who are in charge of urban water, or in other words, the reluctance on their part to raise water tariff to its cost-recovery level, and to the level that will induce awareness to conserve water, is caused by a misconception that the urban poor are unwilling and cannot afford to pay the full cost of piped-water (McIntosh, 2003). As will be evidenced from the following, this misconception is in fact mythical. In fact, the urban poor in Jakarta, not-being served by piped-water, get their daily water from street water vendor and are willing to pay for it at price level between Rp. 6,000 to 20,000 per cubic meter (Shofiani, 2003), which is equivalent to 0.73 to 2.42 USD per cubic meter. That is 15 to 50 times higher than that paid by the urban rich that have piped-water connection. It proves consequently, that unlike the misconception, urban poor are willing and able to pay more for water, had they been given improved and reliable water service. This implies that rising water price is not something which is impossible.

In addition to that, McIntosh (2003) asserts that low pricing is caused by utility staff, government officials, and elected officials, with vested interests in maintaining status quo, that allows a considerable amount of informal revenue (the price paid by vendors for water at source) to enter their pocket. This, in turn, points to poor-governance behind the screen that stands as the prime cause to the exceeding of water demand over that of supply.

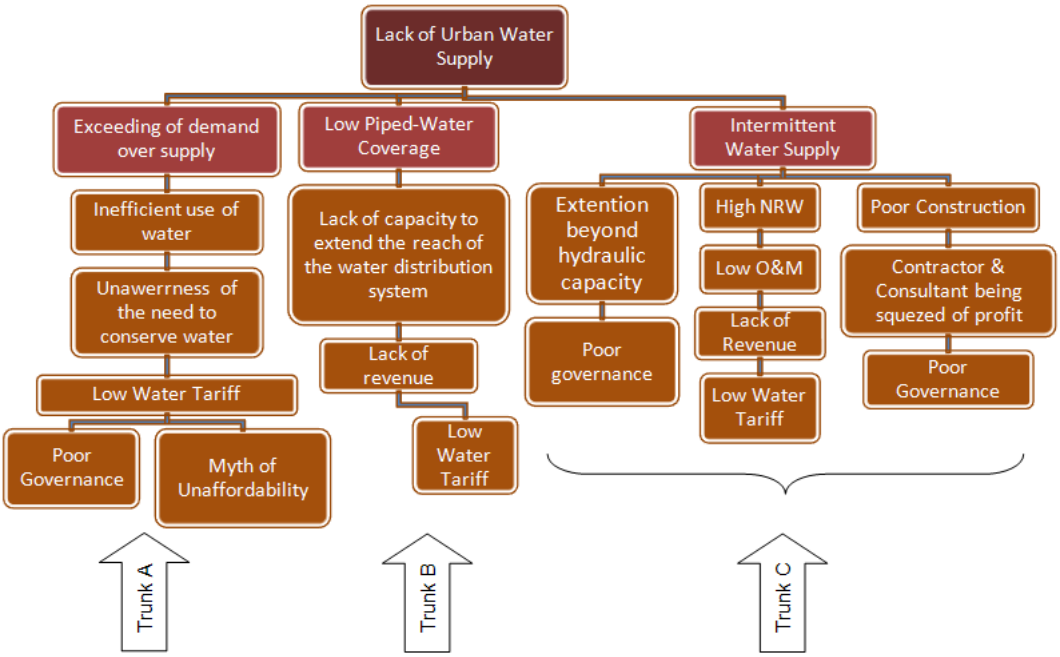

Figure 1. Cause Factor Tree of the Lack of Water Supply in Indonesian Urban

We have so far, traced the chain factors that cause the exceeding of water demand over the supply capacity. The trace can be summarized by trunk A of the cause factor tree shown in Figure 1. It can be made out from the figure just shown that poor-governance and the misconception that the poor cannot afford water at full-cost, cause low water tariff. Low water tariff produces unawareness on the part of consumers to conserve water. This unawareness in turn causes inefficient use of water which is the factor which contributes the most to the rise of the demand over of the supplying capacity of urban water supply system.

Low Piped-Water Coverage

The second manifestation of lack of urban water is in the form of low coverage of urban water supply system (UWSS). Low coverage of UWSS can be caused by lack of capacity on the part of urban public authority to extend the water distribution system to

reach urban parts that are not yet served (McIntosh, 2003). The lack of capacity in turn, in all probability, is caused by the lack of revenue on the part of public water authority, to support the extension of water distribution system. Lack of revenue to extend the service system can logically be traced to the low water tariff. Trunk B of the cause factor tree shown in Figure 1 describes the chain factor that causes the low piped-water coverage. It shows that low water tariff lays as the root cause to the low piped-water coverage.

Intermittency of Water Supply

The third manifestation of lack of urban water supply is the intermittency of water supply. As is the case in most of Indonesian urban, intermittent water supply in Jakarta is evidential. Shofiani (2003) found out that in Jakarta water is not running 24 hours. Mostly there is no water during the day, and water run only during the night and morning. In addition, it has been reported that in semi-arid urban areas such as Kupang, water in the system can run as scarcely as two days per week.

Three factors might be mentioned as the cause to the intermittency of water supply in Indonesian urban. The first factor is the extension of distribution system beyond their hydraulic capacity of providing 24-hour service, and this is usually done at the behest of elected officials (McIntosh, 2003). It is indeed a common practice in Indonesia, Jakarta and the rest of Indonesian urban are certainly not excluded, where an official in charge of urban water management insists to extend water distribution system to serve certain sections of an urban area from which he/she will get political support from urban poor living in that area for promotion to higher position or elections to a legislative position, etc. This extension undoubtedly is done without consideration upon the hydraulic capacity of the system. This, points undoubtedly that poor-governance lies as the root cause to the intermittency of water supply.

The second factor is high Non-Revenue-Water (NRW) in terms of leakage, illegal connection and billing errors. Shofiani (2003) reports that until 1997 leakage from the distribution system, illegal connection, and billing errors are predominant factors of Jakarta's 51% NRW. Leakage, illegal connection, and billing errors can be traced to low quality in operation and maintenance (O&M) for the water distribution system. Low quality O&M can subsequently be traced to the lack of revenue for reconstructing

impaired component of supply system and for motivating staff to carry out good O&M. The lack of revenue is definitely caused by low water price.

The third factor is poor construction of water distribution system. According to McIntosh (2003), this can result from consultants and contractors being squeezed of their profit after rendering special payments to governments or elected officials. Indeed it is a common practice in Indonesian urban, on the part of public authority, to have consultants or contractors doing the construction of water system to illegally pay back to the authority from their supposed profit up to -and in some cases more than- 30% of the project's contract value in order to win the tender to get the project in their prospect. This again points to the fact that poor-governance in the form of corruption lies at the end of the chain, stands the root cause of intermittent water supply.

Cause factors for the intermittency of water supply have thus been traced, and are shown by the trunk C in Figure 1. It can be seen from the figure that poor governance and low water tariff again lay as the root factors which cause the intermittency of water supply.

We have thus far, traced the causing factors to the three most common manifestation of the lack of urban water supply. Chain factor that leads to each of the manifestation is presented respectively by trunk A, trunk B, and trunk C in Figure 1. Compiling these chains forms the tree of cause factor shown in the figure. In the following, the tree will serve as the basis from which the solution to the problem of lack of urban water supply is developed.

Solution in Respect to the Causes of Lack of Urban Water Supply

It can be concluded from contemplation upon the cause factor tree shown in Figure 1 that low water tariffs and poor-governance are root causes to all three manifestations of the lack of urban water supply. In order to solve the problem of the lack of urban water supply, these two causes: the low water tariffs and poor-governance, should therefore be addressed; and accordingly in the following section we will offer higher water tariff and good-governance as prime solutions to the lack of urban water supply.

Higher Water Tariff

Since low water tariff is one of the prime causes to the exceeding of water demand over that of supply, rising water tariff to a higher/full level, the level which guaranties cost-recovery, is one of its key solutions. Higher water tariff will send message to consumers that water is not plentiful, and will send conserving alarm to them when water is used in wasteful manner. It will reasonably induce efficient usage on the part of water consumers, and awareness to conserve water. This in turn will reduce excessive water demand over that of supply.

Rising water tariff is also a solution to low piped-water coverage. By raising tariff there will be revenue available for public authority in charge of urban water to extend distribution and service system to urban area that are not yet served with piped-water (McIntosh, 2003).

In the same way rising water tariff solves the intermittency of water supply. Rising water tariff will lead to more revenue that can be channeled for the reconstruction of impaired supply/distribution system, that subsequently leads to reduce looses through leakage, pipe breaks, and illegal connections. As the results, hydraulic capacity can be maintained and intermittency can be overcome. Also by rising water tariff, there will be money available for incentives to motivate staff to carry out good O&M, which in turn will contribute to prevent intermittency of water supply from happening. Continual and more reliable water supply can then be put into operation, in place of the intermittent and unreliable one.

It is important to note that rising water price will not result in debarring of water consumers from the service system due to inability to afford the full price, since, as has been pointed out in the preceding, the conception that the urban poor cannot afford to pay the full price of water supply is but mythical (McIntosh, 2003). Rising water price therefore is not an unfeasible solution to the lack of urban water supply.

Good Governance

It might be figured out from the preceding that poor-governance lies at the root which causes the lack of urban water supply. Poor-governance in this regard is characterized by the management in the urban water public authority that put official and political

interest to the expense of that of water consumers. This way of management can flourish because the management of public authority in charge of urban water in most of Indonesian urban, has, for a long time, been conducted without transparency to water consumers. This non-transparent management allows public authority to be in control of water system instead of the water consumers.

It can be understood now that to solve the problem, there should be a good governance in water public authority which has transparency in its management that allow water consumers as paying stakeholder to be in control, in place of the public authority. Transparency for this purpose can be achieved by letting water consumers be involved in the policy-making of urban water, and in the supervision for the implementation of those policies. In this way, public authority of urban water will be held accountable to the water consumers in the implementation of water policies, and in the carrying out of the management of urban water system. Satisfaction of water consumers therefore will be held as top target, and the consumers will, as the result, be more in control of the urban water supply system than the public authority.

It can be conceived that in control of consumers upon the management of water supply system will stop the aforementioned gaining of informal revenue through water vendor by water officials. This will subsequently prompt water official to raise water price which eventually reduces the exceeding demand over supply. It also will lead to the availability of revenue to finance the expansion of water distribution system to increase the piped-water coverage.

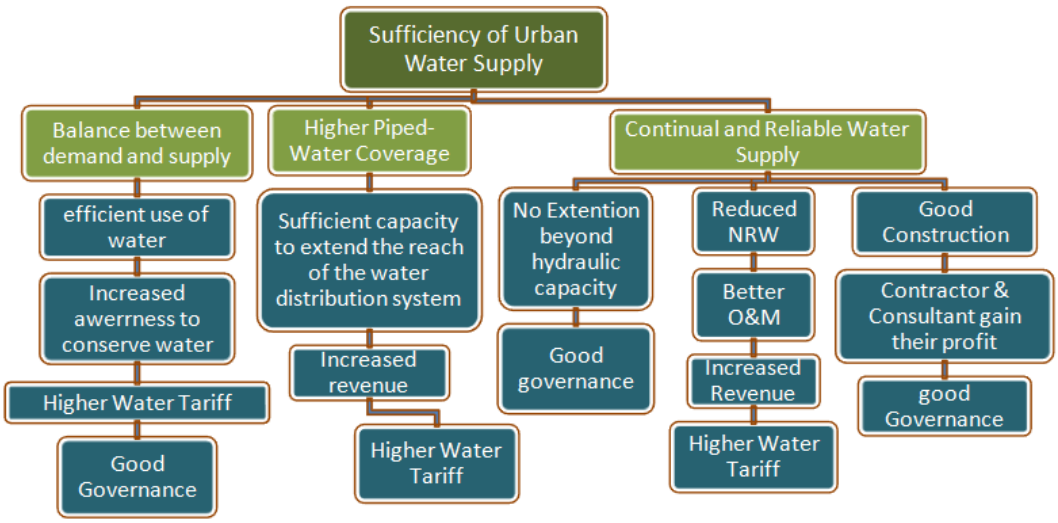

Figure 2. Solution Tree for the Lack of Water Supply in Indonesian Urban

Also by transparency that brings water consumers in control, extension of distribution system beyond hydraulic capacity, and squeezing of profit of consultant and contractors by public authority can be put to a stop. Good construction of and better quality O&M for the urban water supply system can be achieved. This will result in more functional water distribution system. Continual and more reliable water supply system can be put into operation in place of the less reliable and intermittent one.

Chain of solutions has been developed in this section. The chain starts from higher water tariff and good governance, and leads to yield sufficient urban water supply solving the problem of the lack of water supply in Indonesian urban. The chain is shown in the solution tree in Figure 2. As can be seen from the figure, implementing these solutions will yield sufficient and fully functional urban water supply system.

CONCLUSION

1. Results of this study presents the exceeding of water demand over the capacity to supply, low piped-water coverage, and intermittent water supply as the manifestation of lack of urban water supply in Indonesian urban, whereas low water tariff and poor governance as root causes to those manifestations.

2. Low water tariff causes unawareness of conserving water and inefficient water usage. Inefficient water usage causes the exceeding of water demand over that of supply capacity. Low water tariff also results in lack of revenue for the extension of distribution system, which eventually results in low piped-water coverage. It also causes the poor operation and maintenance that subsequently results in high NRW in terms of leakage and illegal connection which eventually results in intermittency of water supply.

3. Poor governance which reflects in the form of misconception on unwillingness of urban poor to pay the full water price, and the taking of informal revenue by officials, hinder the rising of water tariff to the level which induces efficient water usage on the part of the consumers. Inefficient water usage in turn, causes the exceeding of water demand over that of supply capacity. Furthermore, poor governance that results in the squeezing of profit of contractors and consultants, and

in extension of system beyond hydraulic capacity, will lead to poor piped construction that causes high water looses, and eventually causes intermittency of water supply.

4. In response to those causes, results of this study presents higher water tariff and good-governance in terms of transparent management as prime and a key solution to the problem of lack of urban water supply.
5. Higher water tariff will induce demand management and efficient water use that in turn will reduce the exceeding of water demand over that of supply. Higher water tariff will also bring more revenue that can be channeled for better construction of water distribution system and better operation and maintenance, which in turn will results in higher capacity to provide continual and reliable water supply.
6. Good governance by means of transparent management will put water users in control that hold public water authority to be accountable to water users. This will ultimately results in higher capacity of water officials to provide continual and reliable water supply by stopping the gaining of informal revenue, the extension of distribution system beyond hydraulic capacity, and the squeezing of profit of contractors and consultants.

ACKNOWLEDGEMENT

This study was done by the author in conjunction with the three-week course of module: MWI/G/2 Integrated Urban Water Management, taught in late December 2006 to the beginning of January 2007 in UNSECO-IHE, Delft. The author would like to express his appreciation for the encouragement and valuable suggestions made by the course' coordinators which had contributed much to the completion of the study.

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