Improving Strategies in Dealing With Water Supply Fulfilment and Groundwater Conservation:

Learning from Successful Policies and Practices

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ABSTRACT

Despite facts of abundant water resources that appear in Indonesia, the reliability of water service is still far from satisfied level. Central Bureau of Statistics in 2009 recorded that service coverage of drinking water companies is only about twenty percent. Obviously, there are many reasons causing this situation. This reality then leads people to fulfil their need of water individually since water is one of essential needs of humans' daily life. On the one hand, it can reduce the burden of government to fulfil citizens' need. However, excessive individual exploitation can also bring negative implications especially environmental degradation. This trend actually can be prevented through various strategies since water can be viewed as reusable and recyclable substance.

There are many strategies have been being successfully practiced worldwide and can be learned as examples to formulate such improvement strategies. Nevertheless, the success of each strategy cannot be divorced from the embedded characteristics that belong to each country. In this part, it shows that problems and their solutions are always context-dependent. This is in line with the principles of contingency theory and policy transplantation widely utilised in this paper. Synthetising those valuable examples and existing water resources in Indonesia through the principles of contingency theory might be an alternative in formulating such kind of strategies to improve recent condition of drinking water provision in Indonesia.

Keywords : contingency theory, drinking water provision, improvement strategies, lesson learning.

I. Introduction

Water undoubtedly is a basic need of human's daily life. As population keep increasing, the need of water inevitably also tends to escalate. By contrast, water is not unlimited resource and its physical availability is basically constant. Maidment (1993) as cited by Leap (1999) calculated that the total amount of water in the earth is 1,385,984,610 km^3. Nevertheless, only less than five per cent can be consumed to fulfil human's need. On the other hand, Biswas and Tortajada (2010) argued that discussing water-related issues is not merely about physical scarcity but managing this resource through good governance. Therefore, regulating the use of water within sustainable way is far more important than paying too much attention on its physical scarcity. This argument is based on the fact that water can actually be reused and recycled for several times.

In the case of Indonesia, specifically, the existence of water resources is abundant, but the utilisation of this resource to fulfil citizens' need has not been satisfied. The amount of potential water resource is around 6.94×10^3 m^3 but only 23 per cent of this amount has been exploited for domestic and commercial use Hartoyo, 2010 in Samekto and Winata, 2010). This data shows that there are still huge opportunities to overcome problems of insufficient water service. Furthermore, many strategies have been practiced worldwide in dealing with drinking water provision and overcoming obstacles regarding this issue.

This paper aimed to identify the gap between recent condition of water service and the demand. By knowing this interaction, reasons behind individual water resource exploitation expectantly will be well-explained. The next step, then, is seeking many strategies that have been practiced by many countries in dealing with drinking water provision to be learned. While listing such kind of strategies, critical factors that determine the successfulness of

strategies would also be more elaborated. After exploring water resource potential and various practices, strategies to improve recent condition of water service in Indonesia are expected could be formulated.

II. Method

To achieve the objectives of this research, several steps would be taken. The research would be started by identifying current water-related issue in Indonesia especially about water service and its implication to individual exploitation. This stage would be conducted by collecting information from various resources such as previous researches, reports, newspapers, and other media.

After understanding the most critical issue regarding drinking water provision, the next step is identifying water resources potentials as well as the dynamics of water service demand. Information on this issue will be collected from data published officially from government institutions, academic journals, and other resources. Furthermore, various strategies that have been practiced from several countries will be collected by structured literature review. The strategies are selected by considering the suitability to the context of Indonesia. Therefore, they mostly come from tropical countries that have similar climate to Indonesia and also come from developing countries that have similar technical and financial capacity to Indonesia.

After understanding the core problem of drinking water provision in Indonesia and gaining lessons from several foreign experiences, the next step is synthesising those two aspects to formulate improvement strategies. Suitability assessment is essential stage that would obviously be conducted. The expected result of this phase is the list of strategies that are possible to be applied to improve recent condition of drinking water service.

Indonesia has wide diversity in terms of topographical features, population density, cultural and economic condition, and so forth. Therefore, generalising one certain strategy to applied for all regions likely will not be well implemented. The next step of this research is suitability assessment of formulated strategies for specific regions in Indonesia. The suitability assessment was done by testing selected strategies with existing geographical features and regulations. By applying this approach, proposed strategies expectantly will be more effective and efficient when they are implemented.

III. Theoretical Framework

It obviously is not easy to provide sufficient drinking water service due to many constraints have to be faced such as technical and financial obstacles. Regarding this issue, Akbar et al (2007) proposed six principles that should be applied in providing water service for the poor (p.29):

1. Water should be maintained both quantity and quality.
2. There should be strong political commitment to support water provision efforts.
3. Institutional rules and regulations should be maintained and enhanced.
4. Water supply should be managed as an economic good.
5. Water supply should be managed as a social good.
6. Water supply should be operated and maintained with appropriate technical knowledge and tools and standards.

To overcome such kind of obstacles, there are several approach that actually can be done. Public-Private Partnership, for instance, can be an alternative solution (Johnson and Moore, 2004; Osumanu, 2008; Dill, 2011). Another approach is involving community in managing water supply as it has been being conducted in Bangladesh

(Akbar et al, 2007) and Afghanistan (Abdullaev and Shah, 2011). In technical measure, intensifying and expanding the recycling of wastewater like what has been being applied in Kuwait (Al-Damkhi et al, 2009) or promoting rainwater harvesting (Opare, 2011). Besides those technical approaches, institutional approaches such as legislation and organisation reform are also important to be considered. For example, China has issued a comprehensive framework for integrated water management through 2002 Water Law (Liu and Speed, 2009). On the other hand, organisation reform to respond water-related issue has been implemented in Brazil (Braga et al, 2009).

However, selecting appropriate strategies to certain characteristics inherently embeded in such regions. One of approaches that can be taken to deal with this kind of dilemma is principles of contingency theory. The basic assumption of this theory stated thet there could not be "one best way" to deal with a certain problem and the optimal alternative is contingent upon factors which are called as contingency factors (Donaldson, 1996). Moreover, Bradshaw (2009) states that contingency approach is advantageous what suit in one place and time, may not suit in another and efficiency is related to the ongoing alignment of various contingency (p.62).

The principle of contingency theory stated by those authors above can be taken as an inspiration in formulating strategies for drinking water provision that will be discussed in this research. Water-related problems such as water shortage, low level of water service, lack of financial and technical capacity, and so forth are generally faced by many countries in the world. It looks like similar problem, but in fact those problems are dependent to the context of respective country. Since this research will discuss several strategies in dealing with drinking water provision comparatively, it will be useful to follow the basic principle of contingency, strategy perform dependently upon their compatibility to the contingency factors; fitter strategy implicates to higher level of performance.

Donaldson (2001) discusses deeply contingency theory regarding organisational arrangement. He argues that contingency factors of organisational structure consist of task uncertainty, task interdependency, and the size of organisation. These three factors determine what kind of organisational structure that is needed to overcome the problem. Moreover, Bradshaw (2009) explores contingency approach to non-profit governance. She proposes four configurations of governance regarding the dimensions of external environment. The concept of the configurations is illustrated by the following figure.

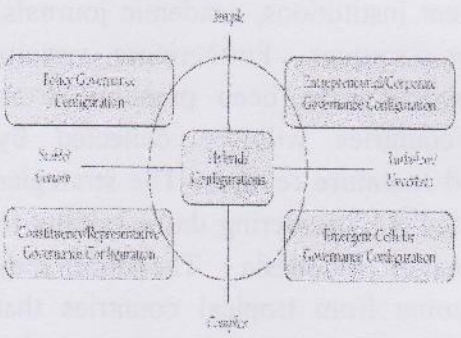

Figure 1. Governance Configuration and Dimensions of the External Environment (Source: Bradshaw, 2009)

In this model, two dimension of external environment are presented into two axes. The horizontal axis represents stability context of environment. Meanwhile, the vertical axis represents the dimension of complexity. Well-defined and homogeneous membership and a set of stakeholders who share similar expectation are categorised into simple situation. By contrast, complex is defined as the opposite of simple situation. And then, governance

configurations are proposed based on the combination of situations. For instance, typical policy governance is recommended for stable and simple situation; other types of governance can be seen in the figure 1 in accordance with respective quadrant. Since water sector usually belongs to government which is non-profit organisation, this model can be an alternative to develop required institutional arrangement for improving the performance of water service.

Following the principles of contingency theory which view every problem is context-dependent; it will be useful to explore various strategies and contexts embedded to them. Every nation has their own strategies to overcome water problems. Therefore, learning these various examples either their successfulness or failure can be very beneficial. In the policy perspective, Dolowitz and Marsh (1996) define this approach as policy transfer which means "*a process in which knowledge about policies, administrative arrangements etc. in one time and/or place is used in the development of policies, administrative arrangements and institutions in another time and/or place*" (p. 344). Furthermore, these authors echoed five categories of policy transfer proposed by Rose. They are: *copying, emulation, hybridization, synthesis, and inspiration* (p.351).

In transferring such kind of policies, there are some elements that occasionally cause the failure in the implementation. van Dijk (2006) noticed four characteristics that make policy transfer is failed to be well implemented. The first pitfall is related to terminology that is sometimes misinterpreted viewed by different localities. The second is jumping directly to a conclusion while problem's core and instrument's target have not matched yet. The next pitfall is in tailoring the procedure. It has to be concerned that an instrument is not one-size-fits-all. The implementation should consider local contexts. Finally, the assumption that views something new means better than the old ones frequently also leads to pitfall.

IV. Brainstorming Improvement Strategies through Existing Potentials

PDAM[1] is constrained by limitations related to technical, institutional, and financial. It is worsened by high growth and uneven distribution of population. For instance, Java Island where the total area is about seven per cent of the total land of Indonesia has only 4.5 per cent of total water potential in Indonesia. However, this island is inhabited by more than sixty percent of total population (Dikun, 2003). According to SUSENAS[2], the percentage of household having access to proper drinking water is only about fifty percent during the period of 1993 to 2010 (Hardjo, 2012). However, this survey defines access to proper drinking water as the condition where people can fulfil their need of water either from PDAM or individual exploitation. If this data is confronted with the data from BPS (2009) showing that the service coverage of PDAM is about twenty percent, this means that individual exploitation has significant portion in water resource abstraction since Water Company has not sufficed the requirement yet.

The survey also recorded that the consumers of bottled drinking water increased significantly during the period of 1998 to 2010. The percentage of household consuming bottled water as their drinking water in 1998 was less than five percent, but in 2010 this percentage increased drastically up to 35 per cent (Hardjo, 2010). It can be

[1] PDAM : Perusahaan Daerah Air Minum (*Regional Drinking Water Company*)
[2] SUSENAS: survey Sosial Ekonomi Nasional (*National Socioeconomic Survey*)

interpreted that people prefer to choose bottled water or shift their fulfilment into this water service even though bottled water is more expensive than water service from PDAMs. It shows that paying more money becomes less important as long as they can achieve reliable and satisfying service. This phenomenon basically is potential to improve drinking water service in Indonesia.

Furthermore, people's preference and their purchasing power reflected from their choice on bottled water should be considered to reformulate water tariff. Compared to bottled water, water tariff of PDAMs is far much cheaper. As an illustration, consumers have to pay 10,000 rupiahs for 20 litres of bottled water, but they have to pay only less than 5,000 rupiahs for one cubic metre of water from PDAM. Unsurprisingly, PDAMs cannot cover investment or even maintenance and operational cost. Following the principles proposed by Akbar et al (2007), water should not merely be considered as a social good, but also an economic good. By applying this concept, it is expected that infrastructure regarding drinking water service will be well-maintained and more sustainable. From this point of view, water tariff which is now applied by PDAMs can possibly to be reformulated into more reasonable rate that is affordable for both consumers and PDAMs.

Besides reformulating water tariff, there is still an opportunity to exploit other water resource such as rainwater. Indonesia is tropic country that has a huge amount of rainwater, but this kind of water resource is still not well-utilised. Rainwater even cause many problems such as flood and landslide in some areas. If rainwater is well-managed and utilised wisely, it can be one of solutions to overcome problems of water provision as well as protecting environment from degradation. Furthermore, the principles of water and environment conservation are also mandated by the Law Number 7 Year 2004 about water resource. According to this law, water resources (both surface and groundwater) and environmental condition that is related to the quality of water resources such as catchment areas in the upstream, river banks, and so forth are supposed to be conserved in order to sustain the availability of water and prevent water-related disaster either caused by human or nature. The issue of water tariff formulation and what aspects are supposed to be included in the calculation, then, are accommodated by Government Regulation Number 16 Year 2005 as an operational instrument of the Law Number 7 year 2004. Through this government regulation, elements such as operational and maintenance cost, depreciation, interest rates, and reasonable benefits are clearly mentioned in article 60, paragraph 3.

V. Literature Study on Various Improvement Strategies

In seeking appropriate examples to be learned, the concepts of contingency theory and policy transplantation is essential to be considered. In the perspective of contingency theory, strategies to improve organisational performance are always Context-dependent. Therefore, in the process of selecting examples to be learned the context of respective country is crucial instead of merely viewing the successfulness.

In selecting the cases as examples, there are some considerations to be taken. The first is geographical condition. The examples mostly come from tropical countries that approximately have similar climate with Indonesia. This factor is essential for avoiding physical obstacles that possibly constrain such strategies to be imitated.

Besides this physical feature, economic condition and technical ability of selected countries are also important to be considered. Therefore, examples mostly come from developing countries where their economic and technological capacity is not too different with Indonesia's.

From structured literature study, in general the list of strategies that is possibly to be applied in Indonesia can be categorised into three main groups namely: (1) institutional arrangement; (2) community-based water management; (3) public-private partnership.

VI. *Institutional Arrangement*

Viewing institutional arrangement strategies and their successfulness, generally there are some critical factors can be highlighted. Firstly, the scale of service is essential to be considered. Although institutional arrangement mostly belong to the domain of government at national level, dealing with water provision problems is likely difficult to be taken in this level. Centralisation, for instance, has led the water service become less efficient (Gerhager and Sahooly, 2009; Biswas and Tortajada, 2010). It increase financial burden of central government to finance the development of water projects. However, some countries like Benin, Mali, and Senegal are also suffered when decentralisation was initially introduced. The gaps in technical and financial capacity between central 59 government and local authority makes the process of decentralisation does not run smoothly. Juglin et al (2011), notice that the difference in understanding centralisation caused the different type of service models implicating to the difficulty in developing standardised water service at local levels.

Secondly, coordination is also a keyword of success. As water issues are characterised by multiple interests within cross boundaries, coordination both inter-regions and inter-sectors, becomes an essential thing. Empirical evidences from listed strategies, such as Lebanon, show that institutional gaps and overlaps formerly existing have led water services become inefficient (El-Faddel et al, 2001). This country has set a general policy for water resource management and conducted several water projects but the results have not reached the desired level because of ineffective institutions and regulations.

Furthermore, the success of strategies above is highly influenced by strong political will to provide satisfying water services. Let us take the case of Singapore. This small country has no significant water resource to be relied on, but Singapore has already been successful to suffice the need of water adequately. The commitment of government to fulfil citizen's need is articulated in the national policy implemented into five strategies: physical infrastructure, legislation and enforcement, water pricing, public education, research and technology (Luan, 2010). Through this strategy, Singapore basically has involved essential factors that are required to manage issues comprehensively. However, a strong political will should be supported by effective legal framework and its enforcement. Otherwise, strategies will be difficult to be implemented and expected results will be hard to be achieved. Phnom Penh, for example, has been successfully improved the performance of water service because of strong law enforcement within the principle of equity and transparency. Former regime privileging government staffs has made the performance of the staffs degrade. This work culture eventually can be changed through a strict enforcement implicating on the increasing of service performance.

Finally, the shift of approach from supply-side to demand-side management also becomes a critical factor determining the success of strategies. Supply-side management that more focus on physical development, in fact, could not fully cover the dynamics of water issues such as environmental changes. Strategies based on this approach are usually costly and requires advanced technology. On the other hand, managing demand-side might be much cheaper and could adapt with environmental dynamics (Brandes and Maas, 2004).

VII. *Community-Based Water Management*

Besides strategies related to institutional arrangement that is highly dominated by the role of government, community-based water management can be an alternative option. This approach is strongly relied on the role of community even though the role cannot be simply ignored.

Community-based management in water provision is commonly practiced for areas where are located distantly from city centre. These areas are usually not covered by water service companies because of geographic obstacles and economic consideration. From listed examples, it shows that community-based management can be an option to overcome those constraints. Although the implementation of this approach is different in many countries, the core of this strategy looks like similar; community involvement.

Moreover, from various strategies that have been practiced there are some critical issues can be noticed; one of them is support from external parties. Community based management strategies in the list above are mostly conducted for communities in rural areas located far from water service coverage. The communities are characterised by the lack of capacity in dealing with water provision. Therefore, the assistance from external parties in the form of financial and technical support is important to succeed the programmes. The experience of rainwater harvesting programme in Ghana can be taken as an example how important the support is. The great opportunity to exploit rainwater as water resource was not successfully achieved because of the lack of technical support (Opare, 2011a). By contrast, at another rural area in Ghana, community based management program was successfully done because of a good collaboration between government and community followed by regular training to increase community capacity (Opare, 2011b). This evidence, once again, shows that the role of community in determining the successfulness of the programme is very essential. And the influence of community in succeeding the programme will be much stronger if their capacity is continuously enhanced.

Moreover, the issue of equity in the relation among different stakeholders is also essential to be taken into account. In most cases, community frequently becomes the weakest party in the system. Tripartite water project in Rajasthan, India called "Our Water Project" which involves government, private contractors and civil society can be taken as an example. In the beginning of the project, everything seems to be good. As time goes by, the performance of water service tends to decrease. When community complain about it, there is no response either from government or private contractors (O"Reilly and Dhanju, 2012).

Apart from those external factors, intrinsic characteristics of community are also a crucial element. Local culture in viewing water issue plays an important role for sustaining such kind of community-based water management. The experience of

public hand pump instalment in rural areas in Mali confirms that local culture determine the sustainability of the projects. In those areas, most local people still view that water is a free substance without any payment. This situation makes existing facilities be less maintained because of the absence of operation and maintenance cost. Therefore, the form of participation is also supposed to be well defined before introducing such kind of community based water management programmes. Jones (2011) proposes that participation should be articulated not only in the form of citizenship but also in the form of payment for public service.

Public-Private Partnership

Another approach to overcome water service provision problems besides two approaches above is Public-Private Partnership (PPP). The PPPs basically are conducted to overcome financial constraints faced by government. From this point of view, the role of private companies is crucial to support government financially. However, they also need political and legal certainty that belongs to government authority. Through this mutual relation, both government and private sectors presumably can achieve benefits respectively as well as share potential risks.

There are some determinants factors can be identified in PPP. Firstly, the initiative to promote PPPs is supposed to be based on the opportunities to gain potential benefits rather than desperation of government to provide public service because of limited funding. It will make PPPs project more interesting and can attract private to involve. The experience of Ghana can be taken as one example when government offered PPPs but in the sense of its desperation. And the result of the approach has not obtained maximally as it was expected.

Secondly, agreement between involved parties has to be clearly stated accommodating the aims and intentions of each party. The obligations and authorities of respective party should be well defined considering potential benefits and risk can be gained by each party. Otherwise, mistrust issues will potentially appear and decrease the performance of the projects.

Apart from public-private partnership, there is another scheme of cooperation between government and non government bodies. The experience of privatisation in Dar Es Salaam, Tanzania, shows that private consortium has failed to provide sufficient level of water service. As a result, government initiated the establishment of public-public partnership. The cooperation involved publicly owned company and community based organisation. In this case CBOs can act as middlemen and direct producers. For those who live relatively close to pipe network, they can be middlemen to deliver water for people who cannot be reached by pipe network. And for those who live distant from pipe network they can be direct producers that can exploit the most possible water resource such as groundwater and distribute the water to the communities (Dill, 2010).

Assessing the Suitability of Strategies to the Context of Indonesia

Departing from listed strategies above combined with opportunities that was discussed previously, there are some critical points can be assessed. From the institutional aspect, there is a huge potential to be improved. Decentralising drinking water service, for example, can be widely applied. This is in line with decentralisation that has been highly promoted since the termination of Suharto's New Order era. However, there is supposed to be more

deeply considered how big the size of service coverage is in order to gain the most efficient service provided by PDAMs.

Furthermore, regulation reform and organisation arrangement is also possible to be implemented in Indonesia. Even though Indonesia actually has already had a set of regulation dealing with water issue, the implementation is still weak and far from what are mandated by the regulation. In addition, water sector is still managed partially by several institutions such as the ministry of public works, the ministry of environment, the ministry of agriculture, and so forth. It makes integration and coordination become difficult to be done. Therefore, regulation reform and organisation arrangement are essential to improve recent condition of water service.

To implement these two strategies, basically there is no specific requirement. Institutional arrangement can likely be applied in any geographic characteristics. However, cultural aspects of certain location are supposed to be considered in order to succeed the strategies. In addition, decentralisation that is nowadays highly promoted expectantly can accommodate local potentials and interests as well.

Besides institutional arrangement, several technical measures can also be conducted. Pipe network expansion, collective well, and rainwater harvesting are strategies can be applied taken from this literature study. The role of community in succeeding these kinds of strategies is very essential. They can participate in improving drinking water service through financial contribution, operational, and maintenance efforts. These strategies are promising since Indonesia has huge amount elements that are required such as natural water resources, rainfall rate, and regulation for legal basis. However, this technical measure can only be implemented in certain physical conditions. For example, expanding pipe network is difficult to be applied for extremely sloped areas and more suitable for flat areas. In addition, the number of population is also important aspect when pipe water expansion will be applied. It is closely related to economic of scale that can determine the success of the project. For regions where those criteria do not match, collective well and rainwater harvesting can be taken as alternatives. However, the existence of sufficient water resource is important aspect to be considered. The benefit of these strategies is that they can be applied in remote areas where piped network has not reached the areas.

Another alternative to improve recent condition of drinking water service is inviting private sector to participate in the project. It can be done by joint funding or public-private partnership. Through these schemes, financial burden of government can be reduced. Furthermore, these can also enlarge the coverage of drinking water service. The involvement of private sector also makes water sector become more competitive. Eventually, drinking water service expectantly can be improved up to satisfying level.

Conclusions

There are some points can be highlighted from this research:

1. Contingency theory states that there is no "one best" strategy to deal with such problems, to organise corporation, or to make decisions. The most possible way is seeking the most suitable one by considering internal and external factors where the problems are dependent. As a consequence, there will be many alternatives to solve one problem; and the most suitable to the context is the

recommended one. . In the case of drinking water provision, a similar phenomenon also appears. Selected examples basically have the same core problem in dealing with drinking water issue, but every place have its own unique strategies and cannot be generalised as one generic approach. This phenomenon essentially is the explanation of contingency concepts that problems are context-dependent and requires specific approach to deal with.

2. This research focuses on the issue of recent condition of drinking water service and pays little attention on the previous events causing this condition. In addition, strategies formulation is highly inspired by foreign experiences. Dolowitz and Marsh (1996) underline that lesson learning may come from either internal or external source. Following this statement, there will be valuable to conduct research on such strategy formulation but use previous events in the drinking water service as main inspiration since this issue has not been widely discussed in this research.
3. This research has not covered the impacts of proposed strategies if they are implemented. Since there is no "one best" strategy to solve problems (Donaldson, 2001), proposed strategies can also bring consequences positively or vice versa. Therefore, continuing this research by exploring possible consequences of each strategy in the field of environment, economics, social, etc. can widen the perspective in understanding drinking water issue.

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