



Towards viable drinking water services

Jarmo J. Hukka and Tapio S. Katko

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This paper presents a framework for viable drinking water services and institutional development of the water sector, especially in developing countries. The key dimensions of viable water services: operative technology, appropriate organizations and adequate cost recovery are dealt with. The role of consumers and the need for institutional reforms are discussed. Some tentative implications of the lessons learnt are discussed regarding the role of external support agencies, based on the authors' experience in developing countries and transition economies. It is suggested here that a polycentric form of governance should be introduced in the water sector, and the ultimate goal for the sector's development should be the reliance on financially self-sufficient and consumer-responsive water entrepreneurs. © 1997 United Nations. Published by Elsevier Science Ltd

Freshwater is an environmental resource with strong impact on public health, economic development and environmental quality. Water, therefore, is a key factor in sustainable development scenarios. Inadequate and unhygienic water supply and sanitation facilities lie at the root of some 80% of the disease and ill health in the world. About 50 000 people die every day as a consequence of unsafe and/or insufficient water and the lack of hygienic sanitation. Few disasters have caused higher death rates and greater suffering to mankind, and the symptoms of these conditions are visible every day. Moreover, the water and sanitation infrastructure of many developing countries is inadequate to support economic growth.

The objective of this paper is to explore the key dimensions to be considered for sustainable development paths in the water sector. The material is drawn mainly from the authors' research and field experience in transition and developing economies. Major factors contributing to the viability of water services are introduced and discussed. Since success depends on the interaction of many aspects, an integrated approach is used.

Key dimensions of viable water services

Although the term "sustainable" became a household word following the Brundtland Commission Report (World Commission on Environment and Development, 1987) in late 1980s, the term "viable"

may be more justified in the economic analysis of systems such as water services. Cf. the definition of "viable" in Webster's dictionary (Merriam, 1977, p. 1303) as something that is "capable of existence and development as an independent unit". The American Water Works Association (AWWA) white paper on "Building Water System Viability" (AWWA, 1995) defines viable water services as self-sustaining systems that can reliably meet all present and future requirements in a dynamic, comprehensive manner that assures the continued delivery of safe water.

Figure 1 presents a practical model for the analysis of water services provision and production. To achieve sustainable water services, three key dimensions—operative technology, appropriate organizations, adequate cost recovery—need to be present within the environment formed by water resources, human and economic resources, socio-cultural conditions and various types of constraints. The term provision here refers to decisions made about the institutional framework for ownership and operational management of water services. Production refers to "the more technical process of transforming inputs to outputs—making a product, or, in many cases, rendering a service" (Ostrom *et al.*, 1993). The model in Figure 1 integrates water systems, organizations, consumers and several other key components within an institutional framework. All components are cross-catalytic and interactive.

Institutional framework

North (1990) makes a clear distinction between institutions and organizations. He defines institutions as the constraints—either formal rules or informal

Jarmo J. Hukka is Senior Research Engineer, and Tapio S. Katko is Senior Research Fellow at the Institute of Water and Environmental Engineering, Tampere University of Technology, Tampere, Finland.

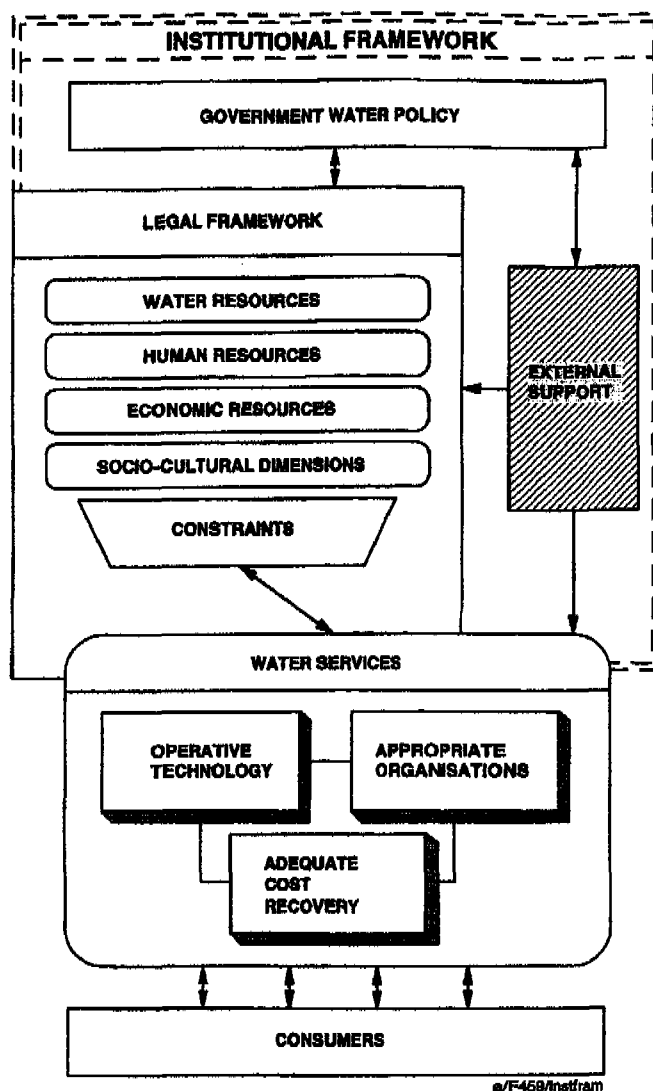


Figure 1 A suggested general framework for viable and sustainable water services. Source: Katko (1991), modified.

constraints that shape human interaction—while organizations are defined as groups of people united by a common purpose to achieve certain objectives. In a society, institutions are the rules of the game, and thus have an influence on what organizations come into existence and how they evolve over time. Institutions determine the opportunities in a society, and organizations are created to take advantage of those opportunities. As organizations evolve they, in turn, alter institutions.

For the institutionalists, there is no *a priori* deference to public or private solutions (Livingston, 1993). The relevant issue is whether or not a particular institutional arrangement serves in achieving those outcomes that depend on institutional instruments. Instrumentalism means that the ultimate function of economic systems and the institutional arrangements upon which they rest, is the survival and well-being of both individuals and the system over time. Therefore, neither formal rules nor informal constraints can be neglected when analysing the performance of the water

sector. North (1990) and the World Bank (1994) emphasize that, in cases where organizations are engaged in unproductive activities and/or perform poorly, the reasons are to be found among the institutional constraints arising from the incentive structure surrounding the activity. One analyst (Ostrom *et al.*, 1993) suggests that centralized institutional arrangements produce incentives that enhance the opportunities for corruption and shirking. In addition, centralized regimes generate few counteracting pressures to discourage these practices.

How well institutions solve the problems of coordination and production is determined by the motivation of the players (their utility function), the complexity of the environment, and the ability of the players to decipher and order the environment (measurement and enforcement) (North, 1990). Since the gains available from opportunism, cheating and shirking increase in complex societies, a coercive third party is essential, although never ideal and never perfect. Effective third-party enforcement of

agreements is best achieved by creating a set of rules that subsequently brings into play a variety of informal constraints. An effective structure of rules, not only rewards success, but also discourages unsuccessful behaviour. When the same rules are applied in different societies, the results may not be similar. The methods and mechanisms of enforcement, the norms of behaviour, and the subjective models of the actors differ, and therefore both the real incentive structures and the consequences of active policies will lead to divergent outcomes (Ostrom *et al.*, 1993; North, 1990).

Data obtained from a group of developing countries reveal that per capita water production costs are four times higher in centralized systems as compared to fully decentralized ones, and are the lowest where decentralization is combined with coordination from the centre (World Bank, 1994). Most water sector studies recommend a three-tiered system. In this type of institutional arrangement, a national agency is responsible for finance, long-term planning, standard setting, and technical assistance. Regional utilities, under the national agency, operate the systems, monitor compliance with standards and regulations, supervise local systems, and train local managers and technical staff. Local agencies manage local systems, collect fees, monitor use and maintenance, and are responsible for local budgets.

A three-tiered model, where the water supply sector partners would be governments, regulators, and service providers, is also gaining importance (Bhatia *et al.*, 1995). The government's role is to propose and implement the institutional framework for water supply services. This includes the introduction of commercial principles in the sector and competition between service providers. The regulator's role comprises monitoring compliance with the sectoral institutional framework by both the government and service providers. To avoid political interference, the regulators should have greater autonomy. The role of service provider is to compete for contracts, and deliver services in compliance with economic and financial performance benchmarks defined in the contracts. Service providers could be public or private, or a combination of both.

Appropriate organizations—consumer-orientation

There is a wide array of organizational options for service production. Community-owned and operated systems are feasible especially in rural areas and, to some extent, in peri-urban areas. In peri-urban areas it is common for water to be delivered by private vendors and resellers. In principle, this is a positive indication of entrepreneurship. Yet, such informal systems often result in high costs to the poorest people. This fact is often ignored by authorities, who may completely neglect peri-urban dwellers when planning water systems (Hukka, 1994).

In urban centres, the service producers can be public or private, or a combination. In developing countries, water production is mostly the responsibility of public organizations. Since these public organizations in many

instances have failed to provide adequate service, or are struggling, demands for larger private sector involvement are being voiced. A lively debate is also going on in economies in transition regarding the pros and cons of public ownership and operation, and the viability and scale of private sector participation.

In England and Wales, private companies own and operate water utilities. In France as well as in a growing number of other countries, various contractual arrangements between public sector owners and private sector operators have been adopted for service production. In Nordic countries (Hukka *et al.*, 1994) and in North America (Tampere University of Technology/American Water Works Association, 1995) public and private partnership of various types also have the required adaptability to adjust to changing conditions, such as inter-municipal cooperation and expanding service areas. The Nordic experience shows that public ownership and operation can often ensure a very high standard of service. In most cases, private companies plan and construct the physical facilities while the municipal utilities are charge of operations. However, this type of institutional model also has its drawbacks. In terms of financial autonomy, municipal utilities are largely dependent on the prevailing political climate. When their autonomy is weak, there is a danger of "hidden taxation" or overcharging by water services. Furthermore, revenues collected by water utilities may be diverted to other municipal sectors, while the long-term development of water services may be ignored.

Regardless of which management option is selected, the water supply organization has to be consumer-driven. Consumers may play various roles as water rate payers, contributors, beneficiaries and, particularly in rural areas, as owners, operators and caretakers. A viable water system must meet consumer needs and expectations in a consistent manner, and anticipate their future needs. The core product of any water supply system is wholesome water. This water has to meet the requirements of cost, quality and quantity and it must be produced and delivered timely. The water supply organization must provide a satisfactory level of services and at the same time take consumer perceptions into consideration. Direct consumer perception is obtained from the quality of service delivered by the water supply organization (Lobato de Faria and Alegre, 1996). In addition to the direct perception of quality of service obtained, there are also indirect perceptions, which are channelled through media and public awareness organizations, i.e. TV, radio, newspapers, consumer protection agencies. Thus, consumers are not only direct users of the drinking water system, but also indirect users, i.e. all those who are not directly connected with but may be affected by the service provider. The two types of users, direct or indirect, are usually of the reactive type. A third type is also considered: the pro-active users. These will be individuals or, more often, organizations whose satisfaction requirements include also those important aspects beyond immediate perception. Examples of such users are environmental organizations, consumer protection agencies, pressure

groups, etc. The capability of direct perception depends on the type of user, as illustrated in Figure 2.

The decision to use or not to use the water supply services is in most cases made at the household level, rather than the community level. An exit/voice model for water supply alternatives in developing countries, based on the approach of Hirschmann (1970) and Paul (1990), is suggested here (Figure 3). The first concept is related to the public's ability to exit, i.e. discontinue their reliance on the specific water supplier, if dissatisfied with the service. The second one is concerned with whether public services differ in the degree to which consumers can make their voices heard, if dissatisfied with the service. The worst

conditions occur in a situation where consumers depend solely on vending and reselling with no alternative sources of supply (peri-urban areas). A low operational level results in difficult exit, i.e. limited alternatives, and low voice for the consumers. Water user associations may afford consumers a high voice and easy exit, however consumer exit may be hindered by entrance limitations.

Operative technology

In the late 1970s, the concept of low-cost technology was introduced and it was strongly emphasized during the water decade. The authors believe this idea to be

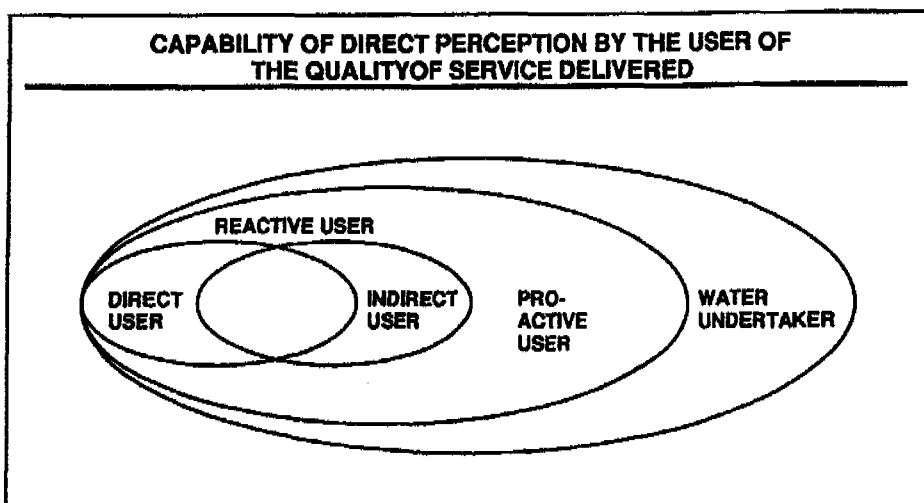


Figure 2 Capability of direct perception by the user of the quality of service delivered. Source: Lobato de Faria and Alegre (1996).

		VOICE		
		NONE	LOW	HIGH
EXIT	NONE	VENDING AND RESELLING, NO ALTERNATIVE SOURCES (PERI-URBAN AREAS)		
	DIFFICULT		VENDING AND RESELLING, SOME ALTERNATIVE SOURCES (SUB-URBAN AREAS, RURAL CENTRES) LESS OPERATIVE AGENCY OR ASSOCIATION-MANAGED SYSTEMS	OPERATIVE AGENCY-MANAGED SUPPLY (URBAN CENTRES, RURAL CENTRES) OPERATIVE CONSUMER-MANAGED ASSOCIATIONS WITH ENTRANCE LIMITATIONS
	EASY		VENDING AND RESELLING, SEVERAL ALTERNATIVE SOURCES (SUB-URBAN AREAS, RURAL CENTRES) LESS OPERATIVE AGENCY- OR ASSOCIATION-MANAGED SUPPLY, ALTERNATIVE SOURCES	OPERATIVE AGENCY-MANAGED SUPPLY, ALTERNATIVE SOURCES CONSUMER-MANAGED ASSOCIATIONS WITHOUT ENTRANCE LIMITATIONS

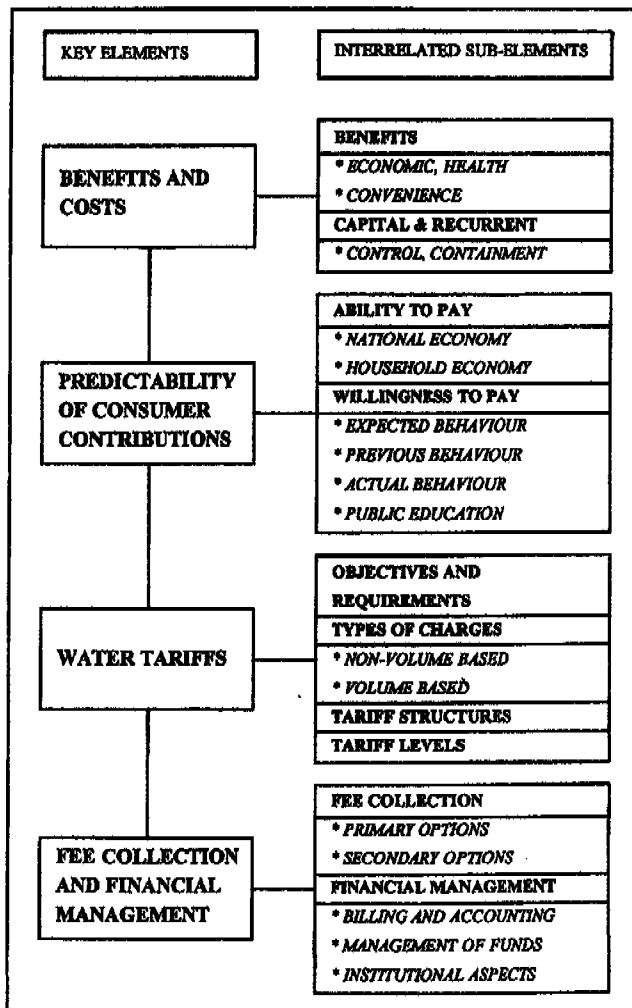
Figure 3 Suggested exit/voice model for water supply in developing countries. Source: Katko (1991).

basically acceptable. Technically simpler systems are often more reliable under the conditions prevailing in most developing countries. Yet, while low-cost technology is suitable in certain areas, more sophisticated modern technology also has its applications, e.g. in water resources inventories and certain water services products. For instance, the best and most reliable hand-pumps, such as the NIRA direct action pump of Finnish-origin, represent a high-level technology at the manufacturer's end as they contain the latest, light-weight durable materials. At the consumer end, however, the model represents low technology since it is very easy to use and maintain. Another key issue is that any technology will be operative and useful only if you have skilful and motivated staff. This underlines the importance of human resources development at all levels in conjunction with water supply installations.

Adequate cost recovery

The third key dimension is adequate cost recovery. According to the American Water Works Association,

the most fundamental measure of viability is a system's ability to bring in more money than it will spend to provide reliable water service, i.e. financial self-sufficiency. Until the 1990s, many developing countries had the official policy of supplying water free or almost free of charge to domestic consumers. For instance, in Tanzania it took almost three decades to realize that this policy will lead to inefficiencies and inequity and in fact will benefit only those who have access to services, usually the middle- and high-income consumers (Mashauri and Katko, 1993). The principle should thus be that everyone should pay, but not necessarily the same amount or in the same way. Also, the concept of cost recovery is related to other factors, and needs to be seen in an integrated perspective. As illustrated in Figure 4, at least four other key elements can be distinguished in addition to policy issues: benefits and costs, predictability of consumer contributions, water tariffs, and finally, fee collection and financial management. These elements include several sub-elements that are also inter-connected. When developing water cost recovery through payment, improving one element only (such as water



nD46@costraco

Figure 4 The key elements and sub-elements of cost recovery in water services. Source: Katko (1991).

metering) without considering other elements, will probably not be successful.

External support

Within the institutional framework (Figure 1), various forms of external support is often channelled through several types of agencies and a number of projects. It is important, especially for developing countries, to consider how and under what forms external support should be channelled for the most efficient and sustainable results, bearing in mind the primary beneficiaries, namely the consumers. During the 1990s, the role of non-governmental organizations (NGOs) has been much emphasized. Yet, with the challenges of urbanization and the development of related economic infrastructure, their role should not be over-emphasized. Necessary policy and institutional reforms will not be possible without the commitment of the governments concerned. Rather, the question is how to balance and integrate the various forms of external support.

In several locations, particularly in arid regions with international water bodies, water resources are increasingly becoming the limiting factor for national economies. In the mid-1990s, already 26 countries were suffering from chronic water scarcity (Kuusisto, 1994). However, in many cases an even more serious constraint seems to be inadequate knowledge of available water resources (Katko, 1986).

Undoubtedly, human resources, knowledge, know-how, skills and proper attitudes of sector professionals are the cornerstone for building local and national capacity. Particularly at university level, a direct link can be formed between research and development (R&D) activities. As to economic resources, the sector should be viewed against the overall economy of the country. It is important to note that the economic infrastructure of any society is the only basis upon which the economic system and social system can be built (Figure 5). For instance it is estimated that, in Finland, the value of the economic infrastructure is some 65–70% of the total national wealth. The servicing and maintenance of such capital assets is of the utmost importance.

Discussion

Should urbanization increase as expected, it will not be possible to provide services for the growing population without the requisite policy changes and institutional reforms. North America and Europe have some 150 years of experience producing water services, but very

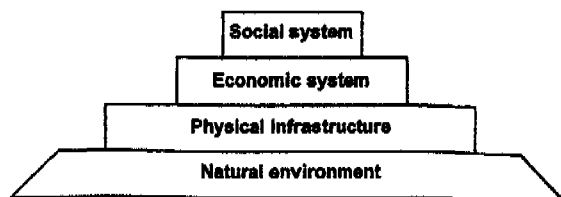


Figure 5 The relationship of infrastructure to socio-economic systems and the environment. Source: Grigg (1988).

few analyses of the long-term development and its implications for international cooperation have been made. In Finland, the experience of the water sector during the past 150 years is the subject of a new study about to be begun. Preliminary findings suggest that several issues, widely held to be new considerations, were in fact already debated and discussed at the turn of the century. These issues include the role of the public and private sectors in developing water services.

Although each country has its own specific conditions and development needs, there are some general principles of efficient water management that probably apply worldwide. The long-term analysis foreseen is also expected to yield important ideas for sector development in countries with economies in transition. In many respects, these countries need to develop the entire institutional framework of their water sectors anew. It is evident that there are no short-cuts to progress. Although transition economies are in many ways different from developing countries, and there are remarkable differences among transition economies themselves, the lessons from international development cooperation should not be ignored. One such lesson is undoubtedly to be cautious of overly ambitious objectives, which may overemphasize new investments without adequate consideration given to operation and maintenance aspects. This concerns both recipient countries and external support agencies. Unawareness of lessons learned is evident in developed countries as well, and was probably one of the key reasons for the privatization of the services in England and Wales in the late 1980s. Another hypothesis is that, in fact, many of the key principles of operative services are more or less applicable worldwide though they may vary slightly over time and under different conditions.

The third policy issue concerns the role of external support agencies. Bilateral agencies, in particular, have had a tradition of providing grant-type aid, the argument being that the agency did not wish to interfere in the internal policies of the recipient country. Although there are justifications for such a policy, it is nevertheless quite evident that this type of aid has opened the possibilities for many developing countries to postpone water pricing development and other necessary reforms. As pointed above (North, 1990), a choice of institutional arrangements is inevitably made either by positive action or its absence, because "not to decide is also to decide".

Conclusions

The following policy principles are suggested for consideration towards improving water services in developing countries, and to a large extent in transition economies and developed countries as well:

- A stronger focus on institutional reforms in the water sector, particularly the introduction of polycentric governance;
- The transition from an administrative domain to a service domain, which requires the development of a consumer-driven water sector;
- Facilitating appropriate public-private partnerships;

- The focus of donors should be shifted from capital investment to sound management of existing capital assets;
- A viability-building system should be incorporated into national strategies for the water sector;
- Comprehensive demand-management policies should be adopted in the water sector;
- The ultimate goal for the water sector should be financially self-sufficient and consumer-responsive water supply organizations.

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