

Clark, Duncan and Roger Ford: *The Crises of Innovation in Water and Wastewater*

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At first glance, the title of this work gives the appearance of providing a novel technological contribution to understanding of water systems. However, the reader soon discovers that this work is much more focused on the policy aspects of water systems. The authors' thesis is that innovation of water systems, potable water provision and wastewater management is long overdue in the U.K. and other developed countries. The technology discussed, microscopic membrane filtration, is noted as relatively cost-effective and space-efficient. However, policy-related barriers make the implementation of this technology difficult. The authors state, "Our aim is mainly to investigate why the water utilities in the developed world, despite their extensive technological experience, have exhibited such limited ability – both technically and culturally – to address the many real fundamental water problems with correspondingly institutionally and technologically innovative approaches and solutions" (Clark et al. 2005, p. 138).

It is interesting to note that one of the most important, if not most pertinent, points of the authors' thesis is not articulated until chapter 5. Here, the authors lay out the

foundation of their thesis: that the U.K. water system is antiquated. Indeed, the authors point out that the water system infrastructure is essentially Victorian.

What is perhaps surprising however is that with few exceptions if a water or sanitary engineer from over a 100 years ago was to return to the present time, they would see little change in the way that modern society tackles these crucial activities. They would probably marvel that we continue to use the same infrastructure that they and their colleagues installed (p. 136).

Additional technological change has been implemented, but this has largely been confined to the use of microbes in the treatment of wastewater. The potable water system remains virtually unchanged since 1867 when chlorine was first added to the water supply in Manchester, U.K. The historical answer to why the water system remains resistant to innovation is its orientation with civil engineering. Civil engineers develop infrastructure and often this is infused with a desire to design grandiose structures such as bridges and dams. Thus, a dominance of water systems by civil engineers has resulted in an emphasis on the construction of centralized water systems, "water is heavy and expensive to move, therefore use gravity whenever possible" (p. 152), and ignorance of the potential for process and control engineering in water systems. This is illustrated through a comparison of the reliance on

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process and control engineering in the petrochemical and food production industries. The role of process and control engineering in water systems becomes clearer in the last chapter where the authors explain the finer details of membrane filtration technology.

Post privatization regulation in the U.K. is also noted by the authors as an impediment to innovation in the U.K. water sector. The authors provide an erudite analysis of some of the negative externalities that regulatory bodies can produce. This part of chapter 5 is important in tying together the problems of a civil engineering “culture” and regulation of privatized utilities. Essentially, the regulatory body oversees a water system, designed within a civil engineering culture, characterized by a “massive and complex capital infrastructure with comparatively low operating costs” (p. 152). The regulatory body had no intention of changing the historically low operational costs, which serve as the basis for measuring cost savings and operational efficiency.

Chapter 3 purports to explain the relationship between technological innovation and socioeconomic growth with the water sector as a prime example. Unfortunately, the authors fall short of elucidating this relationship and they acknowledge the difficulty of providing solid examples here: “a detailed understanding of water sector innovation processes is very difficult given a lack of theoretical and empirical evidence” (p. 62). Instead, a more holistic view, emphasizing radical breakthroughs across sectors related to the water system, is advocated: “We suggest that water utilities must recognize that competence-building can no longer take place solely within the boundaries of the firm” (Elfring and Baven 1996, p. 223). The final sections of chapter 3 are dedicated to explaining the difference between the types of incremental change: perpetual and continuous incrementalism. The former of these characterizes the water system and the supporting example given is the incremental budgetary system used by governments in the U.K., U.S., and France. The incremental budgetary system, because present allocation is based on past allocation, does not allow much flexibility: “Prospects for any breakthrough shifts in technology (or even institutional structures) are slim within such a model of practice” (Clark et al. 2005, p. 66).

One the key points purported by the authors is the extension of the hypothesis to lesser developed

countries. This theme is touched upon in various chapters, but receives a more thorough articulation in chapters 6 and 8. In chapter 6, the authors integrate changes in the water systems of various countries, both developed and developing, with the phases of the sustainability discourse. It is interesting to note that many of the countries – China, Chile, Spain, and Sri Lanka – noted in Table 6.1 (pp. 176–177), made changes beginning in the 1980s, which corresponds to the regulatory phase. Only a few countries such as Denmark, Finland, and Poland have a record of initiating changes during an earlier phase of the sustainability discourse. Chapter 8 provides three examples – Bolivia, China, and Bangladesh – illustrating problems within the water sector. For example, the Bolivian case, the abrogated privatization of the Cochabamba water system, is illustrated as typical of how privatization impedes change in the water system. However, the authors present a weak and incomplete argument here. How did *Agua de Tunari*, the Bolivian subsidiary of Bechtel, limit the innovation of the Cochabamba water system? Lopez de Silanes and Chong (2003) argue that the instigation of collective action against the privatization of the Cochabamba water system did not originate from ideological motivations. Instead, the roots of contention against the privatization of the water system stem from the loss of patronage in a heavily subsidized system. In other words, many persons and groups lamented the loss of *agua en gratis*. The China example is also weak, but it serves a better link to the argument that a civil engineering culture is detrimental to the innovation of the water system. In the case of China, the authors note a runaway monument syndrome highlighted by the building of the Three Gorges Dam project, the most extensive dam building project in history.

In conclusion, this work is best utilized as a cursory overview of the need for innovation of the water system. The use of a developed country, the U.K., as a primary example involves a comparative methodological approach that was once common; yet, the authors turn this old comparative approach on its head. This is so because the old comparative approach usually used the U.S. as exemplary example against which other countries were compared. In this case, the U.K. is used as an example of how certain historical–institutional factors, such as reliance on civil engineering, can lead

to the mitigation of innovation even after a considerable period of time. However, the authors' attempt to extend the hypothesis to developing countries is less than satisfying. A deeper explication of the linkage between the failure to innovate in developed countries and lesser developed countries is needed. As a cursory overview, however, this work can benefit scholarship across a wide range of disciplines: ecology, policy studies, history, and geography, just to name a few.

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