VIEWS ON THE HISTORY OF WATER, WASTEWATER AND SOLID WASTE SERVICES

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Hidden structures

From a historical point of view the city can bee seen as a static backdrop to a drama that takes place in another dimension. In reality – in the minds of people – a city is a place of meeting, noises, smells and changing light effects. For an ordinary person the city probably includes only the experienced and visible part. Yet, what makes a modern city work is largely hidden behind curtains. We could also – of course - assert that people see only what they learn to see.

From the standpoint of infrastructure management, a city forms a network of streets and streetcar tracks, cables, and water and wastewater pipes. Some historians have named these systems "the hidden city" or "the city below the ground". What makes the hidden city interesting – from the viewpoint of historical interpretation – is that it also seems to be hidden from historians. It is a research area from which a lot could be learned. Why did we get such a city? Which were the actual forces behind this evolution, behind the visible and invisible drama that shaped the modern city?

In the field of futures research the following question is also relevant: to what degree are we dependant on earlier choices and structures already built? Do we at all have a board and men that can be moved freely? A trustworthy sketch of the future must be based on historical analyses. We have to learn how earlier choices block possible, probable, and preferable development paths. One of the recent theories that historians have used to understand the complex forces behind the evolution of the technical networks of the industrial city is the path dependence theory. It is also a good tool for futures research and strategic planning. The path dependence theory is also one of the cornerstones of this paper.

This article does not try to direct answer the above mentioned important questions. On the contrary, it focuses on questions and thoughts that came to the fore during the process of answering these questions. The study was conducted as part of the research project in 1997-99 financed by the Academy of Finland and the Ministry for the Environment, called "Long-term development of water, wastewater and sanitation services and their future

implications.

This paper concentrates on the Finnish case. It is important to realize that due to its relatively late industrialization and urbanization, the country is – in a sense – a special case. Thus, all general statements about European cities in early industrialized countries are not relevant for Finland. One example is the mortality in cities (which was one of the main motives for action) compared to the countryside. In Sweden and the rest of Europe, mortality in cities was higher than in rural areas in the 19th century. This was due to miserable sanitary conditions in the early modern cities. At the end of 19th century, mortality declined rapidly in all cities. In Finland the average mortality in cities and countryside was equal, a fact noticed by statisticians already at the beginning of the 20th century.

Importance and justification

Improved water supply and sanitation, especially in today's developing countries are justified largely by improved health conditions. Naturally, health education, maternity clinics, etc. also contributed to the decline in mortality in Finland, but the effect of modern water supply, sanitation and improved hygiene has nevertheless been of fundamental importance.

The demand for urban water supply was created especially by the need for fire-fighting water, since most houses were wooden. Additional demand was promoted by the need for safe drinking water by households as well as industrial and commercial uses. In rural areas improved water supply was promoted particularly by cattle farming. Sanitation, water pollution control and solid waste management were the real forerunners of environmental protection, long before the concept was introduced in the late 1960s. Water, sanitation and solid waste services are primarily an answer to the demands of consumers and customers, and thus have also social justification.

Especially the lessons learned from international development cooperation indicate that project failures are more often the result of poor institutions and management than technology. Although the historical situation in Finland some 50 to 100 years ago was different, there are also obvious analogies. This points out the relevance of new institutional economic theory in analyzing past experiences.

Strategic decisions as a historical problem

The Concise Oxford Dictionary (Oxford 1964) knows only the old meaning of the word strategy: "Generalship, the art of war [...], art of so moving or disposing troops or ships or aircraft as to impose upon the enemy the place & time & conditions for fighting preferred by oneself". Most of today's textbooks on strategy would offer the definition "top management's plans to attain outcomes consistent with the organizations's missions and goals. However, strategy can also be seen in a wider context including one or more of the following five dimensions: strategy is a

plan, a pattern, a position, a perspective or a ploy, a maneuver to outwit an opponent or competitor. In any case, to formulate a strategy we have to start working as the general, to mark our situation on "the map (what we have), to work with a time axis (history, present) and to learn the conditions (the context).

Examples of solid waste management

The strategies of the 19th century cities were not called strategies then. Yet, the decision makers of the growing cities of Finland, which was urbanized relatively lately, had to take decisions – to formulate strategies – in order to prevent the city environment from threatening sanitary problems. What is interesting is that these strategies and the tried technical solutions seem irrational. The selections were based on foreign experiences and the desire to minimize costs. Local circumstances were seldom discussed and observed. An exception was the intensive discussion and the fear of water pollution at the end of 19th century. The actors and ideas of the future had a great impact on selected technical solutions. This led decision makers to choose an alternative which could be called the second best solution.

The second best solution implies a situation where the best considered alternative is rejected for seemingly economical, technical or social reasons; the second best is selected as a temporary solution. The plan is to implement the best alternative when the conditions, which seem to be the obstacle, have been reached. For example, sorting of waste in two fractions was chosen in Helsinki instead of three fractions in 1910. In the 1880s bins were chosen instead of water closets, and landfilling instead of incineration of wastes in the 1930s. When investigating the decision making process we may also wish to look at hidden motives: if a property owner, who was a member of the city government, was truly worried about the sanitary conditions, or primarily interested in disposing his own wastes more cheaply?

While new professional groups gained more power in the Finnish city administration in the 1870s and 1880s, the question of who actually formulates the problem raises. The person who is able to formulate a problem also has the power to heavily influence technical selections. A decision maker who does not see the actual problem cannot actively take part in the decision making process and influence the final result. The power of formulating strategies is then in the hands of professionals: medical doctors and engineers in the case of Helsinki at the end of the 19th century.

Do we actually learn from the past? During the 1980s and '90s the Finnish waste management system changed drastically. Much of the changes were, of course, a consequence of the implementation of EU-related legislation, but a change in attitudes is also noticeable. The environment has become more and more important for the ordinary citizen. No wonder that so-called new ideas also found their way into the market. What

strikes a historian is that discussions similar to the present days were led and the same kind of technologies were used already a century ago. The main focus has just changed from public health to the environment. Source separation was seen as a modern idea in the 1980s. How many engineers engaged in waste management know that the same kind of source separation was introduced in Helsinki already in 1910? How many are familiar with the early plans for building an incineration plant in the first years of the 20th century? And what about the early drum composting techniques that were implemented in Helsinki and Turku in the 1950s?

Examples of water services

In 1864 a doctoral dissertation on the health impacts of lead pipes was published. In the 1870s and '80s related laboratory experiments were conducted and in 1889 the use of lead pipes was forbidden in Helsinki while joints and other fittings were excluded. This decision, taken soon also by other cities, may seem a small technical detail but can be considered very farsighted. For instance the first water pipes in the U. K. were of lead and are still in use. Their replacement, required by EU directives, will be very costly.

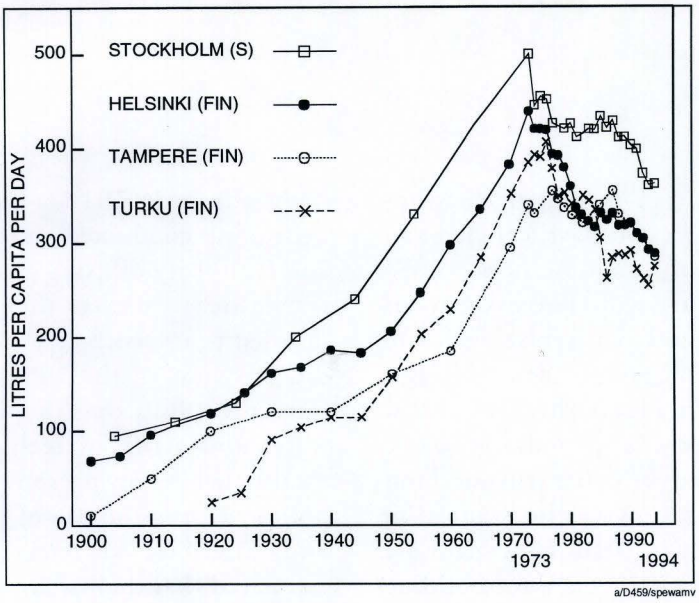
Since the early days of the Helsinki water works in the 1880s, billing of water has been based on metering. It is a historical paradox that more than a century later England, the pioneering country of water services, had to hold a public debate whether to install water meters or not.

By the year 1910 a heated public debate was conducted on the availability and feasibility of using ground water in urban areas. At that time, some cities decided to use surface water and others did the same in the 1950s. It was not until the 1960s that the use of ground water and artificial recharge were re-established. The present government policy favours the use of ground water and artificial recharge, and it is estimated that their share will rise to 70 percent of urban supply by 2010.

Rural areas have a long tradition of private, consumer-managed water supply systems that are operated on a small scale non-profit basis. It is obvious that this approach has been, and still is, appropriate in a country with villages and sparsely populated areas. Central government subsidies have always been limited in water supply and sanitation: expenses are covered mainly by consumers, earlier partly through local tax revenue, and later completely by direct consumer fees. In urban areas and townships municipality-owned enterprises are able to operate efficient services on a commercial basis. Private sector services are used to a large extent in planning, construction, operation, maintenance, and related services. This public-private partnership dates back to the 1880s, and is nothing new as argued by several international agencies and policy makers in the 1990s.

Sometimes technologies and technical knowledge move in cycles. For instance, in water treatment some old methods have been reintroduced as auxiliary methods or new applications.

Since the early 1970s the conventional growth paradigm proved not to



be valid any longer in Finnish water use: per capita consumption, and in some cases even total water consumption, started to decline (Figure 1). We have a new special challenge: how to design systems for declining consumption.

Accumulation of knowledge or reinventing the wheel?

When we consider the long term development of sanitary engineering, the question of how engineers and other professionals use accumulated knowledge raises. We can also ask whether we are making use of the accumulated knowledge – or more drastically, whether we ever learn from our experiences. In modern society one sometimes gets the feeling that only the latest findings and products have relevance, while older studies are without significance. Instead of learning from earlier experiments, we launch new projects from scratch maintaining that enough "basic studies" have been done. Maybe this is why we sometimes get the impression of cyclical development and that every generation seems to reinvent the wheel.

It is of great importance – especially in the field of environmental protection – that we understand the relationship between knowledge and action. How is available knowledge utilized, and if not, why? As the Swedish environmental historian Lars J. Lundgren has pointed out it is also important to discuss questions like what is knowledge, and what does the utilization of knowledge mean.

Another interesting question is, whether knowledge can become outdated and absolute. The authors have witnessed several cases where technology libraries abandoned, sold out or even destroyed publications that were over ten years old. Such an attitude is very unfortunate as concerning infrastructure services since most of the basic books on these services were written and printed in Finnish during the great expansion of these systems in the 1960s and '70s. The bulk of recent research reports and other series are often meant for specialists while basic infrastructure and other related handbooks have not been revised and reprinted. These libraries argue that knowledge becomes

outdated and thus useless. This argument is as absurd as claiming that an adult did not have his or her childhood. The attitude is probably based on development of information technology (IT) and other high-tech areas where the argument might be more valid. In infrastructure, environmental engineering and most probably many fields of basic engineering sciences, knowledge does not become old-fashioned but accumulates, and old knowledge is largely the basis of new. Thus, instead of promoting highly specific, exact sciences, we should remember that even in the development of IT, hermeneutic and less exact sciences like psychology and other human sciences are becoming increasingly important. This is also a current challenge for the history of technology.

Concluding Remarks

The experiences from research on history of technology imply the need of analyzing and understanding the accumulated knowledge and history of technology even in the era of IT.

Firstly, it is important to understand the basic phenomena related to technology development and history of technology. A multi- and interdisciplinary institutional approach is needed rather than, for instance, in the case of history of technology, concentrating only on natural sciences. This is something that is probably overwhelmingly stressed as the basis for technology development.

Secondly, strategic decisions affect present and future options by binding us to certain alternatives, or limiting and postponing them. The analysis of these decisions would be very useful, especially for environmental and infrastructure policy-makers, instead of concentrating possibly too much on fashionable issues.

Thirdly, analysis of long-term development and history of technology is a sound base for future planning, a crucial factor in managing infrastructure systems. To be able to prepare such plans for different time horizons, we have to know where we are and where we are coming from.

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