Maila Herrala

GOVERNANCE OF INFRASTRUCTURE NETWORKS

DEVELOPMENT AVENUES FOR THE FINNISH WATER AND SEWAGE SECTOR
MAILA HERRALA

GOVERNANCE OF INFRASTRUCTURE NETWORKS
Development avenues for the Finnish water and sewage sector

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**Abstract**

The efficiency of public service provision has been a subject of debate for several decades. Discussions that are centred around whether public or private service provision is more efficient are still active around the world and also concern water and sewage services. Additionally, waterworks are facing tightening quality and environmental requirements, while ageing infrastructure and rapidly growing repair debt must also be addressed.

This study aims to identify the actions that are required to improve waterworks performance without compromising service quality. The objective is to find both internal and external factors that will improve efficiency. Despite the clear pressure for new solutions, there is only a limited amount of research on the topic, which provides further justification for this study.

This dissertation has adopted a case study approach with multiple data sources in order to provide as diverse, detailed and profound information regarding the Finnish water and sewage sector. Data sources such as interviews, questionnaire and publicly available financial data were used as a basis for analysis.

The results of this study indicate that the external factors that influence the performance of waterworks include legislation, environmental issues, population density and municipal topography. When benchmarking different waterworks, it is important to understand that some of these conditions are case-specific. Waterworks cannot change the external factors but they must analyse them in order for them to operate optimally. Internal factors that waterworks managers and municipal owners can influence include the selection of a suitable ownership and governance model, the roles of different decision makers, the competence of board members, asset management practices, proper maintenance of infrastructure, and operational and financial transparency.

This study emphasises that municipal owners should concentrate on ownership policy and focus on their role as owners, not as operational managers. The selection of waterworks board members should prioritise management and engineering expertise. Legislators could help improve the efficiency of waterworks by promoting transparency and requiring uniform reporting practices. Making key information publicly available would enable benchmarking and planning of development activities. Waterworks managers should make long-term investment plans and systematically manage their assets.

**Keywords:** business model, governance, infrastructure, ownership, performance, public services, value creation, waterworks
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Oulu

**Tiivistelmä**


Tämän tutkimuksen tavoitteena on löytää toimenpide-ehdotusia, joiden avulla vesihuollon suorituksesta voidaan parantaa kuitenkaan vaarantamatta palvelun laatuja. Tavoitteena on löytää sekä sisäisiä että ulkoisia tekijöitä, jotka vaikuttavat vesihuollon suoritukseen ja joita muuttamalla vesihuollon tehokkuutta voidaan parantaa.

Tämän väitöskirjan lähestymistapa on tapaustutkimus ja siinä hyödynnetään useita erilaisia tietolähteitä, jotta pystytään luomaan monipuolin kuvaus tutkimuskohteesta. Analyysin perustana käytettiin erilaisia tietolähteitä kuten haastatteluja, kyselylomaketta sekä julkisesti saatavissa olevia taloudellisia tietoja.

Tutkimustulosten mukaan vesihuoltolaitoksen suorituksesta vaikuttevat ulkoisia tekijöitä ovat muun muassa lainsäädäntö, ympäristölliset seikat, kunnan topografia sekä asukastiheys.

Vesihuoltolaitokset eivät voi suoraan vaikuttaa ulkoisiin tekijöihin, mutta niiden tunnistaminen ja vaikutusten analysointi on tärkeää, jotta annettuja toimia voidaan toimia optimaalisesti. Sisäiset tekijät, joihin vesihuoltolaitoksen johto ja kuntaomistaja voivat vaikuttaa, ovat sopivan omistus- ja hallintomallin valinta, eri toimijoiden väliset roolit, hallituksen jäsenten pätevyys, omaisuuden hallinta sekä operationaalinen ja taloudellinen läpinäkyvyys.


**Asiayönä:** arvonluonti, hallinto, julkiset palvelut, kunnallistekniikka, kunnan liiketoiminta, liiketoimintamallit, omistus, vesihuolto
Acknowledgements

“The journey of a thousand miles begins with one step.”
- Lao Tzu

Two years, ten months and 15 days ago I stepped into the corridor of Department of Industrial Engineering and Management to start my career as a researcher studying communities’ technical networks’ ownership, governance and operation (in C-Business-project). That day was a little over a year after I closed the lids of my previous research which ended up being my master’s thesis. At that time, I wanted to try a career as a researcher, but I did not know it was going to be so soon.

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Now when I look back these years I feel joy. I feel joy of accomplishment and I feel excitement. With this work, I have demonstrated my capability as a researcher and I feel that my adventure has just begun.

Kerava, May 16th, 2011

Maila Herrala
List of abbreviations

AGM  Annual General Meeting
CEO  Chief Executive Officer
goop  Cooperative
CEDTE  Centres for Economic Development, Transport and the Environment (Elinkeino-, liikenne- ja ympäristökeskus in Finnish)
FIWA  Finnish Water and Waste Water Works Association
FoM  Federation of Municipalities (kuntayhtymä in Finnish)
MOC  Municipally-Owned Company
MOE  Municipally-Owned Enterprise
MU  Municipal Unit
SWWA  Swedish Water & Wastewater Association
SWOT  Strengths, Weaknesses, Opportunities, Threats analysis
OECD  Organization for Economic Cooperation and Development
PPP  Public Private Partnerships
PRINWASS  “Barriers and Conditions for the Involvement of Private Capital and Enterprise in Water Supply and Sanitation in Latin America and Africa: Seeking Economic, Social, and Environmental Sustainability” research programme
ROA  Return on Assets
ROE  Return on Equity
ROI  Return on Investment
ROTI  Rakennetun omaisuuden tila ROTI –selvitys (State of the Built Environment research)
UNDP  United Nations Development Programme
VAP  Value-Adding Partnership
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1 Introduction

1.1 Background

The efficiency of public service provision has been the subject of debate for several decades. Current economic theories and market situations argue that many public utilities and services can be delivered more efficiently if the private sector is involved or when the utility or service is fully privatised (Rondinelli 2003). On the other hand, public ownership is considered to be justified, especially for vital services that must be functional in all circumstances (Perotti 2004, Shleifer 1998, Välilä 2005).

The rise of public ownership took place at the start of the 20th century (Perotti 2004). Prior to that time, it was generally felt that the government could protect companies from market powers and secure the post-war service provision of socially important commodities (Perotti 2004, Taylor 2006). These ideas lasted until the reform and economic transformation of the late 1970s. The most famous privatisation programme of public services started in the United Kingdom in the 1980s under Prime Minister Margaret Thatcher (Summerton 1998). Although privatisation spread throughout the world, it met certain obstacles, such as price rises, deteriorating quality and self-serving management (Willner 1994), which made public provision and different forms of public private partnerships (PPP) more popular.

Public private partnerships started to spread in the 1990s when the difficulties confronted in the privatisation process became clearer and it became understood that purely public provision was not efficient either. By including the private sector in the provision of technical networks, the management and operation of the services could be significantly improved and private capital could be accessed, while the public sector still had the power to control and ensure the provision of socially important commodities (European Commission 2003, Jamali 2004).

Water and sewage services as public utilities have also been under pressure to improve their efficiency. Developing countries in particular have increasingly viewed privatisation or private sector participation as a strategic solution to improve efficiency. There are fears that inefficiencies will lead to environmental degradation and health risks (Al-Madfæi 2009, Anwandter & Ozuna 2002). For example, the model of private provision has been adopted in England and Wales (Summerton 1998), concession to private companies in France (Morange 1993),
and public provision in Sweden (SWWA 2000). Public services are also facing critical times in Finland. Tighter efficiency and financial requirements have forced municipalities to think about new solutions for service provision. The situation also directly reflects the water sector, since many of the waterworks are owned and operated by municipal entities. In addition, waterworks are facing tightening quality and environmental requirements, ageing infrastructure and rapidly increasing repair debt, all of which pose challenges to owners and managers (Hukka & Katko 2007, Silfverberg 2007, Windischhofer 2007).

International comparisons have traditionally ranked Finland’s water supply and sewage services at the highest level (Maa- ja metsätalousministeriö 2010), but several future challenges have been identified. Evaluation of the condition of pipelines has clear deficiencies (Heikkinen & Forsberg 2008), which makes it extremely difficult or even impossible to create solid long-term investment plans and cover all costs through income financing as required by law (Heinonen 2009, Kuntaliitto 2007, ROTI 2009, Vinnari 2008). Without asset management, financial stability and self-sufficiency based on fair fees that cover the true costs, the waterworks may not be able to keep up healthy, safe and well-functioning water service provision in the future (Hukka & Katko 2007, Silfverberg 2007). Additional threats throughout the municipal sector include ageing personnel, disappearance of tacit knowledge due to retirement and the unavailability of competent workforce and skilful management (Silfverberg 2007).

These issues have triggered active debate regarding how the water and sewage services should be provided and by whom. Researchers in Finland agree that waterworks infrastructure should be owned by municipalities; however, whether the services are provided by a municipal unit, a municipally-owned enterprise (MOE), a municipally-owned company (MOC) or something else is another question. Juhola (1990, 1995) studied the strengths and weaknesses of private law waterworks’ governance models and waterworks as communities’ service organisations in the early 1990s. Furthermore, Muukkonen (2006) discussed different governance models and their selection. Hukka et al. (1994) and Hukka and Katko (1999) presented alternatives for conventional service provision, such as privatisation and public private partnerships. In addition to discussing the governance models of waterworks, researchers have discussed the actual role of municipalities in the provision of water and sewage services (Katko 2008, Pietilä 2006, Puttonen 2002) and the options and necessary actions if water
and sewage services are to be separated from the municipal administration (Myllyntaus 2001).

Recent problems with water supply (such as the water supply contamination in the city of Nokia in 2007) and the debate over the amount of repair debt in infrastructure have led to studies on water and sewage service vulnerability (Hukka & Katko 2007), how waterworks can prepare for risks and how they should react in crisis situations (Heikkinen 2008, Nikula et al. 2009, Vikman & Aroilta 2006) and how the necessary infrastructure can be kept in good condition (Heikkinen & Forsberg 2008, Välisalo et al. 2006, Välisalo et al. 2008, Välisalo 2008).

Municipalities and waterworks face a dilemma in the sense that something needs to be done in order to improve the efficiency and financial situation of waterworks while still maintaining good quality and reliability of service provision of these critical services. In recognising this dilemma, the present study seeks to identify actions that are necessary in order to improve the performance of waterworks without compromising the quality of service. The aim is to find out the root causes of problems – what internal and external factors affect the performance of waterworks – and how these problems should be approached at the local and national levels. Although there is clearly pressure for new solutions, there is only a limited amount of research on the topic, which provides justification for this research.

1.2 Research environment

Water and sewage services are vitally important to people and to society at large. They are considered to be necessary services (Vikman & Aroilta 2006) that are critical to sustainable development (UN 2010) and must be secured under any circumstances. Because of the need for the services and the monopoly position of service providers in their operating area, it is necessary to pay special attention to the quality of the service provision and to control the operation through legislation (Abbott & Cohen 2009). In Finland, the provision of water and sewage services is regulated by law, with the purpose of ensuring affordable access to water and adequate sanitation. The most important laws are the Act on Water Services (119/2001), the Health Protection Act (763/1994) and the Environmental Protection Act (86/2000). Appendix 6 lists these and other related laws.

Water and sewage services have many special characteristics. Firstly, waterworks are natural monopolies. This is primarily due to the capital intensity
of the service, but also because it is not reasonable to build a competing pipeline network in the same area of operation, and the provision of services through the same pipelines would require complex technical and contractual solutions. Accordingly, the barriers to enter the water and sewage service business are high. The capital intensity of the water industry results in large capital costs, mostly depreciation and interest charges, which form a significant part of the total operating costs. This capital intensity means that economies of scale are easily attainable and it is cheaper for one provider to provide closely related services than it is for many service providers. Due to the public utility nature of the services, special quality and reliability issues also need constant attention and monitoring so that water is safe to use and treated sewage does not pollute the environment. The final important characteristic is related to the excess capacity of physical structures. Because of the fixed nature of the assets and the long payback time of investments, the capacity need to be designed to achieve the maximum consumption during the payback time, despite possible changes in consumption. Excess costs may be incurred if, for example, the municipality changes the operational area of the waterworks or the consumption of water reduces because of saving activities due to increased environmental awareness (see e.g. Kiuru et al. 2001, Tupper & Resende 2004, Vehmaskoski et al. 2005).

The water and sewage services can be divided into eight main components: raw water acquisition, water treatment, water delivery, sewage collection and transfer, rain water collection and transfer, sewage treatment, sludge treatment and customer service (Korelin et al. 2006, Silfverberg 2007). Fig. 1 illustrates the process of water and sewage service provision.
Fig. 1. Process of water and sewage services.
For easier examination, this study has divided service provision into four core services: water acquisition and treatment, water delivery, sewage collection and sewage treatment. Rather than being considered separately, rain-water collection and transfer is included in the sewage collection and treatment component where applicable.

More than 90 percent of Finland’s 5.3 million inhabitants belong to the water system and around 80 percent are connected to the sewage system of Finnish waterworks (Silfverberg 2007). The fundamental obligation of municipalities (self-administrative units of the Finnish government, of which there were 342 in 2010) is to arrange water and sewage services for residents (Act on Water Services 119/2001).

Finnish law governs waterworks that deliver drinking water or receive more than 10m³ of sewage per day, or serve more than 50 inhabitants and more than one property (Act on Water Services 119/2001). According to the statistical system for Finnish waterworks (VELVET), there are currently approximately 1500 water and sewage service providers in Finland that report their operation to the Centres for Economic Development, Transport and the Environment (CEDTE). Of these, approximately 1000 provide water acquisition and treatment and/or water delivery services and some 400 provide sewage collection and/or treatment services. By way of comparison, statistics from 1999 listed 1319 water suppliers and 642 sewage treatment plants providing services in 452 municipalities (Lapinlampi & Raassina 2002). Most of the waterworks are extremely small, providing water to only a few hundred, or even a few dozen customers. The 25 largest municipal waterworks provide approximately 60 percent of all the water sold in Finland (Kuntaliitto 2007).

1.3 Objectives and scope

The purpose of this study is to clarify the types of actions that are needed to improve the performance of waterworks. The tight financial situation and efficiency requirements of public services are worldwide issues. Finnish municipalities are also facing critical times, which are further reflected in the water sector since many of the waterworks are owned and operated by municipal entities. On the other hand, adequate service levels and reliability of delivery must be ensured and guaranteed. In addition, tighter quality requirements and ageing infrastructure pose serious challenges to owners and managers of waterworks.
This study mainly evaluates performance on the basis of qualitative parameters. Few selected quantitative parameters are used to support analyses. The term “performance” is used in a broad sense in order to understand how well waterworks are able to meet their objectives, given the external constraints placed on them. Performance can be understood to contain several aspects, such as effectiveness, efficiency, quality, profitability and productivity.

The two aspects of performance that this study has considered are efficiency and profitability. Efficiency is understood as a relationship between inputs and outputs; that is, how well waterworks are able to use resources to produce water and sewage services. The objective of this study is not to measure quantitatively how efficiently waterworks operate but to examine qualitatively what, and how, different internal and external factors affect the availability of inputs and the specific level and quality of outputs (for example, legislation defines a certain quality level). From a business perspective, profitability can be seen as the most important factor to be considered since it measures a company’s ability to make profit. This study evaluates profitability quantitatively by analysing financial statements. These are used as supportive material.

The aim of this study is to identify potential avenues for development based on findings of how different internal and external factors affect waterworks’ performance. Many of these factors, such as good governance practices, organisation flexibility and environmental factors, are difficult or impossible to measure quantitatively, which further justifies the choice of a qualitative examination. Consequently, the research problem that this dissertation has attempted to address is stated as follows:

*How can the efficiency of water and sewage sector be developed through governance?*

The research problem is addressed by answering the following research questions (Table 1).

<table>
<thead>
<tr>
<th>RQ #</th>
<th>Research question</th>
</tr>
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<tbody>
<tr>
<td>RQ1</td>
<td>What kind of framework can be used to analyse factors that affect waterworks’ performance?</td>
</tr>
<tr>
<td>RQ2</td>
<td>How do external factors affect the performance of waterworks?</td>
</tr>
<tr>
<td>RQ3</td>
<td>How do internal factors affect the performance of waterworks?</td>
</tr>
<tr>
<td>RQ4</td>
<td>What are the potential avenues for development in the Finnish water sector?</td>
</tr>
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</table>
The first research question (RQ1) is answered through an extensive literature review. The objective is to create an analysis framework based on previous literature that can be used to analyse factors that affect the performance of Finnish waterworks. The second research question (RQ2) aims to specify how various external factors, such as legislation and environmental issues, affect the performance of Finnish waterworks. The third research question (RQ3) looks to specify how different internal factors, such as governance and operational decisions, affect the performance of Finnish waterworks. The fourth research question (RQ4) describes the development areas of water and sewage services in Finland and what can be done at the national and local level to improve the performance of waterworks. Research questions 2, 3 and 4 are answered through empirical research.

This study is limited to the Finnish water sector and waterworks. The examination of water and sewage service provision starts with water acquisition, through the waterworks system until it reaches the border of real estate, thereby excluding real-estate-specific solutions. In addition, some specific issues, such as management of rain water and fire-fighting water, are not considered separately. This dissertation focuses primarily on publicly owned waterworks due to their significant coverage (when measured by number of customers). Additionally, a review of cooperatives is included because of their large number.

1.4 Research process

This study began with a literature review on several related topics, such as ownership, governance and business model. Existing theory was then used to formulate an analysis framework that was later used to collect and organise data and to direct data analysis as described below. This answered RQ1. The collected data was mainly qualitative and was gathered through interviews and questionnaires with open-ended questions. In addition, an analysis of financial statements was conducted. After intensive analysis of data, answers to RQ2 and RQ3 could be formulated and conclusions for RQ4 could be made. Fig. 2 illustrates the research process of this dissertation.
Fig. 2. Research process.
1.4.1 Research approach

The motivation for this study is to identify the types of actions that are required to improve the performance of waterworks. The existing literature has addressed several development points in the waterworks operations but has not clearly indicated what operational levels (whether in work methods or perhaps in governance) these issues are at and at what levels they should be solved. Therefore, the objective of this study is to critically view Finnish waterworks, form an understanding of the present situation and indicate the possible difficulties encountered in the ownership, governance and operation of waterworks.

This study is interpretive in nature and acknowledges hard facts as well as social aspects that are typical of human societies. The social world cannot be understood without also understanding the social structures that have given rise to the social phenomena that one is trying to understand (Bhaskar 1989). Consequently, it can be said that this study takes the position of a critical realist. It is assumed that knowledge is always related to actions (humans’ efforts to structure their experiences and adapt to their environment) and that intentions play a major role in understanding these actions. Therefore, this study is pragmatic, assuming a scientific approach to the development of knowledge that further underpins the collection and understanding of data (Saunders et al. 2009).

The analysis method was mainly inductive. By taking an inductive stance, the researcher has explored the data and developed theories from them and subsequently related that to the literature (Saunders et al. 2009). Easterby-Smith et al. (2002) suggested that qualitative data is likely to work better from an inductive standpoint, and having a variety of methods to collect this data enables different views of the research phenomena to be established. This is why an empirical approach with qualitative case study research methods was selected as the research strategy. In this study, the case is the Finnish water sector.

Qualitative research aims to gather an in-depth understanding of the studied phenomenon and to generate answers to the questions of “why?”, “what?” and “how?” (Saunders et al. 2009). Because of the multidimensionality and complexity of the case (the Finnish water sector), the study used multiple data collection techniques in order to collect as diverse, detailed and profound information of the research context as possible. Employing various data collection techniques and using them in combination helped the researcher ascertain that the
data is actually saying what it implies (Saunders et al. 2009). This is also known as triangulation (Saunders et al. 2009). Table 2 summarises and explains the research approach.

**Table 2. Research approach.**

<table>
<thead>
<tr>
<th>Approach</th>
<th>Explanation</th>
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<tbody>
<tr>
<td>Problem setting</td>
<td>Critical research</td>
</tr>
<tr>
<td></td>
<td>Objective is to outline the current situation and address existing problems</td>
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<tr>
<td></td>
<td>Criticism also aims to influence and change existing practices</td>
</tr>
<tr>
<td>Research strategies</td>
<td>Empirical research</td>
</tr>
<tr>
<td></td>
<td>Perception of phenomena and review of cumulative material</td>
</tr>
<tr>
<td></td>
<td>Strategies of qualitative research</td>
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<tr>
<td></td>
<td>Case study</td>
</tr>
<tr>
<td>Data collection techniques</td>
<td>Multi-method</td>
</tr>
<tr>
<td></td>
<td>Interviews</td>
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<tr>
<td></td>
<td>Questionnaire</td>
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<tr>
<td></td>
<td>Documents such as annual reports and financial statements</td>
</tr>
<tr>
<td>Data analysis</td>
<td>Inductive</td>
</tr>
<tr>
<td></td>
<td>Qualitative (interviews, questionnaire, tertiary data)</td>
</tr>
<tr>
<td></td>
<td>Quantitative (financial statements)</td>
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<tr>
<td>Philosophical position</td>
<td>Realism</td>
</tr>
<tr>
<td></td>
<td>Pragmatism</td>
</tr>
<tr>
<td></td>
<td>Because the objective is practical action and its change</td>
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</table>

**1.4.2 Collecting the data**

This study has utilised interviews, questionnaires, publicly available financial data and other materials. The interviews were semi-structured in nature, covering 12 managers at different levels from diverse waterworks. Two hundred and seventy-eight questionnaires were sent out to waterworks managers and 38 responses were received. The financial data was obtained directly from the waterworks or from public sources.

**Interviews**

The main source of data was semi-structured interviews. Interviewees were selected from among the managers of Finnish waterworks to represent the current state of the waterworks and the water sector as well as possible. Another objective was to get interviewees from the most common ownership and governance
models of waterworks; that is, municipal units, municipally-owned enterprises, municipally-owned companies and cooperatives. This made it possible to compare the differences between these models. Participants took part in a single interview, usually one-on-one, in 2009 or 2010.

A semi-structured interview uses a list of questions (see Appendix 1) as an interview guide (see Bryman & Bell 2003) but the interviewee is given a great deal of leeway to speak freely about the specific topics. This gives the interviewee the opportunity to discuss topics that are of particular interest to them (Bryman & Bell 2003) and it also gives the interviewer room to “probe” answers when, for example, an interesting or complicated issue emerges (Saunders et al. 2009). The interview questions were created with the help of a preliminary analysis framework that was created quite early in the research process. The interview situation was kept informal, which allowed the interviewee to speak freely about other issues as well and gave the interviewer the opportunity to ask additional questions. The professionalism of the interviewees was highly appreciated and it was assumed that they would speak honestly about their experiences of the research topic and share their tacit knowledge with the interviewer. All of the interviews were taped and transcribed and a summary was sent to the interviewee for approval.

The large number of waterworks in Finland meant it would not have been possible to interview all, or even most of the waterworks managers, but the researcher was forced to search for as representative a group as possible. The interviews were conducted one by one until no new major issues emerged. Material thus began to saturate (Yin 1994). Many of the interviewees had years of experience in the field, which meant that, in addition to their own work and work organisation, they could often talk a lot about other ownership, governance and business models; this provided some good material, even though the total number of interviews was quite small. The objective was not to make generalisations from the interviews but to describe the current practices and issues that affect performance.

A total of 12 managers in 13 waterworks were interviewed. These are listed in Table 3 and more details can be found in Appendix 3. In addition, the manager of the Finnish Water and Waste Water Works Association (FIWA) and representatives of the association of Finnish Local and Regional Authorities were interviewed.
Another important source of data was an online questionnaire conducted to gather data from a large sample. This is in line with Saunders et al. (2009), who suggested that even though a questionnaire may be the only data source used, it is usually better to link them with other methods such as in-depth interviews. Because of the qualitative and supportive nature of the questionnaire, it was constructed to include mostly open-ended questions so that the data could be used for descriptive and explanatory purposes. The purpose of the questionnaire was to find out what internal and external factors contribute to waterworks efficiency and how waterworks can be compared with each other.

The questionnaire was sent to approximately 300 managers of FIWA member waterworks; however, because some e-mails did not go through, 278 individuals received the questionnaire. This group was considered to be representative since the member waterworks cover almost 90 percent of the service provision in Finland (measured by the number of customers) and include different governance
models from different parts of the country. Thirty-eight responses were received, which represents a response rate of 13.7 percent.

The sample group corresponds moderately well to the population of waterworks. Only smaller waterworks, which are often organised as cooperatives, were not as well represented as they could have been. The large waterworks with higher volumes had a much higher response rate. The respondents provided a reasonable representation of waterworks of different sizes and governance models, which contributes to the validity of this study. Non-respondents and the population outside the sample group could have added valuable information and new points to this research. Unfortunately, the respondent group was small and the data that was gathered could be mainly used as supportive material to the interviews and not as independent data. It is unlikely that non-respondents would have offered significantly different perspectives had they responded, which indicates that even a relatively small group of respondents can be considered a representative sample. Questionnaire responses support the other data gathered and therefore contribute highly to the analysis and results of this study.

The questionnaire can be found in Appendix 2.

**Financial data**

A financial analysis was conducted in order to achieve a more comprehensive picture of the financial situation of the waterworks. A number of selection criteria were used to reach as diversified and comparable group of data as possible for this study. The first criterion was to find waterworks that represented the most common ownership and governance models (that is, cooperatives, municipal units, MOEs and MOCs) so that their financial performance could be compared. The second criterion concerned the service profile of waterworks. In order to achieve homogeneity, representativeness and applicability of the comparison group, all of the selected waterworks provide all four core water services (water acquisition and treatment, water delivery, sewage collection and sewage treatment). The third criterion and objective was to find waterworks from different sized municipalities from different parts of Finland in order to achieve as diversified a group as possible. The final criterion was that the waterworks needed to have financial documents for at least three years, including profit and loss statements and balance sheets (and, if possible, statements of changes in financial position).
Financial analysis of the companies indicates whether there are differences between the financial performance of different ownership and governance models and how the waterworks area currently coping with investments. The following Table 4 lists the selected 39 waterworks for the financial analysis. The financial information is from at least the three previous financial years (2007–2009). Twelve waterworks have financial information for only three years, while the remaining 27 waterworks have information from at least four years.

Table 4. Reviewed waterworks in financial analysis

<table>
<thead>
<tr>
<th>Waterworks (in alphabetical order)</th>
<th>Waterworks (in alphabetical order)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alajärven kunnan vesihuoltolaitos</td>
<td>Mäntyharjun kunnan vesihuoltolaitos</td>
</tr>
<tr>
<td>Asikkalan kunnan vesihuoltolaitos</td>
<td>Nokian kaupungin vesihuoltolaitos</td>
</tr>
<tr>
<td>Heinolan kaupungin vesihuoltolaitos</td>
<td>Orimattilan Vesi Oy</td>
</tr>
<tr>
<td>Hameenlinnan Seudun Vesi Oy</td>
<td>Oulun Vesi liikelaitos</td>
</tr>
<tr>
<td>Ilomantsin kunnan vesihuoltolaitos</td>
<td>Pieksämäen Vesi</td>
</tr>
<tr>
<td>Imatraan Vesi</td>
<td>Porin Vesi</td>
</tr>
<tr>
<td>Inarin Lapin Vesi Oy</td>
<td>Porvoon Vesi</td>
</tr>
<tr>
<td>Joensuun Vesi –liikelaitos</td>
<td>Pudasjärven Vesiosuuskunta</td>
</tr>
<tr>
<td>Kankaanpään kaupungin vesihuoltolaitos</td>
<td>Raahen Vesi Oy</td>
</tr>
<tr>
<td>Kemijärven kaupungin vesihuoltolaitos</td>
<td>Raison kaupungin vesihuoltolaitos</td>
</tr>
<tr>
<td>Keminmaan Vesi Oy</td>
<td>Seinäjoen Vesi</td>
</tr>
<tr>
<td>Kiteen vesikunta</td>
<td>Sillilänjärven kunnan vesihuoltolaitos</td>
</tr>
<tr>
<td>Kokkolan kaupungin vesihuoltolaitos</td>
<td>Sonkajärven kunnan vesihuoltolaitos</td>
</tr>
<tr>
<td>Kuopion Vesi liikelaitos</td>
<td>Taivalkosken kunnan vesihuoltolaitos</td>
</tr>
<tr>
<td>Kymen Vesi Oy</td>
<td>Tampereen Vesi</td>
</tr>
<tr>
<td>Lahti Aqua Oy</td>
<td>Tohmajärven kunnan vesihuoltolaitos</td>
</tr>
<tr>
<td>Lieksan Vesi</td>
<td>Uudenkaupungin Vesi</td>
</tr>
<tr>
<td>Liikelaitos Haukiputaan Vesi</td>
<td>Valtakosken kaupungin vesihuoltolaitos</td>
</tr>
<tr>
<td>Liikelaitos KRS-Vesi</td>
<td>Vihannin Vesi Oy</td>
</tr>
<tr>
<td>Liikelaitos</td>
<td>Vihannin Vesi Oy</td>
</tr>
<tr>
<td>Liperin kunnan vesihuoltolaitos</td>
<td></td>
</tr>
</tbody>
</table>

Other material

In addition to interviews and questionnaires, a lot of supportive material was used. The data gathered from the interviews was complemented with freely accessible and closed documents received from the interviewees. These documents included annual reports, financial statements, results of customer satisfaction surveys and benchmarking results. The statistical system for Finnish waterworks (VELVET)
was used as a main source of structural information on the Finnish water sector. The main information was a list of waterworks and their location, governance model, year of establishment and the amount of water and sewage they treated and transferred. However, because of certain apparent deficiencies (such as a lack of up-to-date information), the system could not be used for the full benefit of the study. Secondary data was used as complementary data, often providing more detailed and precise information about the research topic, which deepened the data gathered from interviews and questionnaires.

1.4.3 Analysing the data

The data analysis process was iterative; the data was looked through several times with different set of categories in order to minimise the amount of data that was overlooked. Firstly, each interviewed waterworks was depicted and reported by using a pre-set format, which was based on the interview questions, so that the similarities and differences of different waterworks could be identified more easily. These individual descriptions were then classified into groups by ownership and governance model for easier processing of the material and observation. Classification made it easier to identify the differences between and characteristics of different ownership and governance models. In addition, the author conducted a SWOT analysis to identify the strengths, weaknesses, opportunities and threats of each ownership and governance model and the water sector in general. The SWOT analyses were reviewed with infrastructure sector professionals. These professionals included experts who worked for a national project that developed public services in Finland.

The questionnaire, which was created to complement the data from interviews, mainly included open-ended questions to enable qualitative data analysis. The objective was to determine what the term “efficiency” means in a waterworks context, as well as the internal and external factors that affect it. Firstly, the data was classified into three categories: definition of efficiency, external factors affecting efficiency and internal factors affecting efficiency. The data in each category was then divided into subcategories representing the main contributing factors and, if possible, their underlying causes. In addition, the incidence of each factor in the data was recognised so that their importance could be determined.
Next, the data from interviews and the questionnaire were pooled so that the characteristics of water and sewage services business model could be described. Again, the data was categorised, this time into nine categories defined by the business model literature. The objective was not to describe the business models of each interviewed waterworks but to use all available data to describe the issues that influence and create waterworks’ business model. Interviewed waterworks and questionnaire responses were used as examples to describe the differences between waterworks’ business models.

Categorising and grouping the data helped identify regularities and important themes that recurred in the data, from which the final conclusions could be drawn. The further the data analysis went, the more assurance it provided that this kind of analysis frameworks is valid and can be used in the particular research environment.

Finally, a quantitative analysis was conducted of selected waterworks’ financial statements (the waterworks are listed in Table 4 and Appendix 4). A traditional analysis of the financial statements was conducted in order to understand the financial performance of a business entity. The financial analysis followed the standards of financial information analysis developed to study listed companies in a stock exchange (Committee for Corporate Analysis 2006). Because not all the financial performance measurement tools are applicable to non-listed entities, such as all the studied waterworks, the Association of Finnish Local and Regional Authorities was consulted for additional tools. The analyses used publicly available financial information (that is, profit and loss statements and balance sheets) as the core data from which all the ratios are calculated. The key ratios included cash flow statement (free cash flow) and key profitability ratios (return on investment (ROI), return on assets (ROA) and return on equity (ROE)).

1.5 Outline of the thesis

This dissertation consists of four parts. Chapter 1 presents the background of the thesis and provides a short description of the research environment. It also defines the research objectives, scope and research process. Chapter 2 presents the theoretical foundation for the research and ends with an analysis framework that is used to analyse the data and present the results. Chapter 3 describes the empirical data and its analysis and formulates potential avenues for development based on the analysed data. Chapter 4 concludes by presenting the research
contribution, as well as theoretical and managerial implications. The validity and reliability of the research is discussed and directions for future research are defined.
2 Theoretical foundation

The objective of this research is to study what internal and external factors affect waterworks performance. Fig. 3 illustrates the theoretical framework used in the study.

In order to understand the factors that affect waterworks performance and how they do so, it is necessary to first understand the background and characteristics of public service provision, particularly water and sewage services. For example, there has been debate as to whether public or private ownership of waterworks is more efficient. This is why this study has included the examination of waterworks ownership and governance models as major topics. The objective is to understand how the owner and the governance model can affect waterworks performance.

In order to understand water and sewage service provision more thoroughly, it is also necessary to understand how business is conducted and the reasons for the success or failure of a business operation. Therefore, another issue that is taken into consideration is business models. Examining the offering, value creation system and revenue logic makes it easier to understand what kind of
value is created to whom, how this value is created and how money is earned. This helps reveal the value creation logic of a company and at least some of the problems related to it.

There has been quite a lot of previous research on, for example, public service provision and waterworks efficiency, but it has been very specific and quite limited. The objective of the present study is to look more generally at waterworks performance and matters that influence it. This study has adopted more of a top-down perspective in order to understand if and how top level structures and decisions affect the performance of waterworks.

Although the study could have investigated performance more thoroughly, doing so would have detracted from the examination of governance and business models. Consequently, performance is linked to the research topic, governance and business models, in order to note the development potential that exists in the Finnish water sector.

2.1 Waterworks as a public service

Public services

Infrastructure networks such as electricity, heating, water, sewage, telecommunications and transport networks have traditionally been owned and operated by the public sector. Current economic theories and market situation, however, argue that many public utilities and services could be delivered more efficiently when the private sector is involved or when they are fully privatised. The private sector is said to bring stronger managerial capacity, access to newer technologies, specialised skills and more flexible and rapid response to changes in world markets (Rondinelli 2003). On the other hand, public ownership is argued as justified in the following cases (Perotti 2004, Shleifer 1998, Välilä 2005):

- In the presence of market failures
- If there is evidence of either a public or private commitment problem
- When it is costly to renegotiate procedures with private parties
- When explicit regulation is difficult to implement because of non-verifiable contingencies
- When there is a significant chance that cost reductions would have a detrimental, non-contractible impact on the quality of the service
When technical innovations are unimportant or when government employees have strong incentives to innovate.

The rise of public ownership started at the beginning of the 20th century (Perotti 2004). Economics supported government ownership whenever any market inequities or imperfections such as monopoly power or externalities appeared (Shleifer 1998). The general belief was that the government could protect companies from market powers and secure the service provision of socially important commodities after World War II (Perotti 2004, Taylor 2006). These ideas lasted until the 1970s, when it was realised that public ownership, political control and the absence of competition weakened effective management, innovation and operational efficiency (Taylor 2006). The main problems were the lack of dynamism (Jamali 2004) and the fact that economic, financial and social objectives usually superseded commercial objectives, which caused inefficiency, high production costs and lack of appropriate incentives and performance monitoring (Hemming & Mansoor 1988).

These ideas led to the introduction of emerging economic theories suggesting that reform and restructuring of the public sector would make it possible to enhance operational and financial efficiency and the quality of infrastructure services. The general economic standpoint emphasised the introduction of competition and supported the inclusion of the private sector to the provision of infrastructure services and revision and renewal of regulatory frameworks (Taylor 2006). There was a realisation that technological renewal and capital investments could only be reached through compromises between politically determined objectives of the public sector and the investment priorities of the private sector (Martin 1993). Worldwide infrastructure reform started in the late 1970s when industries began adopting the tools of reform: regulatory separation, depoliticisation, liberalisation, deregulation, decentralisation, outsourcing and privatisation (Cheema & Rondinelli 2007, Kopsakangas-Savolainen 2002, Rondinelli 1990, Windischhofer 2007).

The wave of privatisation started in the 1980s with the British government taking the lead under Margaret Thatcher (Bishop & Kay 1989). Privatisation spread rapidly around the world, with previously nationalised infrastructure networks being transferred to private ownership in many countries. However, privatisation confronted several obstacles during and after the process, including price increases, deteriorating quality and self-serving management. In addition, there was a gradual realisation that privatisation does not always lead to lower
costs, better quality or more efficient production (Willner 1994) because of the private sector’s “unbeneficial” objectives to strive for cost minimisation and other goals that are inappropriate from a public viewpoint.

In Finland, public sentiment has long favoured public service provision over private- or third-sector provision in statutory basic services such as education and healthcare (Hallipelto et al. 1992, Jonninen 1994). However, attitudes towards privatisation have not been completely static. Faith in the cost effectiveness of the private sector increased from the 1980 to the 1990s, but from the mid-1990s to 2004 privatization was responded more negatively (see e.g. Haikonen & Kiljunen 2003, Kallio 2007). The results of Kallio’s (2007) research indicate that the attitudes towards private producers have become negative in the 2000s as their use in municipal service provision has increased.

Emerging economic theories and financing instruments suggest that methods such as public private partnerships (PPPs) might be more beneficial in the provision of public services than pure privatisation or public provision. PPPs started to gain ground in the 1990s when the difficulties confronted in the privatisation process became clearer and it became understood that purely public provision is not efficient either. A PPP is a relationship between public and private actors in which both parties work towards a common goal with clearly assigned responsibilities and competence areas (Jamali 2004). The partial inclusion of the private sector in various projects and in the provision of public services makes it possible to take advantage of the strengths of both the public and the private sectors. A realisation emerged that including the private sector in the provision of technical networks could significantly improve the management and operation of the services and private capital could be accessed, while the public sector still had the power to assure the provision of socially important commodities (European Commission 2003, Jamali 2004).

Performance of public service providers

The performance of public service providers can be judged by different stakeholders (including consumers, employees and politicians) who use different criteria to evaluate the standard of public services (Heffron 1989, Rainey 2009). Consequently, there is no fixed or universally applicable set of criteria with which to evaluate the performance of public services.
The body of literature has created different sets of criteria for the conceptualisation and measurement of public organisation performance. One framework has described organisational performance in three dimensions: economy, efficiency and effectiveness (the three Es). “Economy” is often defined as the level of spending on a service or the cost of procuring services (Boyne 2002). This is controversial, however, since the economy of public services is fundamentally a political issue and it is not apparent that, for example, wage reduction of local government employees is ‘good performance’. The term “efficiency” can be defined at least in two ways: technical efficiency refers to the cost per unit of output, while allocative efficiency refers to the responsiveness of service to public preferences (Leibenstein 1966). “Effectiveness” most commonly refers to the ability to produce an effect or *get the right things done* (Drucker 1982).

A literature review by Boyne (2002, 2003) identified several dimensions of public service performance, including the following:

- Quantity of outputs
- Quality of outputs
- Efficiency (ratio of outputs to financial inputs)
- Equity (fairness of the distribution of service costs and benefits)
- Outcomes
- Value for money
- Consumer satisfaction.

Boyne (2003) also identified five variables that are believed to influence performance: resources, regulation, market structure, organisation, management. The major practical lesson from this review was the emergence of resources and management as the most consistent influences on performance. The statistical results for the other three variables are contradictory and Boyne (2003) argued that changes in these variables are “largely a shot in the dark”.

**Water and sewage services**

Many Western nations developed water and sewage services through private operators in the mid-1800s. However, these were soon overtaken by municipalities due to the inefficiency, costs and corruption connected to the private systems. Therefore, the development of water and sewage service provision and production has historically been a local issue in which local
governments have played an important role (Jacobson & Tarr 1995, Juuti et al. 2007).

In 19th century Britain, the water and sewage systems were constructed and provided by private operators but were gradually transferred to local governments. For most of the 20th century, until 1974, water and sewage services were developed by local authorities with heavy central government subsidies. In 1974, Parliament removed the responsibility for the provision of water and sewage services from local authorities to 10 Regional Water Authorities. In 1979, Prime Minister Thatcher’s regime started the privatisation programme, which led to the privatisation of water and sewage services and the assets needed for that purpose, plus the establishment of three politically independent, non-elected regulators who monitored the activities of the service providers. (Summerton 1998)

In France, legislation requires that only the organisation and implementation of sewage collection and treatment is the responsibility of municipalities. In practice, however, the municipalities also bear the responsibility for water acquisition and delivery. The large number of small municipalities (36569 municipalities in 2008 with a median population of 380 inhabitants) has forced municipalities to join forces or use private service provision (Morange 1993). Local authorities have historically built close relationships with private companies, which is why private operators have survived and expanded more in France than in other countries (Juuti et al. 2007). Six different public-private partnerships are used in the French water sector: concession, leasing, three types of service contracts, and a company owned by municipality and private company together. There are also several federations of municipalities that organise the services but usually leave the actual provision for private companies (Morange 1993). Water resource management is divided into six areas that operate under the direction of regional quasi-political agencies. They are responsible for water quality and have the power to determine user charges and polluter taxes. (Prud’homme 1995)

In Sweden, water and sewage services have traditionally been the responsibility of the local government or municipality. Municipal technical service units are usually responsible for service provision throughout the municipality (Eriksson 1994, Juhola 1995). At the turn of the millennium, the Swedish Water & Wastewater Association (SWWA 2000) reported that 252 of the 290 municipalities are organised as a unit within the municipality, while the other 39 ran the services as a municipally-owned company. In addition, eight utilities
were organised in inter-municipal companies and seven had management contracts with a non-governmental company. At the regional level, local water and sewage services are examined, supervised and co-ordinated by the Country Administration. At the central administrative level are the government, various ministries and the Parliament. (SWWA 2000)

In Finland, water supply and sewage treatment has been run by municipalities since the late 1800s (Katko 1997, Pietilä 2006). The first urban water supply system was built in 1876 and sewage treatment plants started in 1910. Municipally provided water and sewage services spread most rapidly after the enactment of the first Water Act in 1961. Public water and sewage systems were introduced in urban areas first, and later in smaller ones (Katko 1997). Unlike many other countries, privately organised water and sewage services (which are mostly organised as cooperatives) have been very important, especially in rural areas. Cooperatives have traditionally handled water supply systems, while sewage is treated with on-site systems, although cooperatives providing both services have also been established. Each municipality typically has its own waterworks. In addition, one or more cooperatives and, for example, a regional sewage treatment plant, may reside within the same municipality. (Pietilä 2006)

Efficiency of water and sewage services

The efficiency of waterworks has been the subject of studies around the world for several decades (Coelli & Walding 2006, García-Sánchez 2006, Thanassoulis 2002) and there is growing interest in the subject in Finland. In the case of water and sewage services, however, it is quite difficult to measure efficiency. The objective of waterworks is not to deliver as much water as possible, but to connect as many households as possible with efficient cost and quality. The general problems in measuring efficiency of water and sewage services concerns data quality issues such as differences in the valuation methods of capital, price deflators, the influence of public funding and outsourcing of various activities (Coelli & Walding 2006). The water sector is also characterised by a high degree of complexity, which requires a large number of observations, while data availability is most often very restricted (Cunha Marques & Garzon Contreras 2007).

The efficiency of a waterworks is difficult to define and consists of various “dimensions”. There are important issues to consider when evaluating all kinds of productive activities, and research on the subject has produced a variety of
evaluation techniques (Abbott & Cohen 2009, Coelli et al. 2005, Corton & Berg 2009, Irastorza 2003). According to Abbot and Cohen (2009), estimating cost functions, through various techniques, has been the most commonly used method of determining the levels of efficiency in the water industry. The most frequently used variables in efficiency measurement include items such as the length of pipelines, volume of water delivered and sewage treated, the number of customers, labour costs, operating expenditure and capital expenditure (Abbott & Cohen 2009).

According to Al-Madfaei (2009), most government-operated waterworks are characterised by inefficiency and ineffectiveness. According to Al-Madfaei’s (2009) summary of PRINWASS research programmes case study reports, the reasons for poor performance reside in the weaknesses of the institutional framework or the poor operation and maintenance and the lack of monitoring, which allows illegal connections and thefts, as well as in ineffective pricing. According to the case study reports, this will lead to “poor service delivery, low revenues, poor operation and maintenance, high unaccounted-for water, low capital investments, low accountability of water undertakers, inadequate incentive system resulting from absence of transparency in financial management, overstaffing and wrong deployment of staff, and unsustainable operations and lack of regulation and enforcement” (Al-Madfaei 2009).

2.2 Governance

The word governance (from the Greek verb κυβερνάω [kybernao]), was first used by Plato to metaphorically describe the act of governing men. This led to the Latin verb gubernare, derivatives of which have been adopted in several languages. The English word governance means “the art or manner to govern”.¹

The literature has given the word governance several distinct meanings. Previously, governance was mainly understood as what governments do at the state level and was used almost synonymously with ‘government’ (Kjær 2004, Weiss 2000). This line of thought is evident in the World Bank’s (1992) definition of governance from 1989: “the manner in which power is exercised in the management of a country’s economic and social resources for development”. It is also manifested in the United Nations Development Programme’s (1995)

¹ For the etymology of the word “governance” in different languages, see http://ec.europa.eu/governance/docs/doc5_fr.pdf.
definition of governance: “exercise of political power to manage a nation's affairs”.

Throughout the years, researchers have also identified other levels and meanings of governance. At one end of the scale is global governance that focuses on the dynamics of the international system and world politics (Dingwerth & Pattberg 2006, Finkelstein 1995, Hewson & Sinclair 1999, Rosenau 1995, Rosenau 1999). At the other end of the scale, corporate governance concerns the relationships between a company’s management and its shareholders and other stakeholders (Becht et al. 2002, Fama & Jensen 1983, Rhodes 1996, Shleifer & Vishny 1997). Agere (2000) identified seven important perspectives regarding governance structures:

- The relationship between governments and markets
- The relationship between governments and citizens
- The relationship between governments and the private or voluntary sector
- The relationship between elected officials and appointed officials
- The relationship between local institutions and urban and rural dwellers
- The relationship between legislature and executive branches
- The relationship between nation states and institutions.

Therefore, governance can be understood at international, national, local and corporate levels, which also partly explains the wide array of governance definitions. This study examines governance at three different levels. Chapter 2.2.1 discusses governance at the national level, concerning key laws and policies guiding public service provision. Chapter 2.2.2 uses the term governance at the local and corporate level as the relationships between local governments, markets and citizens. According to the World Bank (2007) definition, governance is the “manner in which public officials and institutions acquire and exercise the authority to shape public policy and provide public goods and services”.

2.2.1 Public governance

Public governance refers to how governments and other social organisations interact, make decisions, decide who to involve in the process, and how to render an account (Graham et al. 2003). Public governance is interaction between governments and citizens by various means in order to provide citizens with the opportunity to achieve satisfaction and material prosperity (Rotberg 2004). According to UNDESA (2007), however, governance is not just about interaction
between the rules and the citizens, but also about the manner in which public functions are carried out, public resources are managed and public regulatory powers are exercised. “[P]ublic governance ... relates to the process by which a society organizes its affairs and manages itself” (UNDESA 2007).

Public governance refers to the traditions and institutions through which authority is exercised for the common good. It is the process by which those authorities are selected, monitored and replaced; the ability of the government to manage its resources and implement policies; and the respect of institutions that govern economic and social interaction (UNDESA 2007, World Bank 2010). Rotberg (2004) compared public governance to the management, supply and delivery of political goods to the citizens. These political goods include security, rule of law, medical and health care, schools and education, fiscal and institutional context, communication networks and support for civil society (Besançon 2003). The role of government in this arrangement should be to provide a stable political and economic environment so that fiscal responsibility can be promoted, barriers of competition can be removed and legal framework for property rights and transparency of the law and policies can be ensured (UNDESA 2007). While companies seek profits or to maximize shareholders’ wealth, government agencies have multiple objectives that they must weigh against one another. The balance of these objectives also changes because the political processes change the rules of the games and because political parties with different ideological agendas alternate in power. (Fratianni & Pattison 2007)

It is noteworthy that in Finland, the local level has a significant role, as opposed to many other countries where public governance is run at the national level in a centralised manner (see e.g. Pietilä 2006).

Defining the principles of good governance is difficult and controversial (Graham et al. 2003). Several commissions and the like have formulated sets of principles that vary slightly but usually contain the same basic idea. The present study has used the principles as worded by UNDP (United Nations Development Programme) because there is strong evidence of their universal recognition. Table 5 presents five good governance principles and the related UNDP (1995) texts, as summarised by Graham (2003).
Table 5. The five good governance principles.

<table>
<thead>
<tr>
<th>Principle</th>
<th>Explanation</th>
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<tr>
<td>Legitimacy and Voice</td>
<td>“Participation – all men and women should have a voice in decision-making, either directly or through legitimate intermediate institutions that represent their intention. Such broad participation is built on freedom of association and speech, as well as capacities to participate constructively. Consensus orientation – good governance mediates differing interests to reach a broad consensus on what is in the best interest of the group and, where possible, on policies and procedures.”</td>
</tr>
<tr>
<td>Direction</td>
<td>“Strategic vision – leaders and the public have a broad and long-term perspective on good governance and human development, along with a sense of what is needed for such development. There is also an understanding of the historical, cultural and social complexities in which that perspective is grounded.”</td>
</tr>
<tr>
<td>Performance</td>
<td>“Responsiveness – institutions and processes try to serve all stakeholders. Effectiveness and efficiency – processes and institutions produce results that meet needs while making the best use of resources.”</td>
</tr>
<tr>
<td>Accountability</td>
<td>“Accountability – decision-makers in government, the private sector and civil society organisations are accountable to the public, as well as to institutional stakeholders. This accountability differs depending on the organizations and whether the decision is internal or external. Transparency – transparency is built on the free flow of information. Processes, institutions and information are directly accessible to those concerned with them, and enough information is provided to understand and monitor them.”</td>
</tr>
<tr>
<td>Fairness</td>
<td>“Equity – all men and women have opportunities to improve or maintain their wellbeing. Rule of Law – legal frameworks should be fair and enforced impartially, particularly the laws on human rights.”</td>
</tr>
</tbody>
</table>

When societies build the government institutions for the 21st century, it is important to implement policies and initiatives that promote transparency and accountability in public administration and foster an environment of trust in the private sector. As the United Nations Department of Economic and Social Affairs states in its report, “Good public governance also underpins good corporate governance.” (UNDESA 2007)

### 2.2.2 Corporate governance

The need for corporate governance emerges when the ownership and governance of companies is separated (Berle & Means 1932, Fama & Jensen 1983, Shleifer & Vishny 1997). This is the case when ownership is divided between many parties
or when the shareholders or owners do not run the company but instead have a separate management team take care of the daily activities of the company (Olsson 1999, Ooghe & De Langhe 2002).

According to the Organization for Economic Cooperation and Development (OECD): “Corporate governance is the system by which companies are directed and controlled, in the interest of shareholders and other stakeholders, to sustain and enhance value”. Therefore, it is the array of external and internal control mechanisms that motivate corporate executives to make decisions that are expected to enhance a firm’s value and/or the wealth of its major stakeholders (Watson 2005). According to Shleifer and Vishny (1997), it is also a question of the use of property rights for the benefit of all shareholders; in other words, how investors assure themselves of return on their investments.

According to Olsson (1999), the question of property rights (that is, ownership) can be divided into three functional types. The first is the right to exercise control over the property and determine how the property is used. The second is the right to benefit from the asset through its usage or lease. The third is the right/obligation to bear the consequences if the net value of the property changes. Alchian and Demsetz (1973) and Alchian (1993) added that property rights also include the right to sell, give up or exchange the property and exclude others from using it.

The transferability of property rights makes it possible to separate and dynamically specialise ownership and control (Olsson 1999); however, it also introduces certain problems, such as the agency problem. Agency theory considers the question of what kind of mechanism enables an agent (management) to act in congruence with the principal’s (owner’s) objectives under conditions of asymmetric information and diverging interests (Alchian & Demsetz 1973).

Therefore, it is the agency problem and the separation of ownership and control that leads to the question of corporate governance. Corporate governance demands that institutions and mechanisms are identified and established that can reduce the costs arising from the separation of ownership and control (Olsson 1999). Governance is about information sharing between owners and managers so that the owner can trust management to make decisions that are reasonable from the owner’s viewpoint and maximise profit. The following principles of good corporate governance (Table 6), as defined by the OECD (2004), focus on governance problems that arise from the separation of ownership and control.
Table 6. Principles of good corporate governance.

<table>
<thead>
<tr>
<th>Principle</th>
<th>Statement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ensuring the basis for an effective corporate governance framework</td>
<td>“The corporate governance framework should promote transparent and efficient markets, be consistent with the rule of law and clearly articulate the division of responsibilities among different supervisory, regulatory and enforcement authorities.”</td>
</tr>
<tr>
<td>The rights of shareholders and key ownership functions</td>
<td>“The corporate governance framework should protect and facilitate the exercise of shareholders’ rights.”</td>
</tr>
<tr>
<td>The equitable treatment of shareholders</td>
<td>“The corporate governance framework should ensure the equitable treatment of all shareholders, including minority and foreign shareholders. All shareholders should have the opportunity to obtain effective redress for violation of their rights.”</td>
</tr>
<tr>
<td>The role of stakeholders in corporate governance</td>
<td>“The corporate governance framework should recognise the rights of stakeholders established by law or through mutual agreements and encourage active co-operation between corporations and stakeholders in creating wealth, jobs, and the sustainability of financially sound enterprises.”</td>
</tr>
<tr>
<td>Disclosure and transparency</td>
<td>“The corporate governance framework should ensure that timely and accurate disclosure is made on all material matters regarding the corporation, including the financial situation, performance, ownership, and governance of the company.”</td>
</tr>
</tbody>
</table>

There are few methods by which a principal (owner) can affect an agent so that the agent works to the benefit of the owner. In a situation where property rights are traded, these methods are called “voice” and “exit”. If the owner wants to exert his or her influence through “exit”, he or she can sell shares of the underperforming firm, which may then lead to a decline in membership and a decrease in revenue. This makes it more difficult and costly for the firm to raise capital and the firm’s low price opens it up for a potential hostile takeover and replacement of the management. An owner who exerts his or her influence through “voice” can take active part in management and, in the case of mal-performance, may lead the company to an owner-initiated change of management. In both of these cases, the management is engaged in a search for the ways and means to correct whatever caused the customers’ and members’ dissatisfaction. Other mechanisms include effective disclosure requirements, competition in product and managerial labour market and influence through capital market. (Olsson 1999)

Two distinct corporate governance systems can be identified from the literature: the Anglo-American system (also called the shareholder or “outsider”
system) and the Continental European system (also called the stakeholder or “insider” system) (Becht & Röell 1999, Brean & Kobrak 2007, Franks & Mayer 2001, Ooghe & De Langhe 2002). The main differences between these two systems are in the shareholder concentration and identity, liquidity of the stock market, and interlocking ownership (Ooghe & De Langhe 2002). The Anglo-American system is typically associated with many shareholders holding relatively small percentage of the company, with the board representing and defending the shareholders’ collective interests (Brean & Kobrak 2007, Ooghe & De Langhe 2002). The Continental European system typically has concentrated ownership and control and stakeholders are active participants in the company and its corporate affairs (Brean & Kobrak 2007, Franks & Mayer 2001). Table 7 shows these and some other differences.

**Table 7. Differences between Anglo-American and Continental European corporate governance systems.**

<table>
<thead>
<tr>
<th>Shareholder concentration</th>
<th>Anglo-American system</th>
<th>Continental European system</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low concentration of shareholders, which infers that there is only a small group of managers who can make decisions and exert power. This might lead to over-investment and lower profitability to shareholders.</td>
<td>Small number of shareholders who hold a large proportion of the firm’s shares; thus, the control is dispersed to a large number of anonymous investors with a variety of interests.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Where Ownership</th>
<th>Anglo-American system</th>
<th>Continental European system</th>
</tr>
</thead>
<tbody>
<tr>
<td>For example, the US and the UK</td>
<td>For example, Germany, France, Italy</td>
<td></td>
</tr>
<tr>
<td>Shares are in the hands of the agents of financial institutions (over 50 percent) rather than private individuals.</td>
<td>Shares are mostly held by private companies (20–40 percent), financial institutions and private individuals.</td>
<td></td>
</tr>
<tr>
<td>Dispersed ownership.</td>
<td>Concentrated share ownership.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Board structure</th>
<th>Anglo-American system</th>
<th>Continental European system</th>
</tr>
</thead>
<tbody>
<tr>
<td>One-tier board</td>
<td>Two-tier board</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Discipline mechanisms</th>
<th>Anglo-American system</th>
<th>Continental European system</th>
</tr>
</thead>
<tbody>
<tr>
<td>External discipline mechanisms, such as take-over market and competition, which are introduced from outside the company.</td>
<td>Internal discipline mechanisms, such as board of directors or compensation contracts are introduced from within the firm.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Time horizon</th>
<th>Anglo-American system</th>
<th>Continental European system</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short-term orientation</td>
<td>Long-term orientation</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Main potential conflicts of interest</th>
<th>Anglo-American system</th>
<th>Continental European system</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between managers and dispersed shareholders</td>
<td>Between controlling shareholder and powerless minority shareholders</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Agency costs</th>
<th>Anglo-American system</th>
<th>Continental European system</th>
</tr>
</thead>
<tbody>
<tr>
<td>Free-rider problem. Not economically attractive to invest in control for each investor.</td>
<td>Larger equity interest and other economic ties make investment in control more economically feasible.</td>
<td></td>
</tr>
</tbody>
</table>
The ownership and corporate governance models are strongly interrelated. The differences in corporate governance models are related to how ownership and control is organised (Franks & Mayer 2001, Ooghe & De Langhe 2002) and changes in ownership structure also change the corporate governance (Robbie & Wright 1995). The ownership structure, and therefore the corporate governance, can and should vary according to the efficiency of fiscal structures, the evolving financial structure of the government budget, and changes in interest rates (Rosa 1993). On the other hand, the ownership structure is also expected to correlate to the strength of the firm’s internal mechanism of corporate governance (von Nandelstadh & Rosenberg 2003). According to Franks and Mayer (2001), concentrated ownership should also involve more active corporate governance than in the case of dispersed ownership. However, a study by La Porta et al. (1999) revealed that ownership concentration is in fact often associated with weak rather than strong corporate governance, which is when more active corporate governance should be introduced.

### 2.2.3 Governance models

Ownership and governance models are closely linked to each other. Currently, the four company forms in the private sector in Finland are trade name, partnership and limited partnership, limited-liability company and cooperative. The governance models in the Finnish public sector are municipal unit, municipally-owned enterprise (MOE), municipally-owned company (MOC) and federation of municipalities (FoM).

When considering what kind of public ownership model to pursue, at least the following three factors should be considered (Sarin 1998):

1. **The nature of the service**: Is the commodity/service socially important? How important is it for the government to guarantee the provision of the service? What are the social objectives of the service?
2. **Quality of service**: What is the best way to guarantee the quality of the service for customers? Should the provision of collective undivided service be turned over to a municipally-owned enterprise or municipally-owned company?
3. **Competition**: Can the market be opened for competition? Is it possible to introduce competition, in the case of natural monopoly, for example?
The owners can choose the governance model according to their own needs and on the basis of the business concept. The following subchapters describe the most common ownership and governance models used in the Finnish water sector.

**Municipal unit**

As a municipal unit, a waterworks is an integral part of a municipal organisation. *Gross budget unit* is the closest and most integrated part of the municipal organisation. It works under income transfers received from government or municipalities, it cannot collect payments to finance its operation and usually cannot adjust its expenses to achieve profitability. (Kähkönen 1996) This is often the case in municipal technical services, for example. However, waterworks and energy companies, for example, collect payments that, according to the law, must be calculated separately from the municipality. This can be done through a calculatorily separate unit, net budget unit or municipal owned enterprise (described in the following chapter).

* A net budget unit has more financial power than a gross budget unit and usually has self-profitability as its starting point. A net budget unit needs a defined income source, normally from user fees; it might also receive income transfers from the municipality in order to function under the principle of full cost recovery. A net budget unit budgets the difference of revenues and expenses to the revenue side of the municipal budget if revenues are larger and to the expense side if expenses are larger. Instead of only having activities related to public law, a net budget unit might also have some commercial activities. In such a case, the unit’s activities are usually limited to at least some partially restricted customer groups. A net budget unit cannot take loans and it cannot lend to others. (Heikkinen et al. 1996, Kähkönen 1996) The municipality carries all the risk.

* A calculatorily separate unit occurs when the unit is separated from the municipality by calculatory methods without creating an independent accounting unit, such as a net budget unit. There is currently no special provision or guideline for this kind of separation, but in most cases it is achieved by making simple financial and balance sheet calculations for the separated operation. (Myllyntaus 2001)

Municipal units are part of the municipal budget and investment programme. Consequently, waterworks often compete with other municipal units, such as healthcare and education, for municipal financial resources. The unit operates
directly under the municipal council and municipal government. There may also be a committee or executive board that is appointed by the municipal government and named by the municipal council. The municipal unit is headed by a chief (executive) officer, who is responsible for all activities. The unit’s decisions are made public and parties involved have the right to appeal, which can delay decisions, such as the start of a construction project. Municipal units usually have to conform to the Act on Public Contracts (348/2007), which sets stricter limits for competition and negotiation procedures than the Special Act (349/2007) enacted for water, energy, transport and postal services (which is used in these special cases).

**Municipally-owned enterprise (MOE)**

A municipally-owned enterprise (MOE) is a business unit that the municipal council has awarded (financial) independence. A MOE has the power to decide on everything that is not excluded by regulations, which means it can autonomously design and operate its business operations and investments. MOEs have both business and social objectives and obligations, which are usually set by the municipal council. Although MOEs are fully owned by the municipality, their budget is separated from the municipality’s budget and they have their own financial statements, including profit and loss statements, balance sheet, and funds statements. MOEs’ operations are mainly financed by payments from customers and, in the long term, the MOE is expected to cover all expenses (operating and investment costs) with income financing. Public ownership ensures that the municipality can reap the benefits of operations, while retaining democratic control over its operations. (Heikkinen *et al.* 1996, Jalkanen *et al.* 1996, Kählönen 1996, Myllyntaus 2001)

Because the MOE is part of the municipality, it cannot go bankrupt and it is not tax liable when operating within the municipality’s territory (Heikkinen *et al.* 1996). The municipality becomes liable for taxes on profits (6.1828 percent) if the operations are carried out outside the municipality’s territory. A MOE is also exempted from stamp duty on property transfers and from a property tax if its properties are situated within the municipality. A MOE cannot establish subsidiary companies.

Operation of a MOE is regulated by the *Municipality Act (365/1995)* and the ordinance established by the municipal council. A MOE always has a chief executive officer (CEO), who reports to the executive board. The executive board
is appointed by the municipal government and named by the municipal council. The decisions made by MOE are public and parties involved have the right of appeal. Procurements are usually made in compliance with the *Act on Public Contracts (348/2007)*; the *Special Act (349/2007)*, mentioned above, is sometimes followed.

Within a municipality, a MOE is considered a good alternative to a municipally-owned company (Heikkinen *et al.* 1996, Myllyntaus 2001), while state-owned enterprises are usually the first step towards incorporation. According to Kähkönen (1996), public ownership should be transferred from a municipal unit to a MOE or MOC if external turnover covers all of the costs. Jalkanen *et al.* (1996) added that the enterprise or company should also make a profit and be able to provide the municipality with a reasonable return on capital. Kähkönen (1996) considered the main benefits of MOE to be financial effectiveness, improved cost awareness and better competitiveness; flexible decision-making (free investment and personnel policy); financial independence; and improved customer service.

**Municipally-owned company (MOC)**

A municipally-owned company (MOC) is owned and controlled by one or several municipalities. A MOC operates under *Limited-liability Companies Act (624/2006)* and articles of association/by-laws. It operates as a commercial business, does not have societal obligations (unlike municipal units and MOEs) and receives no government or municipal financial support (Kähkönen 1996). MOCs can also be expected to make a profit and to provide a reasonable return on capital to the municipality (Jalkanen *et al.* 1996).

A MOC has its own budget, investment programme and financial statement. A MOC is subject to taxation on profits at a rate of 26 percent. It is also liable to pay property tax. MOCs can make independent investment decisions, freely acquire financing from the financial markets, and the municipality can support the operation with share capital financing in exchange for a dividend yield (Heikkinen *et al.* 1996).

In a MOC, the general meeting is the highest decision-making body. The company can also have a supervisory board, nominated by the general meeting, which supervises the board of directors and the chief executive officer (CEO) on behalf of the owners. However, this three-tier structure is rare; usually there is only the board of directors, which works together with the CEO. The board of
directors consists of representatives of the owner(s) who are usually also members of the municipal council. The CEO of the company is named by the board of directors, to which the CEO is also answerable. Members of the board of directors and accountants are nominated by the general meeting. The municipality can exercise its power by having all of the votes in the general meeting and having its representatives on the board of directors. Decisions made by the MOC are not public and there is no public right of appeal. The employees of a MOC are in a different position than those of the two previously mentioned models because they are not civil servants; this means they do not have to follow the public sector collective bargaining agreements.

Choosing a MOC rather than a municipal unit or MOE has certain benefits. Donovan (2006) emphasised the easier access to financing, increased productivity, esprit de corps and clearer responsibility for results. Jalkanen et al. (1996) noted that MOCs have faster and more target-oriented decision making, that the number and selection of employees is set according to current needs, and that the pay policy and the system leads to lower costs and a more cost-effective way of working. The MOC is the only model with relative freedom to make decisions towards product markets, factors of production and financial markets (Heikkinen et al. 1996). In municipal units and MOEs, the decision-making is somewhat restricted. According to Donovan (2006), there is a risk that the government (or local council in this case) may be tempted to take the company’s profits to fund other sectors, leaving insufficient funds for the company to maintain and expand its system.

Federation of municipalities (FoM)

Waterworks organised as a federation of municipalities (FoM) resemble a MOE with MOC features. The main difference is that a FoM is owned by two or more municipalities. A FoM is established by a mutual agreement that states how the member municipalities organise the FoM’s service provision and decision-making.

The foundation for establishing a FoM is usually the operational tasks that have been impossible or unreasonable for municipalities to carry out alone. It is reasonable to achieve these tasks within the common framework and to divide the costs between the members of the federation. The FoM takes care of service provision on behalf of municipalities within the pre-set co-operation district. According to the law, a FoM is an independent legal entity that is separate of its
member municipalities. (Välilä 1998) Just like a MOC, a FoMs has its own budget, investment programmes and financial statements.

Member municipalities use their voting power in the general meeting of the federation. Each member municipality chooses its representative for each meeting separately. The representative of the municipality has voting power that is equivalent to the basic share capital. The general meeting of the federation elects the members of the board of directors, which further nominates the CEO for the federation. The FoM does not raise taxes. Instead, costs are covered by fees and contributions from member municipalities; for example, in relation to the services provided.

The advantage of a FoM is that it gives the municipalities an opportunity to use their scarce financial resources more efficiently and appropriately, especially in smaller municipalities. Potential problems could include heavy administration, underdeveloped management and unrealised democracy. Elected FoM officials are not chosen by popular vote, but each member municipality appoints its own representatives to the various governance bodies. (Pekola-Sjöblom 2000) The most interesting question in this respect, according to Pekola-Sjöblom (2000), is how the representatives are selected to the FoM: are representatives also in the municipal government or are they just “ordinary” councilmen.

FoMs can also organise service provision through a MOE-like structure that takes care of the service provision on behalf of the FoM’s member municipalities (similar to a single-municipality MOE). Another way is to create a joint MOE for many municipalities to serve only one purpose. This is a kind of federation of municipalities as a municipally-owned enterprise. The latter two models are rarely used, however, and it is yet to be seen how popular or unpopular these models become.

**Cooperative**

A cooperative is an entity formed by a group of autonomous individuals to meet certain service needs of its members. A cooperative is owned by its members, who are usually the customers of the service. Therefore, cooperatives are communities by nature and although they run business operations, their main purpose is to support their members’ welfare rather than sharing profits; this is why cooperatives often operate on a non-profit basis. According to the Co-
operatives Act (1488/2001), a cooperative cannot pay dividends to its owners but the surplus can be distributed to the member through cheaper prices.

Cooperatives must comply with the Co-operatives Act (1488/2001) and they have the same tax on profits as limited liability companies (26 percent). In addition to loans provided by banks, financial institutions and insurance companies, cooperatives can obtain financing from government and municipal subsidies. The different kinds of fees collected from cooperatives’ members also play an important role in funding the activities. Cooperatives also receive professional help from the municipality (for example, in the form of consulting), which is considered important when considering the fact that most of the cooperatives are being run by volunteers without any expertise. (Mynttinen & Taipale 2007)

Each member of the cooperative has one vote in the general meeting of the cooperative. The general meeting votes and selects the board of directors. The cooperative can have a CEO if it is so agreed in the contract or if the board of directors so decides. A cooperative can also have a supervisory board nominated by the general meeting. The supervisory board controls and supervises the board of directors and the CEO, and offers its opinion on the financial statement for the general meeting.

There are three main types of public service cooperatives, when categorised by life cycle. Traditionally, cooperatives have been established with the idea that they would always remain as independent actors. The intention for the second type of cooperative is that it starts by making the major investments and stabilises its operation; then, after a few years, it is supposedly transferred to the municipality’s responsibility and control. The third cooperative type is located in an area that could be joined with the municipal waterworks area of operation. By sufficiently subsidising this type of cooperative, it is possible for the municipality to delay its own investments. Soon after the construction stage, the cooperative is merged with the municipality. (Kuntaliitto 2007)

### 2.3 Business model

In order to get a more comprehensive picture of waterworks organisation and its operation, it is not sufficient to examine only ownership and governance models; a level of more concrete operation should also be included. A business model study is an excellent way to describe and evaluate the success or failure of a business operation (Chesbrough & Rosenbloom 2002, Osterwalder 2004, Shafer
et al. 2005). In particular, with the help of business model, corporations can try to find the cornerstones of their success (Osterwalder 2004, Shafer et al. 2005). A good business model answers questions such as: Who is the customer and what does he or she value? How do we make money in this business? How can we deliver value to customers at an appropriate cost? Business models are the stories that explain how enterprises work. (Magretta 2002)

The background to business model thinking dates back to Alfred Chandler’s (1962) *Strategy and structure* and Igor Ansoff’s (1965) *Corporate strategy*. However, scientific interest in business models has only increased in the 1990s and 2000s. Consequently, the current shape of business models is still very young (Osterwalder 2004).

The business model concept and its theoretical base are still patchy (Morris et al. 2005). Especially during the Internet boom at the turn of the millennium, the business model was used very broadly to cover all activities of the company and even to replace corporate strategy. Increasing interest has led to a need to define the concept of a business model more precisely. Several researchers have attempted to define the concepts and components of a business model in order to create a unified model that can be utilised more efficiently (Hamel 2001, Hedman & Kalling 2003, Magretta 2002, Osterwalder & Pigneur 2009, Shafer et al. 2005, Timmers 1998). Table 8 presents some definitions of business models from the last decade or so.

**Table 8. Business model definitions.**

<table>
<thead>
<tr>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Timmers 1998, p.4 “An architecture for the product, service and information flows, including a description of the various business actors and their roles; and a description of the potential benefits for the various business actors; and a description of the sources of revenues.”</td>
</tr>
<tr>
<td>Hamel 2000, p.3 “Strategy, customer logic, resources and network: these are the four components of the business model.”</td>
</tr>
<tr>
<td>Magretta 2002, p.4 “A good business model answers Peter Drucker’s age-old questions: Who is the customer? And what does the customer value? It also answers the fundamental questions every manager must ask: How do we make money in this business? What is the underlying economic logic that explains how we can deliver value to customers at an appropriate cost?”</td>
</tr>
<tr>
<td>Chesbrough &amp; Rosenbloom 2002, p.532 “The business model provides a coherent framework that takes technological characteristics and potentials as inputs, and converts them through customers and markets into economic outputs.”</td>
</tr>
</tbody>
</table>
After the Internet boom and e-commerce problems, interest in business models collapsed and their credibility was tested. Porter (2001) claimed that the existing definitions of business models were murky at best. He argued that this “loose conception” of doing business and generating revenue was a far cry from the creation of real economic value. However, Magretta (2002) argued that the problem was not in the business model concept but in its implementation. A business model is not a magical solution in itself; when correctly used, however, it focuses attention on how all elements of the system fit into a working hole and forces managers to think rigorously about their businesses (Magretta 2002).

The literature presents numerous taxonomies, ontologies, dimensions and elements for business models. Timmers (1998) considered a business model to be architecture for the product, service and information flows including a description of the various business actors, their roles and the benefits they could potentially receive. A business model also includes a description of the sources of revenues. Hamel (2001) introduced four business model elements: strategy, customer logic, resources and network, all of which are linked through consumer benefit, configuration and company frontier. Chesbrough and Rosenbloom (2002) included competitive strategy as one component of a business model. According to Morris et al. (2005), the most frequently cited elements are value offering, economic model, customer interface, partner network, internal infrastructure and target markets. Table 9 lists some different business models and their elements. It is noticeable that despite some differences between different models, they all answer the same questions: What kind of value do we create to whom? How do we create this value? and How do we earn money?
Table 9. Business model components.

<table>
<thead>
<tr>
<th>Suikki's framework</th>
<th>Offering</th>
<th>Value creation system</th>
<th>Revenue model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Osterwalder’s &amp; Pigneur’s ontology’s nine elements</td>
<td>Customer segments</td>
<td>Channels</td>
<td>Customer relationships</td>
</tr>
<tr>
<td>Timmers 1998</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Hamel 2000</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Magretta 2002</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Chesbrough &amp; Rosenbloom 2002</td>
<td>x</td>
<td>x</td>
<td>(x)</td>
</tr>
<tr>
<td>Hedman &amp; Kalling 2003</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Morris et al. 2005</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Suikki 2007</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Osterwalder &amp; Pigneur 2009</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
</tbody>
</table>
All of the researchers whose business model components are presented in Table 9 have different theoretical backgrounds and ideas. Despite this, they have all arrived at a very similar set of components that they consider critical for describing a business model. The present study has adopted and combined the frameworks introduced by Suikki (2007) and Osterwalder (2004). Suikki (2007) presented three dimensions (offering, value creation system and revenue model), which are further divided into 10 components (composition, customer, sales approach, structure, network players, network size, basic logic, cost and pricing structure, market and share of total value). Osterwalder (2004) and Osterwalder and Pigneur (2009) started by dividing business models into four blocks that are familiar from balanced scorecards (customer interface, product, infrastructure management and financial aspect) and nine different elements (customer segments, value proposition, customer relationships, channels, key resources, key activities, key partners, revenue streams and cost structure). These two models are notably similar, even though they use somewhat different terminology.

As Table 9 shows, despite numerous differences between the business models and the fact that every researcher ranked the components in a different order of importance, they all include the three top level issues of Suikki’s (2007) framework: offering, value creation system and revenue model.

The rest of this chapter concentrates on describing the different business model elements based on the combination of Suikki’s and Osterwalder’s frameworks. For clarification, Fig. 4 shows the interrelationship between these two frameworks.

![Fig. 4. Business model framework.](image-url)
2.3.1 Offering

Value proposition

According to Osterwalder and Pigneur (2009), “value proposition is the bundle of products and services that create value for a specific customer segment”. Value proposition is the offering that the company lays out for its customers in order to solve a customer problem or satisfy a customer need (Osterwalder & Pigneur 2009, Suikki 2007). Hedman and Kalling (2003) added that the offering must have a favourable quality or price position compared to other service providers, while Porter (2001) and Shafer et al. (2005) emphasised the uniqueness of value proposition for companies to succeed in the market. According to Osterwalder (2004), value proposition “describes the way a firm differentiates itself from its competitors and is the reason why customers buy from a certain firm and not from another”. The value proposition, therefore, is based on the company’s entire value creation system.

Customer segments

Customer segments are the groups of customers or market segments to whom the value proposition will appeal and to whom it is offered (Chesbrough & Rosenbloom 2002). There are several possible attributes for segmentation, including customer type, geographical area, demographic differences or interaction requirements. Division can also be made between businesses and individual customers; these are often referred to as business-to-business (B2B) and business-to-consumer (B2C) transactions. According to Morris et al. (2005), different attributes have a significant impact on how an organisation is configured and what kind of resource requirements it has, since failure in market identification is a key factor associated with venture failure. Some researchers (such as Hamel 2001) have segmented customers in order to define the area in which the company is working, whereas others (such as Osterwalder & Pigneur 2009) have segmented customers in order to better satisfy customers with different (or common) needs or behaviour. The latter approach is more in line with the idea that the sole purpose of a company is to satisfy its customers’ needs and that the customers are at the heart of a business model.
Customer relationships

Customer relationships refer to how a company goes to the market, how it reaches its customers and how it interacts with them (Osterwalder 2004). The term describes the types of relationships the company wants to establish with its customers. These can range from face-to-face to fully automated interaction (Osterwalder & Pigneur 2009) and from occasional to continuous relationships (Hamel 2001). According to Grönroos (2004), the relationship between the company and the customer creates additional value for both parties, in addition to the value of products and/or services. A continuous relationship and the right channels may offer the customer a sense of security, control and trust (Grönroos 2004, Osterwalder 2004). Modern customers do not look for just goods or services; they require a more holistic value proposition that ranges from delivery, installation, repair and maintenance to trustworthy and timely information about the best and safest way to use the product. The core product is less often the reason for dissatisfaction than the elements surrounding it. (Grönroos 2004)

Distribution channel

Distribution channels describe how a company reaches its customers to deliver a value proposition. They represent the connection between the company’s value proposition and its target customers. (Osterwalder 2004) As Pitt et al. (1999) put it, “the purpose of a distribution channel is to make the right quantities of the right product or service available at the right place, at the right time”. Osterwalder and Pigneur (2009) defined distribution channels through five more specific points: (1) raise customers’ awareness about company’s products and services, (2) help customers evaluate the company’s value proposition, (3) enable the purchase of a specific product or service, (4) deliver the value proposition and (5) provide post-purchase customer support. There are a wide variety of different methods, media and channels through which a company can distribute a value proposition. In a simple market, the appropriate delivery channel is usually quite evident; when a market is more fragmented and diverse, however, the channel configuration becomes more obscure (Anderson et al. 1997). When a product like household water is considered, the delivery channel is fixed, but companies must also consider issues such as how to raise customer awareness and provide post-purchase support. Companies can ask themselves whether they have invested in
their customer, how they can strengthen the link between the company and the customer, and how they can exceed customer expectations (Hamel 2001).

### 2.3.2 Value creation system

**Key activities**

Key activities are the things that people do in companies. They are the processes and routines that are performed in order to transform inputs into outputs so that the value proposition can be fulfilled (Hamel 2001). According to Prahalad and Hamel (1990) and Stalk et al. (1992), the competitive success of a company depends on transforming these key processes into strategic capabilities that provide superior value to the customer. Activities can be divided into primary and support activities. Primary activities are involved in the creation of the value proposition and its marketing and delivery (Osterwalder 2004). Support activities, such as human resource management, technology development and procurement, allow the primary activities to take place (Porter 1985). These are the core elements in creating and offering a value proposition, reaching markets, maintaining customer relationships and earning revenues (Osterwalder & Pigneur 2009).

**Key resources**

A company needs a set of resources in order to offer a value proposition and earn revenues. Grant (1991) made a distinction between tangible and intangible resources and people-based skills. Tangible resources include items such as facilities, equipment, machinery and cash reserves, while intangible resources include trademarks, patents, brands and customer information. Human resources include people and their skills and knowledge to create value with tangible and intangible resources. (Grant 1991, Hamel 2001, Osterwalder & Pigneur 2009, Wernerfelt 1984) Key resources can be owned, leased or acquired from key partners (Osterwalder & Pigneur 2009); a key question, therefore, is what the core competencies of the company are and what is advantageous to acquire from outside. Hamel (2001) used the term “core competency” to capture an internal capability of skills and knowledge that the company performs better than others. These core competencies lie at the heart of the business model and make it work...
Companies need to ask themselves what kind of value and other benefits they can provide for their customers with their core competencies and whether there are opportunities to utilise these in different ways and in different contexts (Hamel 2001). According to Grant (1991), a company may have difficulty identifying and appraising its resources, given that management information system is typically fragmented and incomplete and financial balance sheets disregard intangible and people-based skills, which are probably the most important resources of the company.

**Key partners**

Instead of keeping all resources and activities within the company, it might be reasonable to acquire some of the less important resources outside company boundaries. Osterwalder (2004) described this as a partner network, which outlines what activities and resources are distributed among key suppliers and partners and what is done in-house. According to Hamel (2001), partners typically provide essential “supplements” to the final product or service and the inventive use of partnerships can be a key industry revolution. Potential alignment within the companies can leverage the value of a technology (Chesbrough & Rosenbloom 2002), visibly enforce cost effectiveness (Hedman & Kalling 2003) and reduce risk (Osterwalder & Pigneur 2009). Osterwalder and Pigneur (2009) identified four types of partnerships: (1) strategic alliance between non-competitors, (2) coopetition, which is a strategic partnership between competitors, (3) joint ventures to develop new businesses, and (4) buyer-supplier relationships to assure reliable supplies. Although some companies have been using partnerships and alliances for decades, they have recently become more strategic partnerships that aim to create and enhance the competitive position of the companies involved (Osterwalder 2004).

**2.3.3 Revenue model**

**Revenue streams**

For-profit companies need to make money in order to survive. Their survival depends on the value they create and how they capture returns from that value (Shafer et al. 2005). According to Osterwalder (2004), revenue generation
measures a company’s ability to translate value proposition into revenue streams that are vital to its long-term survival. Economic value is created when customers are willing to pay more than the cost of producing the product or service (Porter 2001). Shafer et al. (2005) argued that many companies have a tendency to ignore the value-capture part of the business model, which means they fail to capture corresponding economic returns in relation to the value they create. This is why companies need to define the “revenue architecture” presented by Chesbrough and Rosenbloom (2002) in order to identify how much to charge, how a customer will pay and how the value created will be divided between the customers, the company and other stakeholders. A company can generate income from a variety of revenue streams, each of which may have a different pricing mechanism. The company can receive revenue from selling, lending or licensing a product or service, taking a cut of a transaction or relying on advertising revenues. The type of pricing mechanisms, such as fixed or dynamic pricing, can make a significant difference in generated revenues. (Osterwalder 2004, Osterwalder & Pigneur 2009)

Cost structure

This element describes all the costs the company incurs while operating under a particular business model. It measures the costs of all resources, assets, activities and network relationships that are required to create, market and deliver value to the customers (Osterwalder 2004). According to Osterwalder (2004), the value creation process has an important potential for cost savings, whereby the company focuses on its core competencies and activities and the partner network performs the other non-core activities. Osterwalder and Pigneur (2009) made a distinction between two different approaches to business – cost-driven and value-driven. A cost-driven business concentrates on minimising the costs and creating as lean a cost structure as possible, while a value-driven company focuses on creating a premium value proposition to its customers.

2.4 Value creation system

Industrial organisations are naturally related to each other. They are dependent on each other’s production, distribution, use of goods and services. These exchange relationships are important because it is rare today for a firm to exist as a self-
supporting business. That is why firms must establish and develop sustainable cooperation, alliances and possibly joint ventures to guarantee the quality and quantity of goods and services exchanged. (Johanson & Mattson 1991)

Value networks and partnerships exist because it is usually not reasonable to create value only through the firm itself and its limited resources and competencies. If a company can ally with other firms that can complement its existing competencies, this presents greater opportunity to add value for the customer. In these alliances and networks, each actor does the things that they do best, offers something to the creation process and receives benefits from the partnership (such as experience, profit or visibility). Working together enables firms to create maximal value for the end customer without making major sacrifices, and even to gain more than they originally gave away. (Helander 2004)

Partnerships may also reduce transaction costs, promote the development of knowledge, give parties some control over each other, and be used as a bridge to other firms (Johanson & Mattson 1991). What matters most in the creation of partnerships are social relations, which lead to trust, loyalty, tacit understanding and a willingness to make risky deals (risk sharing and allocation) and share resources. Shafer et al. (2005) stated that the fundamental functions of business are to create value and capture returns from that value. According to Helander (2004), these two functions are the reasons for collaborative customer/supplier relationships. Creating and capturing value reflects the two fundamental functions of all organisations: creating value in ways that differentiate them from the competition, and developing core competencies that are different from those of competitors (Shafer et al. 2005). In order to create value for an end customer, a firm must use its core competencies in core processes, so that something valuable to the customer is created. Networks generate value through complex dynamic value exchanges instead of a single firm’s core processes (Allee 2000, Hamel 2001).

2.4.1 Value chain

Porter’s (1985) world-renowned value chain analysis disaggregates a firm into its strategically relevant activities, in order to understand the behaviour of cost and the existing and potential sources of differentiation. Analysing a value chain can be a tool with which to analyse a single firm’s activities and its interaction in a very exact manner.
It is important to note that when Porter’s main objective is used to analyse individual firms, one must consider value creation with a wider scope in order to determine the potential in value networks. Indeed, Porter took this into consideration when presenting an idea of a value system. According to Porter, a value system is a set of consecutive activities in which each actor successively adds value to the product. All of these activities are interrelated and there are linkages between value activities within a firm’s own value chain as well as between value chains in the value system.

### 2.4.2 Value-creating network

Value-creating networks have been the subject of study for several decades. Many theoretical researchers have presented their own models and methods to describe and analyse value creation in a network of organisations. The lack of empirical research and material is a considerable deficiency in this sector. Most of the value network researchers have followed similar methods when it comes to value networks, but the terminology and scope frequently varies.

Johnston and Lawrence (1991) presented a concept called “value-adding partnership” (VAP) in which a set of independent companies work closely together to manage the flows of goods and services along the shared value-added chain. Instead of having only arm’s length relationships, each player in a VAP has a stake in the other’s success and the whole chain is monitored to enhance competitive dynamics. Excellent examples are Japanese car manufacturers, such as Toyota, where thousands of companies work for a single large firm, thereby forming a *Keiretsu* (Miyashita & Russell 1994).

Normann and Ramírez (1994) presented another view, a “value constellation”, in which actors come together to co-produce value. Instead of performing activities sequentially (Porter’s value system), activities are performed simultaneously and value is created together. In this new value network, organisations focus on the value-creating system itself rather than that of the company or the industry (Peppard & Rylander 2006).

Parolini (1999) continued the development started by Normann and Ramírez by assuming that, “rather than being considered simply as sets of economic players, value-creating systems should be seen as sets of activities that are jointly involved in the creation of value”. In Parolini’s model (*the value net*), value-creating systems are a fundamental object of investigation and activities are the
basic unit of analysis. The model emphasises the need to establish stable connections and lasting alliances with other economic players in order to ensure the competitiveness of the whole system.

Bovet and Martha (2000) also used the term “value net”, defining it as a network of partnerships. According to Bovet and Martha, the value net is a dynamic, high-performance network of customers/supplier partnerships and information flows, the objective of which is to create value for customers, the company and its suppliers. Bovet and Martha listed five important characteristics of value nets:

- **Customer-aligned**: customer choices trigger activities in the value net
- **Collaborative and systemic**: companies engage in value-creating relationships
- **Agile and scalable**: flexible production, distribution and information flows
- **Fast flow**: order-to-delivery cycles are fast and compressed
- **Digital**: digital technology and digital supply chain concepts

Value net design is based on customers’ needs, which are seamlessly linked back to a carefully designed fulfilment engine. Many capabilities of the fulfilment engine are drawn from the collaboration across agile, scalable and fast networks of partners. One important tool in Bovet and Martha’s value net model is the concept of the digital supply chain, which makes it possible to achieve superior customer satisfaction and company profitability. (Bovet & Martha 2000)

Kothandaraman and Wilson (2001) called their concept a **value-creating network**, the focus of which is the key firms in the network that deliver value to the final consumer. This model moves beyond considering just VAPs, where firms collaborate to improve their position in the markets, to consider customer value. Kothandaraman and Wilson (2001) developed a rationale for value-creating networks using three building blocks, which makes it possible to understand the value creation process and its links to core capabilities of firms in the network. These building blocks are superior customer value, core capabilities and relationships, which are described in the following chapter.

### 2.4.3 A conceptual model and analysis

Four key building blocks impact the value chain of a product or a service: customer value, core competences, relationships and interaction (e.g. Helander 2004, Håkansson & Johanson 1992, Kothandaraman & Wilson 2001, Möller et al. 2005, Parolini 1999). A firm must use its core capabilities and core competencies
to deliver products that fully satisfy the needs and wants of its customers at a competitive price. By creating close partnerships, a firm can concentrate on its core competencies and outsource non-core activities. This way, the delivery process can be clarified and the value increased. In addition, partnerships do not exist without interaction between the different actors. Actors exchange information, material, resources and money, thereby reinforcing and facilitating value creation in the network of partners. These four building blocks are briefly discussed in the following subsections and their interrelation is presented in Fig. 5.

Fig. 5. A conceptual model for value creation.

Value

Porter (1985) defined value as the “amount buyers are willing to pay for what firm provides them”. On this basis, value is measured in competitive terms by total revenue, which can be calculated by multiplying the price of the product by the quantity of the product sold. Parolini (1999) criticised Porter’s definition of value and instead derive the net value for a customer from a combination of tangible elements (for example, quality, durability and functionality) and intangible elements (such as prestige), as well as service and economic elements (such as purchase price, payment method and warranties). Kothandraman and Wilson (2001) saw value as the relationship between the competing market offerings and their respective prices in the eyes of the customer.

Allee (1999, 2000) and Normann and Ramirez (1994) supported Parolini and considered value beyond monetary value. Allee (1999) saw value as a tangible or
intangible quality, good, knowledge, benefit or service that is desirable or useful enough that the recipient is willing to pay for or exchange it for another “valuable item”. Value is created through complex dynamic exchanges between one or more enterprises, their customers, suppliers, strategic partners, and the community (Allee 2000). Normann and Ramirez (1994) also recognised social, psychological, aesthetic and moral values.

Normann and Ramirez (1994) emphasised that “the ultimate goal, if not the very nature, of economic activity is to create value” for the customer. The difficult aspect of this notion is that, in the end, the value is created in the mind of the end customer, which means that the value created and obtained is always perceived subjectively. Möller and Rajala (2007) added that customers are also co-producers of the value. The end customer is therefore one of the most important factors in determining what kind of value-creating activities the network should perform. (Helander 2004)

There is no exhaustive method for determining the value the customer receives. Values can be measured, for example, by the “density” of options made available to the user at the right time in the right place. Perceived value can be estimated by asking customers about their willingness to pay for a certain product or service. Helander (2004) measured the value as a difference between a customer’s monetary and non-monetary benefits and sacrifices. This presents an interesting dilemma in the public arena, as finance ministries (or other accountable agencies) typically look at cost as the sole determining factor and not at the value-added services or savings. In the public sector, there are many customers and various points of view regarding what is considered valuable. This may result in conflicting points of view and decision making practices.

**Core capabilities and core competencies**

Core capabilities and core competencies are the means by which customers can have their needs satisfied and superior value provided to them. These capabilities and competencies should correspond to customers’ needs and support the entire value-creating network.

Core capabilities are a set of core beliefs that signify a way of doing business (Hamel & Prahalad 1994, Kothandaraman & Wilson 2001). Hafeez et al. (2002) defined a core capability as “the ability to make use of resources to perform some task or activity”. According to Stalk et al. (1992), there are four basic principles concerning core capabilities. Firstly, the building blocks of a corporate strategy
are business processes that start by identifying customer needs and end by satisfying these needs. Secondly, a firm’s success depends on the firm transforming its core processes into strategic capabilities that provide superior value to customer. Thirdly, firms create core capabilities by making strategic investments and support infrastructure that links different functions and units in the value chain. Fourthly, firms must focus on capabilities that serve customers and create a new horizontal and customer-oriented organisation architecture. (Stalk et al. 1992)

Core competencies represent the collective learning within the organisation (Hamel & Prahalad 1994, Kothandaraman & Wilson 2001). They are organisationally embedded resources, strategic activities, knowledge and skills, which represent the sum of learning across individual skill sets and organisation units (Hamel & Prahalad 1994). Parry et al. (2010) provided a newer definition of core competence that integrated previous literature: “Core competence is a skill/asset/technology that underpins the growth of the business and differentiates the business from its current and future competitors”. However, this definition lacks an important factor that Hamel and Prahalad (1994) and Kaplinsky and Morris (2001) had already emphasised: the customer. According to these authors, a firm should concentrate only on those competencies that provide value to its customers, are unique, and/or are difficult to copy, and should outsource everything else. Companies can also try to control and enhance capabilities in order to achieve a competitive edge without outsourcing (Gottfredson & Phillips 2005).

Core competencies should be considered in close connection to the value perceptions of the company’s end customers. Ultimately, it is customers who define value and judge whether something is a core competence (see e.g. Hamel & Prahalad 1994, Helander 2004, Normann & Ramirez 1994, Peppard & Rylander 2006). Firms should ask themselves certain questions, including: What are the value elements in certain product or service? What is the customer actually paying for? Why is the customer willing to pay for a certain product or service? Which value elements are most important (that is, make the greatest contribution to price realisation)? (Hamel & Prahalad 1994) From a value-creating network point of view, firms should emphasise those core competencies that they are able to utilise, instead of concentrating only on those that they possess (Helander 2004). This requires information about the value activities of the networks and
capabilities of the different actors so that the underlying knowledge can be accessed and shared (Möller & Rajala 2007).

**Relationships**

When a combination of firms concentrates on their core competencies and combines their efforts and builds strong partnering relationships, this leads to a value-creating network. The objective of each firm taking part in the cooperation is to add value to the market offering and to create value to the customer (Kothandaraman & Wilson 2001). Business partners who get together to share information, to analyse their business/value propositions and to better understand their core operating processes typically find ways to improve their efficiency and effectiveness in a cooperative manner (Poirier *et al.* 2004). The most familiar cooperating relationships are: partnerships, alliances, joint ventures, network organisations, franchises, concession models; and licensing, service, and management agreements. These relationships differ from each other in terms of their closeness, dominance/balance level, intensity and extendedness (e.g. Helander 2004, Mentzer 2004).

Partnerships cannot exist without meeting certain conditions. The companies must have shared opinions about the value that they are to create together; they must also be convinced that they need each other to create that value and they must agree on how the created value is to be divided between the parties. Without meeting these conditions, the organisations cannot really commit to pursuing a common objective and will continue to operate as independent entities. (Parolini 1999)

**Interaction**

The way in which value is created for the customer is influenced by the nature of the actors’ relationships with each other. Business relationships develop as a result of interaction between the actors; on the other hand, business relationships are the context within which the interaction takes place (Turnbull *et al.* 1996). When the actors share resources or activities with each other, there will always be a connection between them, and what happens in one relationship will affect all other connected relationships (although sometimes only marginally) (Håkansson & Ford 2002). Therefore, interaction is about co-ordinating activities and
resources between companies, from which each actor will gain benefits but also incur costs (Håkansson & Snehota 1995, Håkansson & Ford 2002).

In any agreement and collaboration, actors need to interact with each other and ask such questions as: What can you do for me? What can I do for you? How can we benefit from each other? (Helander 2004). Several factors determine the level and depth of interaction (for example, transactional, short-term or long-term relationship). These include:

- The relationship type
- The actors
- Actors’ commitment
- Actors’ trust in each other
- Strategic behaviour of actors
- The exchanges
- Information, material, resources, money and social exchanges
- The importance and significance of exchanges
- The contract type
- Legal issues.

It is important to consider the value created for the end customer, but it is equally important to assess how firms can benefit from creating that value together; that is, what they can give to the network and what they can receive in return. Interacting parties should, to some extent, have shared goals and interests. (Ford et al. 1986)

**Model of analysis**

The building blocks described in the previous chapter can be used to create a method with which to analyse value-creation in a value-creating network. Parolini (1999), Helander (2004) and Peppard and Rylander (2006) have all created similar methods for this kind of analysis. These systematic methods are created to answer such questions as where the value lies in the network and how value is created through relationships. By understanding these relationships, strategists can better understand where value lies in the network, how value is co-created, how the firm’s activities affect the network and how other members are likely to respond. (Peppard & Rylander 2006)

Helander (2004) crystallised the method in four phases, using the following questions:
1. Who is the customer? What does the customer consider to be valuable?
2. What activities are needed to create the value for the customer?
3. What resources are needed to carry out the activities?
4. Who (=actors) are able to utilise these resources?

Before starting the initial analysis, the network should be defined and the boundaries of analysis set so that the research area does not over-expand and become impossible to manage. (Peppard & Rylander 2006)

In the first phase, the researcher should ask questions such as: Who is the customer and what does the customer consider to be valuable (Helander 2004)? What constitutes value for the final customer and can it be taken full advantage of (Parolini 1999)? The perspective of the final customer gives the firm ideas about how customers evaluate things and how the firm can help by providing products and services. Ultimately, it is the customers who define value; they are an integral part of the network when seeking choices, quality, relevance, ease of use, fair pricing and support. In value networks, firms not only deliver value to each other, based on requirement of next in line; they must also base their offering around the notion of value defined by the customer and create value for the customer together. (Peppard & Rylander 2006) However, Hamel and Prahalad (1994) noted that customers lack foresight and firms should not blindly trust market analyses. Instead, they should know what their core competencies are and make use of them together.

This leads to the second phase, where the critical activities that are needed to create the value for the customer can be found, and how these activities are inter-related. These activities can be classified into three groups: production activities (aimed at the creation of the product/service), support activities (which aim to improve the effectiveness and efficiency of other activities) and external transaction activities (essentially, purchasing and selling activities). These activities should be regarded with the highest reasonable level of disaggregation and should be free from exact organisational and firm boundaries. It is also important to represent the significant ties and relationships between the activities in order to highlight the influence that they have on the entire network system. (Parolini 1999)

The third phase should identify the core competencies and capabilities of the network’s participants. This phase identifies the firms’ core competencies and what the firms are able to utilise through other network participants. (Helander 2004) Each actor in a value network should concentrate on performing the “right”
activities for it and externalising even traditionally important activities if they do not fit the firm’s core competence. (Normann & Ramírez 1994)

The fourth phase should identify the network participants and other actors that influence the value delivered to the customer. These can include customers, suppliers, competitors, allies, regulators and supplementary firms. It is also important to define how network members can utilise and benefit from the different resources available. The purpose of this is to understand why each firm is part of the network and what it is getting out of it. (Peppard & Rylander 2006)

Helander’s four questions can be complemented with one further question:

5. How do actors interact and influence each other?

This stage identifies the different roles and linkages of the network participants. These networks operate on the principle of fair exchange of all types of values, where value flows are interwoven, interdependent and multidirectional. These value exchanges can be goods, services, information and revenues or knowledge or intangible benefits. (Allee 1999, Allee 2000) Exchanges are influenced by the perceived value and the behaviour of the network participants and the customers (Peppard & Rylander 2006). The objective of this phase is to identify the roles and value exchanges of the network participants and how they are influenced by each other. It is also important to note that the partnerships will only operate and work properly if both parties are convinced that they need each other and believe that they can benefit from the cooperation (Parolini 1999). To work properly, successful value networks and exchanges especially need integrity, honesty, responsibility, inclusion and respect (Allee 1999, Allee 2000). Relationships can be classified by the level of closeness, co-operation, type of interaction and whether the relationship is short-term or long-term (Helander 2004). Fig. 6 shows the value creation model.
Fig. 6. Analysis model of value creation.

2.5 Analysis framework

An analysis framework was created to examine the Finnish water sector and the efficiency and financial performance of waterworks. The purpose of this framework is to pinpoint the preconditions for effective performance of waterworks and to help collect and analyse empirical data. Fig. 7 presents the framework.
The various external factors that affect the waterworks’ operations are illustrated on the side of the figure. Because of the essential nature of the services and the natural monopoly position of service providers, high level of regulation and control is required to guarantee quality and reliability of service provision (see e.g. Abbott & Cohen 2009). Legislation has set guidelines regarding how and where services should be provided and the roles and responsibilities of different actors. In addition, various environmental and societal issues have an impact on waterworks performance.

In Finland, water and sewage services have long been seen as public services that belong under public authority (with some exceptions), which is why public ownership and administration are considered important (Katko 2008, Pietilä 2006). Consequently, this study has emphasised public ownership and how it affects waterworks performance. Furthermore, ownership cannot be viewed as separate from a governance model that describes the relationship between the local governments, markets and citizens (that is, public governance), as well as the system by which companies are directed and controlled (that is, corporate governance). This study has examined governance from public and corporate governance perspectives and the central units of analysis are the different
governance models of waterworks. Governance is examined mainly in relation to good governance principles; that is, whether it is participatory, accountable, transparent and efficient, but also equitable, inclusive and follows the rule of law (UNDESA 2007, UNDP 1995, UNESCAP 2010).

In order to gain a more comprehensive picture of waterworks organisation and its operation, it is not sufficient to examine only external factors and ‘top level’ structures; for this reason, the framework also includes a level of more concrete operation. The business model study makes it possible to describe and evaluate the success or failure of a business operation (Chesbrough & Rosenbloom 2002, Osterwalder 2004, Shafer et al. 2005). It is not a magical tool (Magretta 2002), rather a set of elements and their relationships that enables the business logic of a specific firm to be expressed (Osterwalder et al. 2005). The present study describes the business model through three elements: offering, revenue model and value creation system. For a more detailed examination, these elements are divided into nine further elements: value proposition, customer segments, customer relationships, distribution channel, key activities, key resources, key partners, revenue streams and cost structure for closer inspection. Looking at these elements in detail allows easier identification of the internal factors that affect the waterworks’ performance.

The offering of water and sewage services is basically the same everywhere; customers cannot be discriminated and revenues are quite stable because of strict external control. What differentiates waterworks, and their ability to generate money and become efficient, is the value creation system through which the value proposition is offered to the customer. This study has examined value creation system through five key building blocks: customer value, key activities, key resources, key partners and the interaction between the different actors (e.g. Helander 2004, Håkansson & Johanson 1992, Kothandaraman & Wilson 2001, Möller et al. 2005, Parolini 1999). These are the elements that were used to formulate the interview questions and the questionnaire in the data collection phase.

Any change in the value creation system also changes the offering and revenue model. A study of the business model, especially the value creation system, can reveal the underlying problems of service provision and provide opportunities for development and new business opportunities. The business model cannot be looked at separately from the ownership and governance model. In public services in particular, the governance model and owners’ control affect how the business can be carried out. Therefore, it is the combination of ownership,
governance and business models that determines the efficiency and financial performance of public services.
3  Empirical findings

This chapter presents the empirical findings of the dissertation. The first subchapter outlines the characteristics of the Finnish water sector with the help of SWOT analyses conducted by the researcher. The second subchapter describes the external factors that affect waterworks performance, based on the interviews and questionnaire responses. Subchapter 3.3 presents four common ownership and governance models of waterworks. The same subchapter presents the characteristics of ownership and governance models and their SWOT analyses, and describes the impact of each governance model based on the interviews, questionnaire responses and a review with infrastructure sector professionals. Subchapter 3.4 uses the interviews and questionnaire responses to provide an overview of the general business model of waterworks. Chapter 3.5 concentrates on the waterworks’ financial performance by analysing financial statements of selected waterworks. The final subchapter summarises the results from the empirical findings by presenting the potential avenues for development.

3.1  Characteristics of the Finnish water sector

This study has analysed the characteristics of the Finnish water sector with the help of SWOT analyses. The analyses were conducted by the researcher and reviewed together with professionals from the infrastructure sector. These professionals include experts working for a national project to develop public services in Finland. The SWOT analysis presented below describes the generic issues that pertain to all Finnish waterworks, regardless of their ownership and governance model.

**SWOT Analysis – Finnish waterworks in general**

Fig. 8 presents the strengths, weaknesses, opportunities and threats of Finnish waterworks in general.
Excellent natural resources
Knowledge of business as usual
Municipal ownership \(\Rightarrow\) security (excl. cooperatives)
High-quality services especially in more densely populated areas

Aging infrastructure
Not enough information about the current state/condition of the infrastructure
Inadequate investments
“Slow moving” municipal owner (excl. cooperatives)
Lack of management and engineering expertise in the board
A great number of small waterworks
Poor sewage treatment provision in sparsely populated areas

Larger waterworks units
Regional cooperation / collaboration
Introduction of new (information) technologies
Full cost recovery
Systematic investment allocation
Improvements in efficiency
Education, training, recruitment and motivation of skilful staff
Truly customer and stakeholder oriented service provision
Transparency

Contamination of natural resources
Crisis situations (pipeline break-ups, human errors…)
Underinvestment \(\Rightarrow\) causing risks
Aging workforce \(\Rightarrow\) loss of core competence
Decrease in water sales (due to water saving)

Fig. 8. SWOT of waterworks in general.

**Strengths**

Excellent and plentiful natural resources are the foundation of high-quality water services in Finland. Strict environmental laws ensure relatively clean groundwater and surface water, which allows high-quality services in the areas of ample water supply. Most municipalities consider public ownership of waterworks to be an important strength since it provides citizens with a feeling of security. The strength of hundreds of small private cooperatives and associations in sparsely populated areas is that the customers are the owners, and good quality services are in everyone’s interests. Water and sewage services are generally of high quality, especially in more densely populated areas, although some weaknesses and threats do exist.

**Weaknesses**

Although public ownership can be seen as a strength, a slow-moving municipal owner and its limited resources to renovate ageing infrastructure is a weakness. In
addition, the members of the waterworks’ board of directors often lack the necessary management and engineering expertise. More worrying than a lack of financing, however, is the lack of information about the current condition of the infrastructure. Short-sighted investment policies can endanger the condition of the infrastructure and the ability to provide service. A structural weakness of the water sector is Finland’s sparse population and, especially in the north, a population that is spread out across small and distant villages. This has led to a large number of small water service providers and poor sewage treatment provision in remote areas.

**Opportunities**

The most important opportunities are systematic mapping of infrastructure conditions and proper investment allocation to reduce the maintenance backlog. New technologies could help waterworks map the assets and identify renovation needs. Waterworks should also identify opportunities for regional cooperation in order to achieve economies of scale and more efficient service provision. The pursuit of efficiency and the importance of cooperation are evident in the current situation, where tightening quality requirements and environmental constraints place many small waterworks into a challenging position. Transparency of waterworks operation and full cost recovery could enable national benchmarking and financing of future investments.

**Threats**

Contamination of natural resources and diverse crisis situations are significant threats that waterworks need to address. Underinvestment, due to the absence of up-to-date information on infrastructure condition and the lack of financing, poses a serious threat to the waterworks services and, consequently, society at large. An ageing workforce and the loss of core competence is a threat in many infrastructure network operators. Waterworks must make their business more attractive in order to attract young employees and ensure that the tacit knowledge is saved and transferred to future generations.
3.2 External factors affecting waterworks

A number of external factors affect waterworks performance. In the present study, the interviewees and questionnaire respondents identified the four most influential external factors: legislation, government subvention, external control and environment.

3.2.1 Legislation

Legislation plays an important role in setting guidelines for the provision of water and sewage services. The Act on Water Services (119/2001) set guidelines for how and where services should be provided and for the roles and responsibilities of different actors. According to the law, the municipality is responsible for organising and developing water services. Although this does not mean that the municipal organisation needs to provide the water and sewage services, it does guarantee quality service provision in the operational area that the municipality sets for the waterworks. The waterworks is responsible for delivering water services in its area of operation, while the property owner or the lessor is responsible for the water services within its property.

The Act on Water Services (119/2001) is also linked to the Health Protection Act (763/1994) and the Environmental Protection Act (86/2000), which further describe the quality requirements that waterworks need to fulfil. Therefore, legislation sets the basic framework within which waterworks need to operate. It also partially determines the incurring investment and other costs for the waterworks. As one questionnaire respondent said, “waterworks purification targets, new licensing conditions, other legal requirements or authority’s strict interpretations can significantly increase costs. For example, closing stack composting down increased the cost of sludge treatment by 100 percent”. Therefore, legislation and its changes may have a significant impact on water service provision.

One issue that currently concerns waterworks managers is the 2004 government regulation that set the minimum requirements for household sewage treatment. The purpose of the regulation is to reduce the pollution caused by household sewage. The rule stated that household sewage treatment must be improved in sparsely populated areas by the end of 2015. Many of the respondents consider the regulation to be a burden that forces waterworks to
broaden their sewage pipelines into unprofitable sparsely populated areas. As one questionnaire respondent argued, “Because of the new regulation, we need to expand our operational area for other than commercial reasons > efficiency will suffer > costs will increase > customers will pay!”

Another significant change in legislation that is currently being prepared considers who is responsible for rain water. Currently, rain water is the responsibility of the waterworks, but this responsibility may be transferred to the municipality. According to the respondents and interviewees, such a change in the division of responsibilities is positive and would bring financial benefits.

3.2.2 Government subvention

Another role of the national government in the operation of waterworks is subvention. While setting laws and guiding waterworks to the right direction from the point of view of the community and the environment, the government may provide financial assistance to help fulfil the set requirement. The law (Act no. 686/2004) provides that the state can support waterworks when the objective is:

1. To bring about regional cooperation in the provision of water and sewage services
2. To secure service provision in special situations
3. To bring water and sewage services to rural and sparsely populated areas
4. To prevent surface and groundwater pollution or improve its condition.

However, the amount of state aid has clearly declined over the years and, according to some of the interviewees, only the smaller plants have the opportunity to obtain financial support for investments from the government. One manager said that, in their case, the most important decision-making criteria for financial support is environmental impact, not the size of the municipality: “We currently have four applications for state aid. When I asked around, one or two projects have a theoretical chance to get money. They are in the lakeside. Still there are many groundwater areas that are a priority”.

State aid is meant to improve service provision in rural areas, increase regional cooperation and prevent pollution. In some places, however, subsidies could be “misdirected”. As one questionnaire respondent remarked, “State aid favours inefficient pipeline construction into sparsely populated areas, and at worst, causes necessary renovation investment to be delayed”. Although the state aid is important for many small waterworks, it may be that the aid is sometimes
applied and received for secondary investment while the old pipelines continue to
deteriorate and may cause serious damage later on.

3.2.3 External control by authorities

In waterworks operation, the main role of controlling authorities (that is, CEDTE, and municipalities’ health protection and environmental protection authorities) is to set and monitor the fulfilment of permit conditions (set for limited period of time for sewage treatment). Among other things, environmental permits regulate the extent of the operations, the level of emissions and their reduction. The quality of water is monitored by the controlling authorities, and the sampling and analysis is made in accordance with a pre-set monitoring plan. Waterworks often share these quality results with the customers. Sewage treatment is considered environmental work, for which waterworks must take care that the sewage does not pollute the receiving watercourse or the environment in general. This is monitored by the waterworks’ own quality monitoring programmes, which are overseen by CEDTE.

The permit conditions vary widely between the different waterworks. According to one questionnaire respondent, larger waterworks in particular have stricter permit conditions than smaller ones. For example, some waterworks are required to have a nitrogen removal process; this is an expensive investment that directly affects the total capital costs. According to one respondent, “Capital costs are affected by investments, which in turn are affected by licensing authority’s requirements; for example, for sewage treatment. Some waterworks have a nitrogen removal requirement, which means larger investment costs compared to waterworks that do not have this requirement”.

Permit conditions have a major impact on waterworks operation and performance because they set the refinement and purification targets that must be met for all conditions. If the waterworks does not meet the set requirements, the controlling authority can interfere in its activities and require waterworks to change their conduct so that the permit conditions are met. However, quality requirements set by the government and its authorities are vital in order to guarantee safe household water to customers and for environmental protection.
3.2.4 Environmental factors

The efficiency of water and sewage services is also affected by the municipality’s geographical and social conditions. These include the availability of fresh water, whether the municipality is growing or declining, population density, and industry. This chapter describes the environmental factors affecting waterworks efficiency that emerged from the interviews and questionnaire responses.

Area of operation

Municipalities’ decisions on waterworks’ operational area can have a significant effect on the profitability of waterworks. The provision of water and sewage services is different in sparsely populated areas and is often less efficient than in urban areas. On the other hand, repair investments are more expensive in densely populated areas than in sparsely populated areas. A fragmented or large operating area that covers a lot of sparsely populated areas can increase pipeline network length and cost and reduce efficiency. In Finland, the length of pipelines related to sold water volumes is a critical parameter that affects the profitability of a waterworks, and pipelines constitute 80 percent of the capital invested in the water and sewage service infrastructure (Pietilä 2006, Vehmaskoski et al. 2005).

One questionnaire respondent said, “An overly wide operational area reduces efficiency and causes the focus on key areas and tasks to suffer. The operational area should be reasonably sized, or else efficiency will be reduced”. Therefore, according to some questionnaire respondents, municipalities should set the operational area so that efficient operation in the area is financially possible. Increasing the size of the operational area is not the sole way to guarantee quality service provision, as one cooperative’s manager noted: “The operating area should be set too small rather than too large. Investing in an area where there is no paying customers is not profitable. Services can also be offered outside the operational area”.

Moreover, the law does not require services to be provided in areas where it is not financially viable. However, the municipality may have “hidden agendas” and, as one respondent feared: “If the municipality decides on a water and sewage service development plan solely on political grounds, waterworks might face an impossible task. Waterworks should be active, once the development plan and operational area have been determined. I think almost all waterworks are currently facing difficulties with the new regulation concerning household sewage
Municipalities are asking waterworks for the impossible”. The questionnaire responses clearly show the influence of the new regulation that set minimum standards for household sewage treatment. Some respondents fear substantial expansion of the operational area due to the new regulation will cause the costs to increase so much that the operation will become economically unviable.

It can be concluded, therefore, that the area of operation is an important factor that affects the efficiency of water and sewage services, but which waterworks themselves cannot govern. This means that, without an open and active dialogue between waterworks and municipalities regarding the operational area, the waterworks will not be able to improve their efficiency in this respect.

**Location and geography**

Another issue that is closely related to the area of operation is the physical location of waterworks and its pipelines, and the geography in the operational area. In general terms, Finland is quite sparsely populated and the distances between cities, towns and villages can be very large. As previously mentioned, operating waterworks in a large, sparsely populated municipality can be inefficient when the pipelines are long.

However, it is not only the distances that affect the investment and operational costs of the waterworks. The geography and topography of the municipality also have an impact on waterworks efficiency and the reliability of comparisons among different waterworks. As one questionnaire respondent said, providing services in a hilly, sparsely populated area of Eastern Finland is completely different to providing services in a flat, densely populated metropolitan area in the south.

Soil conditions and the quality of raw water also have an impact on how and where waterworks can acquire water and how they need to treat it. In addition, environmental issues determine how the sewage must be treated so that it can be led back to the nature. For example, in the areas where there is groundwater, there are tighter sewage treatment requirements than in those areas where there is no risk of contaminating groundwater. According to a few questionnaire respondents, the possibility of environmental risks, as well as preparing for them and preventing them, affects the operation of waterworks and accruing expenses.
Community structure

Another external factor that affects waterworks’ efficiency is the structure of the community. While this is related to the operational area discussed above, it gives closer consideration to town planning and other structural issues of the community. Most of the structural decisions are made by the municipality and waterworks only have a minimal influence when, for example, a new residential area is designed. According to several questionnaire respondents, efficient land use and town planning also has a positive impact on the efficiency of the water and sewage services. Fragmented “satellite” street plans, numerous urban areas that are located far away from each other, and sparsely populated areas make it difficult for waterworks to build an efficient water and sewage system. As one of the respondents noted, an important factor of overall efficiency is “a good, properly sized technical infrastructure that is in relation to community structure and customer base”.

Community structure mainly affects the length of pipelines and, therefore, the costs of waterworks. Water and sewage services are very capital-intensive and the investment, maintenance and operation costs of the pipelines account for a significant part of the total costs. Therefore, if geographically small and large municipalities with similar population are compared, it is likely that the more centralised and smaller municipality’s waterworks will be more efficient. As one respondent pondered, “What is the importance of a municipality’s area and the length of the pipelines? The neighbouring municipality (with approximately the same population) has an area 3.5 times smaller than ours. The pipeline network covers nearly all residents in both municipalities. Our neighbour has a lot less water intake and only one sewage treatment plant, which affects operating and investment costs. In this case, decentralisation is also more expensive than centralisation”.

Waterworks efficiency and community structure is also linked to the growth rate or decline of the municipal population. In growing municipalities, new residential areas are built and waterworks must keep up and provide services to these new areas. New pipeline networks need to be built, but old pipelines also need to be kept in good condition, which could be problematic for some waterworks if there is not enough money to build new pipelines and renovate old ones. The situation is different in regressive municipalities with declining populations. In these municipalities, waterworks obviously require more resources to renovate old pipelines than to construct new ones. On the other hand,
population decline is a problem because it reduces the income of waterworks, even though pipelines and facilities require as much money for operation and renovation as before.

Water acquisition and treatment

The efficiency of waterworks is also related to the surrounding environment and the technical and physical structures of the facilities. The technique of water acquisition and treatment can vary greatly from facility to facility and from municipality to municipality. The source and quality of raw water and the number of water intakes are the main reasons for different processes and cost structures. Potential raw water sources and their locations differ from one area to another. For example, Oulu has two surface water intakes in the city area but it is planning to build a new groundwater intake and a 70 km transfer pipeline to the city. This is designed to improve the quality of delivered water and reduce the water treatment costs but also to guarantee water acquisition in crisis situations when the old intakes are left for backup.

Surface water generally requires more treatment than groundwater. According to the questionnaire respondents, this means that more resources, such as chemicals and labour, are used. Instead, groundwater may be so clean in the first place that only small adjustments of, for example, pH-level, are necessary. As one questionnaire respondent explained: “In some municipalities, raw water needs to be treated a lot, while in others it is enough to pump groundwater with adequate pressure to the network. Some waterworks have several water intakes and others have only one. The number of sewage pumping stations and industrial customers also varies”. Raw water sources also have an impact on the cooperation possibilities between different waterworks. According to one interviewee, there is a greater opportunity for cooperation if all cooperating waterworks have, for example, groundwater in use, compared to a situation where one has groundwater and the other has surface water. One questionnaire respondent noted that these different physical structures complicate the efficiency comparison of different waterworks.
3.3 Ownership and governance model

According to the statistical system for Finnish waterworks (VELVET), the most common ownership and governance models in the Finnish water sector, measured in numbers, are, in order: cooperative, municipal unit, municipally-owned enterprise (MOE), municipally-owned company (MOC) and federation of municipalities (FoM). In addition, there are hundreds of small water service associations and partnerships that provide services to fewer than 50 people. According to VELVET’s statistics, 223 Finnish waterworks are organised as municipal units, 54 as municipally-owned enterprises (MOE), 155 as municipally-owned companies (MOC) and 886 as cooperatives. The remainder of the roughly 1500 waterworks are organised as partnerships, limited partnerships and federations of municipalities. Fig. 9 shows the type of municipalities in which the most common ownership and governance models exist, according to VELVET’s statistics. Municipalities are classified into three groups according to Statistics Finland’s statistical grouping of municipalities. The grouping is made according to the share of urban population and population of the largest urban area, into urban municipalities (62), densely-populated (66) and sparsely-populated (214) municipalities.
Fig. 9. Ownership and governance models in different operational environments.

The following subchapters describe the characteristics of the most common ownership and governance models in the Finnish water sector, based on interview data.

### 3.3.1 Municipal unit

The most traditional ownership and governance model of waterworks in Finland is those that operate as an integral part of a municipal organisation. These waterworks, which are often located in the more rural areas of Finland (see Fig. 10), are usually part of municipal technical services and use its resources and knowledge. When the waterworks are organised as a municipal unit, they become part of the municipality’s budget and investment programme and the assets are legally owned by the municipality.
Waterworks units can take care of all core water services in the municipal centre and also sell water and sewage treatment services to cooperatives and associations that operate in sparsely populated areas. Waterworks units do not always have their own personnel; instead, they use the resources of municipalities technical services. In Taivalkoski, for example, available technical service personnel handle all of the design, construction and maintenance, as well as operations. This is an efficient way to use resources in small municipalities, since it is not necessary to hire personnel just for waterworks. Outsourcing and buying design and construction services is also very common, since small municipalities, like Vimpeli, might not have the necessary resources and knowledge in-house.

Municipal units can also buy water from a regional wholesaler and transfer sewage to a regional sewage treatment plant. In this case, the municipal unit is only responsible for the construction and maintenance of pipelines. Municipal owners consider this kind of arrangement to be a good option since it gives the municipality a way to control and guarantee the service delivery through pipeline ownership, but still has the opportunity to outsource some parts of water services and benefit from economies of scale.

The law requires that waterworks must be financially separated from the municipality so that it has its own profit-and-loss statement and balance sheet. This has caused many changes regarding the financial treatment of waterworks in the municipal management of finances and requires a new way of thinking. According to FIWA, the financial separation of waterworks from municipal bookkeeping has not entirely come true in municipal units, although the law was enacted 10 years ago. In addition, there is evidence that the service prices are too low, customer payments do not cover the costs and the municipalities need to subsidise the operations. These are all against the law.
Fig. 11 depicts the municipal unit’s governance model.

A waterworks as a municipal unit operates under the municipal council and municipal government. Under the municipal government, there is a committee or an executive board that is appointed by the municipal government and named by the municipal council (committee being the most common one). A waterworks does not usually have its own committee but operates under the municipality’s technical committee. The committee consists mostly of municipal councillors and officials, in addition to which a representative of the municipal government, the municipal government chairman and the municipal manager may have the right to be present and speak. In cases where waterworks operate under the guidance of technical committee, the technical director is also the director of the waterworks.

The technical director acts as a presenting official in the committee and is responsible for daily operations and decision-making. The committee is responsible for higher level policies and guidelines, budget, financial statements and service fees. The municipal council and the government set the grounds for and have the final word in service fees and have the power to decide on larger investments and development. The decision-making power of various governing
bodies may vary from the framework mentioned above, according to the municipal ordinance.

The decisions made by the municipal waterworks are public and parties involved have the right of appeal. The appeal process can sometimes severely delay decisions, such as the start of a construction project. Waterworks as a municipal unit must conform to the *Act on Public Contracts (348/2007)*, which sets stricter limits for competition and negotiation procedures than the *Special Act (349/2007)*, which was enacted for water, energy, transport and postal services and is used in all other cases.

**SWOT analysis – municipal unit**

Fig. 12 presents the SWOT analysis of waterworks organised as a municipal unit based on the data collected from interviews.

![SWOT analysis table](image)

**Strengths**

The most important strength of the municipal unit is the back-up that the municipality provides to the waterworks. A stable financial structure, large balance sheet, cheaper loans and job security create a stable and secure environment in which to operate. Waterworks as municipal units often operate as part of a municipality’s technical services, which enables flexible use of labour.
As one waterworks manager said: “Running a small waterworks under technical services is undoubtedly the most effective and cheapest way, especially in a regressive municipality where staff is not needed for new construction”. From the waterworks’ perspective, the strength of the municipal unit is that it can receive hidden subsidies from the municipality, which helps it keep prices low and/or make investments. Being part of the municipality also exempts the waterworks from taxes. From the community’s point of view, however, the tax exemption and subsidies may cause unwanted distortions. The municipal unit’s democratic decision-making process can also be seen as a strength because citizens may feel that they can better influence what is happening in their surroundings.

**Weaknesses**

The main weaknesses of the municipal unit are the lack of transparency and cost awareness. Simple calculatory separation may “hide” waterworks costs within municipal bookkeeping and not show them in the waterworks’ financial statement. In addition, capital transfers to and from waterworks make the operations non-transparent and lead to decision-making compromises. Because waterworks operate under municipal budget and investment programme, the municipality’s annual budget limitations are a clear weakness and the four-year election period makes long-term planning difficult. In some cases, the manager has several other responsibilities (such as also managing the technical department of the municipality), which may lead to relatively unprofessional waterworks management. In addition, municipal units often lack innovation, since secure financial and operational position are not incentives for drive and motivation to change.

**Opportunities**

More transparent operation, together with clear cost accounting, provides opportunities for more efficient operation. Different computer-based technologies and automation, benchmarking and learning from one another might also provide improvements in terms of service development.
**Threats**

Other issues that might hinder efficient waterworks operation include short-term politicking and bureaucratic decision-making, which can severely delay necessary infrastructure re-investments. The poor financial situation of the municipality is also a threat, which may affect the financing of the waterworks, increase subsidies from the waterworks to the municipality or lead to corporatisation (or even selling) of the waterworks. Finally, peripheral waterworks in particular may have difficulties recruiting skilful and motivated staff due to the location but also because of lower salaries.

**3.3.2 Municipally-owned enterprise**

Municipally-owned enterprises (MOE) resemble the municipal unit described above. A MOE is still part of the municipal budget and investment programme, but has its own financial statement and balance sheet. It also has a certain level of operational and financial independence. The assets of the waterworks are separated from the municipal balance sheet and the waterworks has its own cash flow. MOEs usually strive for financial efficiency and, in the long term, are expected to cover all expenses (operating and investment costs) with income financing. Only the profit of the MOE is included in the municipal budget.

As Fig. 13 shows, urban municipalities in particular consider a MOE to be the most suitable ownership and governance model for waterworks.

![Fig. 13. MOEs in different operational environments in Finland.](image)

More than half of Finland’s 50 largest cities have a waterworks MOE. The reason why MOEs are popular in larger municipalities rather than small ones is probably due to the “heaviness” of the governance model described below. For example, restructuring municipal units into MOEs can create extra costs (such as labour costs).
Waterworks MOEs usually provide all four core water services in-house. A MOE may also be able to use the services of a regional water wholesaler or sewage treatment plant. Facility operation and pipeline maintenance are typically conducted with waterworks own labour and some design and construction work might also be done in-house. However, design and construction are usually outsourced to private companies or done in cooperation with the municipality’s technical services. The latter is due to the fact that water and sewage pipelines are often designed and constructed side by side with roads, and because waterworks are still part of the municipality and the other unit’s employees are easy to use. In Oulu, the technical services also carry out the pipeline maintenance for the waterworks.

One intention of the law reform of the Act on Water Services (119/2001) was to encourage the municipalities to transform their waterworks into MOEs. This transformation guarantees the transparency and financial separation required by law and offers the opportunity to operate waterworks in a business-like manner. When a MOE operates as part of a municipality within the municipality’s territory, the municipality is not tax liable for these activities. The MOE becomes liable to tax on profits (6.1828 percent) if the operations are carried out outside the municipality’s territory. However, this tax is avoided if the municipality writes a co-operation agreement regarding the service provision. The MOE is also exempted from stamp duty on property transfers and from property tax if its properties are situated within the municipality. According to this study, MOEs are often a good or excellent organisation model for an owner, especially for taxation reasons. However, the operational possibilities of a MOE are still rarely used fully for the benefit of the waterworks.
Governance – MOE

Fig. 14 depicts the MOEs governance model.

Operation of a MOE is regulated by the Municipal Act (Article of Municipally-owned Enterprises (519/2007) in the Municipal Act (365/1995)) and the ordinance established by the municipal council. A MOE always has a CEO, who is responsible to the executive board. The CEO, who is appointed by the municipal government, prepares and presents the issues to be discussed to the executive board. The CEO is also responsible for daily operation and decision-making in the waterworks. The executive board is appointed by the municipal government and named by the municipal council. The executive board is usually politically appointed and consists mostly of municipal councillors and elected officials. Representative of the employees and the municipal government, the municipal government chairman and the municipal manager may have the right to be present and speak at the board meetings. According to the questionnaire replies, several MOEs also have a management team. These management teams usually consist of at least the CEO and directors of each unit, but may also include the chair of the executive board, the representatives of the employees, designers and controlling authorities. The management team does not have decision-making power.
The roles and responsibilities of the CEO and the executive board are set out in the *Municipality Act* (365/1995) and the *Article of Municipally-owned Enterprises* (519/2007) and the ordinance of MOEs. The CEO is responsible for the operative management and the development of MOE activities, as well as the administration, financial management and internal control of the organisation. The CEO ensures the implementation of the decisions made by the executive board and gives the board relevant information related to the business activities and events. The CEO has the right to speak on behalf of the board, unless otherwise specified. The CEO is usually responsible for decisions regarding design, construction and procurement; utilisation, maintenance and sale of the buildings, premises and movables; charging of water and sewage fees; liability for damages; hiring and firing of personnel; and delegation of power.

The management team assists the CEO in decision-making. For example, it might participate in the preparation of issues to be presented to the executive board. Mostly, the management team acts as an information-sharing and discussion body. The executive board directs and supervises the business activities of the MOE. According to the law, the executive board is responsible for ensuring that the management, operation and internal control of the MOE are organised properly. In addition, the board decides on business development, approves the budget, has the power to hire and fire the CEO, decides on investments and other expenses with long-term effects, and supervises the interests of the MOE. In addition, the executive boards of some MOEs are responsible for the financial statements, customer fees (in accordance with the objectives set by the municipal council), buying and selling of property and compensation issues when the waterworks is liable for damages. The executive board can also grant relief or exemption to the waterworks regarding future payments, compensation or claims; it can also decide to remove them from the accounts and decide the point up to which the CEO has the right to decide on the matter.

The role of the municipal council and the municipal government is to guide and provide the frame of operation. The municipal council approves the budget and may set profit or other targets. The decisions made by MOE are public and parties involved have the right of appeal. Procurements are usually made in compliance with the *Act on Public Contracts* (348/2007); in other cases, the above-mentioned *Special Act* (349/2007) is followed.
**SWOT Analysis – MOE**

Fig. 15 presents the SWOT analysis of waterworks organised as a MOE, based on the data collected from interviews.

<table>
<thead>
<tr>
<th>Strengths</th>
<th>Weaknesses</th>
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</thead>
<tbody>
<tr>
<td>Municipal back-up</td>
<td>Political interference</td>
</tr>
<tr>
<td>Stable financial structure</td>
<td>Multi-phased and inflexible decision making process</td>
</tr>
<tr>
<td>Job security</td>
<td>Public procurement rules</td>
</tr>
<tr>
<td>Transparency</td>
<td></td>
</tr>
<tr>
<td>Improved administrative and financial responsibility (compared to traditional)</td>
<td></td>
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<tr>
<td>Preferential tax treatment</td>
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<tr>
<td>Profit transfers from waterworks</td>
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<td></td>
<td></td>
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<tr>
<td>More business-like operation</td>
<td>Short-term politicking</td>
</tr>
<tr>
<td>Cost accounting</td>
<td>Bureaucratic decision making process</td>
</tr>
<tr>
<td>Wider use of computer-based technologies, robots and automation</td>
<td>Difficult to recruit skilful and motivated staff (low salaries)</td>
</tr>
<tr>
<td>Cooperation with other waterworks</td>
<td>Changes in tax code that remove or lessen preferential tax treatment</td>
</tr>
<tr>
<td></td>
<td>Dependency on material and service providers</td>
</tr>
</tbody>
</table>

**Fig. 15. SWOT of waterworks MOE.**

**Strengths**

MOEs have the same municipal back-up and job security as the municipal unit. They also have improved administrative and financial responsibility since the operation needs to be separated from the municipality for accounting reasons. This gives the decision-makers more information related to assets, costs and revenues, with which they can make more informed decisions. The management of a MOE can also be expected to be more professional since the CEO does not have any other obligations towards the municipality. MOEs have similar tax treatment as in the municipal unit, which is preferential to a municipally-owned company. In addition, the municipality can – and, according to this study, often does – claim profit transfers from the waterworks.

**Weaknesses**

One weakness is the high level of political interference, even in the operational decisions of waterworks. In some cases, public procurement rules hinder and slow
down decision making. As one interviewee said, “The Act on Public Contracts does not support the establishment of public private partnerships. If a private company has already invested a lot in the design phase of a project, what are the options to keep another company from cherry-picking at the mandatory competitive bidding phase?” From the waterworks perspective, another weakness is that the municipality may use it as a “cash cow”, which can endanger waterworks operations and planned investments. In addition, MOEs operate close to the municipality’s leadership and may still lack independence and flexibility in pricing.

**Opportunities**

The reason for changing municipal units into MOEs is usually the desire for a more business-like operation. However, the full potential of business thinking is not always realised and unexploited opportunities remain. In particular, cost awareness, use of new technologies and innovative thinking can bring cost savings and efficiency gains. Cooperation with other waterworks should also be exploited.

**Threats**

A MOE is still a part of the municipal organisation. Therefore, threats can include short-term politicking and bureaucracy. An example of this is found in Oulu, where the waterworks is forced to order materials and services from a municipal unit, in the pursuit of a modified client-supplier model and for employment reasons, even though they could be found cheaper on the market. The low level of municipal salaries might also make it difficult to recruit skilled staff. Other threats from the owners’ perspective include the forthcoming EU ruling on state- and municipally-owned enterprises and changes in the tax treatment of MOEs.

**3.3.3 Municipally-owned company**

A municipally-owned company (MOC) is owned and controlled by one or several municipalities. Most MOCs are owned by a single municipality; approximately one-third of MOCs are regionally-owned (Pietilä et al. 2010). Typically MOCs provide only one or two of the core services. This is mostly because water
acquisition and treatment and sewage treatment are easily definable services that can be separated from the core service chain. Additionally, in the wholesale business, economies of scale are also attainable. As Fig. 16 shows, MOCs are most popular in rural areas.

Since many of the waterworks MOCs only provide water acquisition and treatment or sewage treatment services, their main focus is on the operation and maintenance of facilities. In addition, there are currently at least four large water companies in Finland that provide all four core services: Jyväskylän Energia Oy, Lahti Aqua Oy, Hämeenlinnan Seudun Vesi Oy and Lappeenrannan Vesi Oy (the first three of which were interviewed). However, wholesaler and sewage treatment MOCs are greater in number.

MOCs do not usually design or construct facilities or pipelines; instead, they buy consultant and construction services from private companies. Employee competence permitting, however, some smaller design or construction works can be done in-house. Some special works, such as automation, are also outsourced.

MOCs are subject to civil law and operate in accordance with the Limited Liability Companies Act (624/2006) and articles of by-laws. The municipality still holds the responsibility for organising water and sewage services in its territory. MOCs have their own budget, investment programme, profit-and-loss statement and balance sheet. MOCs are subject to taxation according to procedures that are relevant for any Finnish company that operates on the basis of normal business regulations. This means taxing of profits at the tax rate on profit of 26 percent and liability for property tax.

Waterworks MOCs often pay a certain percentage of their net revenue to the municipality in the form of interest payments and loan amortisations. There has been some discussion recently about what can be considered “a moderate profit” when the owner is also entitled to a return on invested capital. At the same time, however, there should be discussion regarding whether waterworks are able to
make the necessary investments to maintain and improve the service quality. As positive exceptions, there are a few non-profit waterworks MOCs in Finland that pursue zero profit and are not obliged to make payments to the owner.

**Governance – MOC**

Fig. 17 depicts the MOCs governance model.

The governance of MOCs is regulated by the *Limited Liability Companies Act* (624/2006) and the articles of association. The company’s CEO is appointed by the board of directors, which is appointed at the annual general meeting. The board of directors consists of representatives of various stakeholders. Most of the members are usually municipal councillors and officials, but may also include representatives of consumers, industrial customers and neighbouring waterworks (for example, a cooperative operating in the area).

The roles and responsibilities of different governing bodies are set in the *Limited LiabilityCompanies Act* (624/2006) and in the by-laws. According to the law, the annual general meeting (AGM):

1. Approves the balance sheet
2. Decides on the profits
3. Has the power to fire the board of directors, board members and the CEO
4. Nominates the board of directors and accountants
5. Decide on other issues set in the by-laws (such as setting operational targets)

The company does not have to hold the AGM if the shareholders reach a consensus on the matters to be discussed at the meeting. Thus, MOCs that are owned by only one municipality do not have to hold an AGM. The board of directors ensures that the administration, management and the operations are organised properly. The board can set the profit targets, decide on the budget and make decisions about larger investments and customer fees. The CEO acts as a presenting official to the board of directors. By law, the CEO is responsible for routine management within the guidelines and limits set by the board of directors. The CEO is also responsible for ensuring that the company’s accounting complies with the law and the finance is organised in a reliable manner. MOCs also need independent accountants.

Decisions made by the MOC are not public and there is no public right of appeal. Because a MOC is not subject to public law, it has looser procurement rules than municipal units and MOEs. A MOC only needs to follow the special law enacted for water, energy, transport and postal services (Special Act (349/2007)). MOC employees are also in a different position than the two previously mentioned models because they are not civil servants, which means that they do not have to follow the public sector collective bargaining agreements.

**SWOT Analysis – MOC**

Fig. 18 presents the SWOT analysis of waterworks organised as a MOC, based on the data collected from interviews.
Fig. 18. SWOT of waterworks MOC.

**Strengths**

The most important strength of MOC waterworks, compared to municipal units and MOEs, is business orientation. MOC salary and employee policies are more flexible than in municipal unit and MOE models. Independence and flexibility add degrees of freedom to financing and the opportunity for longer-term planning of infrastructure investments. In addition, municipalities have a legitimate right to demand profit transfers from waterworks, which is a definite strength from the owner’s perspective.

**Weaknesses**

The abovementioned strengths of a MOC are not always fully realised and some companies still lack knowledge of the asset conditions and systematically under-invest in infrastructure, leaving pipelines in poor, bad or unknown condition. Pricing from the natural monopoly position limits the full potential of MOC and requires municipal oversight. MOCs are also in an unequal position compared to the traditional and MOE models because they need to pay both value-added tax and tax on profits.
**Opportunities**

Business-like operation carries opportunities, which not all MOCs have realised. The MOC model enables innovation, especially if the employer encourages innovations through a reward system. This is different from the municipal unit, where money flow is guaranteed and everything works “satisfactorily”, even without innovation. MOCs can also sell their services to other municipalities. As one CEO of a MOC said, “Business can be expanded by spreading into neighbouring municipalities. ... The only way to increase turnover is to expand.”. Also, MOC is the only model that provides real opportunities for institutional investors to invest in water and sewage services.

**Threats**

The main threats are related to the conflicts between the owner’s will and the company’s interest. The board of a MOC often consists of municipal councillors who might be short-sighted and not have technical competence. This might lead to problems in long-term planning and lead to some level of political control.

**3.3.4 Cooperative**

A water cooperative is an entity formed by a group of autonomous individuals to meet the water supply and sewage needs of its members. A water cooperative is, in a legal sense, a waterworks if it provides services to more than 50 people or if the amount of water used or sewage produced equals 10m$^3$. In Finland, there are some cooperatives that do not reach this threshold. A cooperative is owned by its members, who are usually the customers of the service. Cooperatives must comply with the Co-operatives Act (1488/2001). The role of cooperatives in the provision of water services has historically been very important in sparsely populated areas, as it is today. Fig. 19 shows the number of cooperatives in different operational environments.
Fig. 19. Cooperatives in different operational environments in Finland.

Cooperatives established by municipal residents are often a quick and convenient way to organise centralised water services in sparsely populated areas. A cooperative can also be a transitional stage for later incorporation to another waterworks.

Cooperatives often operate only as a water supplier with its own water intakes and pipelines, while each household arranges its own sewage treatment. Cooperatives can also act only as deliverers of water and collectors of sewage. In these cases, water is bought from a regional wholesaler or municipal waterworks and sewage is transferred to a municipal or regional sewage treatment plant. Water cooperatives handle facility operations themselves and procure special maintenance and automation from outside service providers. They rarely do design and construction in-house, which means that investments, such as pipeline renovation, are always competitively tendered. Water cooperatives have existed in Finland since the early 1900s.
Fig. 20 depicts the governance model of a cooperative.

The governance model of cooperatives is enacted in the *Co-operatives Act (1488/2001)* and the charter of association. Each member of the cooperative has one vote at the cooperative’s annual meeting. The annual meeting votes and selects the board of directors and, if necessary, the accountants. The annual meeting also:

1. Approves the balance sheet
2. Decides on actions related to the balance sheet profit/loss
3. Has the power to remove the board of directors, board members and the CEO
4. Decides on other issues set by the Co-operatives Act (1488/2001) and the cooperative’s rules.

The board of directors is nominated by the annual meeting and is responsible for the administration and the proper organisation of the operations. The cooperative can have a CEO if it is so agreed in the charter or if the board of directors so decide. The CEO is responsible for the daily management of the waterworks and is answerable to the board of directors. The CEO is responsible for ensuring that the company’s accounting complies with the law and that the finance is organised
in a reliable manner; the board must ensure that these are duly organised. The CEO and the board often work closely together so to plan and develop the operation; the CEO takes care of the daily operations and the board is responsible for the procedures.

The objective of the cooperative is to provide services to its members, not to make a profit for invested capital. A cooperative can also have a supervisory board that is nominated by the general meeting. The supervisory board controls and supervises the board of directors and the CEO and offers an opinion on the financial statement for the general meeting. According to the *Co-operatives Act (1488/2001)*, a cooperative cannot pay dividends to its owners but the surplus can be distributed to members in the form of lower prices.

**SWOT Analysis – Cooperative**

Fig. 21 presents the SWOT analysis of waterworks, organised as a cooperative based on the data collected from interviews.

<table>
<thead>
<tr>
<th><strong>S</strong></th>
<th><strong>W</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Owned by the users</td>
<td>Small-scale operation</td>
</tr>
<tr>
<td>All owners equal</td>
<td>Absence of professional management</td>
</tr>
<tr>
<td>Light administration</td>
<td>Small capital</td>
</tr>
<tr>
<td>Simple organisation and easy decision making</td>
<td>Small leverage of large owners (because only one vote)</td>
</tr>
<tr>
<td>Independent from municipal decision making and economy</td>
<td></td>
</tr>
<tr>
<td>Not-for-profit</td>
<td></td>
</tr>
<tr>
<td>Working bees</td>
<td></td>
</tr>
<tr>
<td>Cooperation and consolidation with other cooperatives and municipal owned waterworks</td>
<td>Higher water quality requirements are difficult for small units to achieve</td>
</tr>
<tr>
<td>Service provision to neighbouring villages</td>
<td>Lack of interest among owners towards sustainable development</td>
</tr>
</tbody>
</table>

**Fig. 21. SWOT of waterworks cooperative.**

**Strengths**

Cooperatives are not-for-profit organisations that do not pay dividends to the owners. The owners are also the users of the service, which means that services that are of “good enough” quality – rather than too low or too high – are in everyone’s interest. Cooperatives are usually relatively small and have a simple organisation and easy decision-making process, which is strength. The strength of
a cooperative is also independence from municipal economy and decision-making. As one interviewee said, “A good thing is that the members of the cooperative have real decision-making power; it is outside political regulation and decisions are not ideological, but they are made purely on a technical basis.” Independence from the municipal organisation also means that all revenues can be used for investment and to develop the service.

**Weaknesses**

A small-scale operation can also be a weakness if owners are not interested in the development of the cooperative and if the management is not skilful enough to make rational decisions to improve operational efficiency. There may also be difficulties in obtaining loans because cooperatives do not have the back-up of a municipality. Larger customers (such as the municipality) might feel that they do not have enough decision-making power since they have only one vote in the general meeting.

**Opportunities**

Cooperatives’ opportunities are related to cooperation and consolidation with other waterworks and municipally-owned waterworks. In the future, small units may find it difficult to achieve tightened water quality and environmental requirements, which is why cooperation and consolidation with other cooperatives is a realistic option.

**Threats**

One threat to cooperatives is the lack of interest among owners in sustainable development of the services. Higher water quality requirements make it difficult for smaller units to reach targets without substantial investments.

**3.3.5 Impact of ownership and governance in waterworks performance**

This sub-chapter presents the factors that the interviewees and questionnaire respondents felt were most important in terms of ownership and governance affecting waterworks performance. It also explains some differences between the
different ownership and governance models. The sub-chapter finishes by summarising the main strengths, weaknesses, opportunities and threats of different ownership and governance models.

Political decision-making is one of the most influential issues affecting waterworks operation and performance. At worst, it can cripple the effectiveness of the waterworks, if, for example, development measures are unnecessarily postponed; at best, it can be of great interest. Municipal decision-making mainly affects the municipal units and, to a lesser degree, the MOEs and MOCs; only in some respects does it affect the operation of cooperatives. Based on the questionnaire responses, there are four main ways in which a municipality/owner can affect the operation of waterworks:

- Municipality makes the decision of the operational area of the waterworks
- Owner sets the operational targets
- Owner can affect the resources
- Owner has the right to require a return on invested capital

The setting of the waterworks’ operational area is commissioned to the municipality by law, which affects all waterworks, regardless of their governance model. Respondents considered the decisions of the operational area to be critical to the effectiveness of waterworks. If the municipality sets the operational area “too wide”, covering a lot of sparsely populated areas, the effectiveness of the operation will clearly be compromised. As one questionnaire respondent stated: “Political decision-making can easily lead to inefficient solutions ... there should be an assertive and clear-cut ownership policy”. Examples of inefficient solutions include “satellite” street plans and the obligation to build unprofitable sewerage systems to sparsely populated areas. In addition to operational area decisions, a municipality can affect waterworks through land-use decisions and with efficient or inefficient town planning. The second task, which clearly belongs to the owner, is to set goals and monitor their implementation. Some respondents wished for clear and realistic operational and financial targets without unnecessary politicking, while others hoped for more freedom to decide which services are made in-house and which are bought from the market. The latter is directly related to municipal decision on resources.

The municipal owner can have an important impact on waterworks through resource allocation. This particularly applies to the municipal units, but also in some cases to MOEs and MOCs. In the case of municipal units, the municipality
has full control of the waterworks’ human and financial resources. In the case of MOEs, the municipality can force it to use other municipal units or MOEs for service provision (such as construction and maintenance). This is mainly because for municipal employment reasons but, according to one interviewee, this complicates the efficient procurement of services. By providing sufficient amount of resources and space, the municipal council and the municipal government can best contribute to the successful operation of the waterworks. Of course, this is not always possible when many municipalities are struggling with difficult economic circumstances.

In addition to resource decisions, many municipalities step into the discussion and decision making of service fees and their division. Some municipalities do not want to raise water rates for fear of losing citizens to the neighbouring municipality. On the other hand, waterworks can be “cash cows” that support the municipality’s otherwise poor financial situation. Neither of these situations are ideal and, in some cases, they are even illegal. The Act on Water Services (119/2001) states that waterworks should cover all their costs through customer payments and that the owner can only collect a “reasonable” profit on its investment. The required return on invested capital particularly affects the financial performance of MOEs and MOCs. High rates of return can hinder investments and lead to increasing repair debt and, in the worst case scenario, deterioration of assets and serious damage to the environment and the community. According to one respondent, the owner can best affect the efficiency of waterworks “by holding the return and service level requirements reasonable and by letting waterworks work in peace”.

The decisions and actions of the manager and the board (executive board in MOEs and board of directors in MOCs and cooperatives) also have a major impact on waterworks’ performance. Firstly, it is crucial that the manager and the board have a vision for the long-term development of the waterworks and the ability to act accordingly. Strategic decision-making, prioritising, goal-setting and deliberate investment and financing decisions are the main tasks of the board. What waterworks managers also hope for is speed and flexibility in decision-making, and trust between the manager and the board. Without mutual trust and understanding, the decisions might not please both parties and may cause serious conflicts of interest. However, as one respondent said, “With adequate resources and goals, the municipal council and the government can best affect the productive operations of the waterworks. A professional executive board may also create excellent opportunities for skilful and motivated management and staff”. In
addition to decision making, the board is also responsible for measuring and monitoring the productive activities and financial performance of the waterworks through various key figures and scorecards.

The role of the board in a waterworks operation is highly dependent on the waterworks’ ownership and governance model, the scale of operation and the competence and composition of the board. The role of the committee operating above a small municipal unit can be very different compared to the board of directors of a large MOC. The committee of a municipal unit or the executive board of a MOE may want to address very detailed issues and leave strategic decision-making aside while the board of directors of a MOC usually trusts the management and makes decision according to the manager’s suggestions. As one representative of a small MOC said: “The role of the board of directors in a small waterworks is minimal due to the lack of expertise. In practice, the CEO makes the investment and construction decisions, of course, with the board’s blessing. In our case, the board of directors is not even willing to think about technical issues but trusts the manager’s ability to manage things professionally. ... Board members’ skills and their conceivable inability and lack of knowledge to make decisions affects decision making”. In addition to the board members’ professional skills, the composition and selection of the board also has an impact on its decision-making ability. Issues such as whether the board is selected in line with the political power relations or whether the board consists of so called “front-row” politicians impacts what kind of decisions are made and how. One company respondent stated, “The board of directors should consist of people who do not have political interests”. Consequently, the competence and composition of the board has a significant impact on decision-making and, therefore, also the efficiency of water and sewage services.

Table 10 summarises the strengths, weaknesses, opportunities and threats of different ownership and governance models. One clear difference between these four models is the tax treatment. The fact that MOCs and cooperatives are liable to tax on profit puts them in a different financial position than municipal units and MOEs. There are also differences in the accounting practices and transparency between waterworks, as well as between different ownership and governance models. The present study suggests that, on average, MOEs are the most transparent; financial and operational information is easily accessible and relatively comprehensive. Information about municipal units is also reasonably available in public but is more concise than average. Financial information about
MOCs and cooperatives is often available only in the Trade Register and public operational information is also limited. Thirdly, this study has revealed that there are differences in the decision-making practices between the various ownership and governance models. Municipal owners have the greatest impact on municipal units’ decision making, but they also seem to impact the decisions of MOEs and, to some extent, MOCs.

Table 10. Comparison of different ownership and governance models.

<table>
<thead>
<tr>
<th>Strengths</th>
<th>Weaknesses</th>
<th>Opportunities</th>
<th>Threats</th>
</tr>
</thead>
<tbody>
<tr>
<td>Municipal unit</td>
<td>Support from the municipality and its units</td>
<td>Limited resources</td>
<td>Cost accounting</td>
</tr>
<tr>
<td></td>
<td>Preferential tax treatment</td>
<td>Lack of cost awareness</td>
<td>Asset management</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Lack of transparency</td>
<td>Benchmarking</td>
</tr>
<tr>
<td>MOE</td>
<td>Transparency</td>
<td>Municipal interference</td>
<td>Cooperation with other municipal units and other municipalities</td>
</tr>
<tr>
<td></td>
<td>Preferential tax treatment</td>
<td>Heavy administration</td>
<td>Business orientation</td>
</tr>
<tr>
<td>MOC</td>
<td>Business-like operation</td>
<td>Weaker municipal back-up</td>
<td>Customer orientation</td>
</tr>
<tr>
<td></td>
<td>Flexible decision-making</td>
<td>Different tax treatment</td>
<td>Access to capital markets</td>
</tr>
<tr>
<td></td>
<td>Independent finance</td>
<td></td>
<td>Innovation</td>
</tr>
<tr>
<td></td>
<td>Transparency</td>
<td></td>
<td>Cooperation</td>
</tr>
<tr>
<td>Cooperative</td>
<td>Owned by customers</td>
<td>Small-scale operation</td>
<td>Consolidation or cooperation with other cooperatives or municipal owned waterworks</td>
</tr>
<tr>
<td></td>
<td>Light administration</td>
<td>Lack of skilled staff</td>
<td>Tightening quality requirements</td>
</tr>
<tr>
<td></td>
<td>Not-for-profit</td>
<td></td>
<td>Lack of interest</td>
</tr>
<tr>
<td></td>
<td>Working bees</td>
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</tbody>
</table>

3.4 Business models

Because of the nature of the service, waterworks in Finland have similar business models. Waterworks are natural monopolies in their own operational area and their offering is basically the same everywhere. Business models are traditionally used to help identify and create competitive advantage; in the case of waterworks, however, it plays a minor role. Instead, business model elements are used herein to describe the business at hand and find the underlying development potential. In
addition, although business models are often used to describe a business model of one product of one company, similarities in waterworks service provision, their natural monopoly position and this study’s need to see the “big picture” enables a generalised business model of waterworks to be described. The business model described below includes general issues, findings from the case studies and notes from the questionnaire respondents.

### 3.4.1 Offering

Water can be considered as a universal commodity that cannot be differentiated, and all citizens in the operational area must be treated and served equally. In practice, this means that waterworks cannot choose their customers and have minimal power to change their offering.

**Value proposition**

The value proposition of a waterworks is similar throughout Finland. Customers are provided with household water and sewage is transferred from their dwellings. Since waterworks are natural monopolies, the value proposition does not determine the competitive advantage of the service provider; instead, it determines what customers value and the activities upon which the company should focus.

The true value proposition is not the production or service processes that each waterworks possesses, but what customers can receive through the waterworks; namely, clean, good-quality water from their taps and properly discharged wastewaters. As one interviewee accurately said when asked what services his waterworks provides to their customers, “Firstly, we deliver a staple foodstuff called water. It involves great responsibilities since the water must of good quality ... Secondly, we have sewage treatment, which can be considered as an environmental activity since we take care that sewage does not contaminate the receiving watercourse”.

What customers really care about is accessibility of water and reliability of delivery, so that water is where they want it, when they want it and of sufficient quality to guarantee their health and safety. In addition, it is desirable that the wastewaters are duly conducted to the treatment facility. Quality of service and reliability of delivery were raised as among the most important factors of total
efficiency among the questionnaire respondents. According to the respondents, the quality of services consists of achieving water purification and sewage treatment targets, but also of good customer service and communication. As one CEO of a MOE stated, "A waterworks' total efficiency consists of quality, adequate and uninterrupted services".

When overall efficiency is considered, important issues in addition to service quality are reliability of service (that is, preparedness and prevention of distractions) and readiness in the case of disturbances. Questionnaire respondents emphasise that it is not sufficient to only consider quality of service and reliability of service delivery; risks also have to be taken into account and must be prepared for in advance. As one questionnaire respondent wrote, "Water supply is comparable to the food industry, where special hygiene is adhered to and reliability and quality of service are of great importance. Significance of risk must always be taken into account when minimising the costs". Indeed, the Finnish water sector has started paying greater attention to risk management in the last few years. In particular, the water crisis in the municipality of Nokia (which saw treated wastewater being fed into the household water pipeline network) resulted in a series of actions to prevent this kind of occurrence.

**Customer segments**

Waterworks cannot segment their customers according to whom they want to provide services to. All citizens in the operational area are entitled to the service. However, segmentation can achieve fairness in pricing and provide better service to, for example, high-volume customers.

Because waterworks cannot discriminate among their customers, they create customer segments, mainly for billing reasons. Customers are usually segmented by their type of real estate in order to determine the connection fee. Detached houses, townhouses, small apartments, apartment buildings, recreational buildings, industrial buildings, residential commercial buildings, public buildings and agricultural buildings may all have different connection fees. Segmentation is also based on the size of the water meter (m³ or pipe diameter in mm), which sets the fixed charge per year. Furthermore, division can be made between household and industrial customers. Major industrial customers (for example, in the dairy industry) with high volume and special sewage treatment requirements demand special service provision from waterworks. Heavy sewage requires special
treatment, which is why industrial customers are billed differently than household customers.

Price segmentation can and should enable waterworks to meet the full cost recovery principle sought in the Act on Water Services (119/2001).

Customer relationships

Interviews revealed that waterworks generally appreciate their customers but do not properly notice them. The only contact that some waterworks have with their customers is when customers open their water connections and when they are billed. According to this study, many waterworks set high customer satisfaction as an important objective but only few have methods such as customer satisfaction surveys to measure this. In larger cities, such as Oulu, customer satisfaction is measured through questionnaires that record citizens’ overall satisfaction with the city’s operation. This is hardly adequate if the questionnaires only include a few general questions about water and sewage services. A few interviewed waterworks also conducted their own surveys every second year and collected feedback through other channels. Direct customer feedback is stored, analysed and acted on and customer complaints are always taken seriously.

Smaller municipalities might not have any structured way of knowing whether their customers are satisfied. As one interviewee said, “We have not commissioned customer satisfaction surveys ... This is a pretty small town and customers give feedback quite easily anyway. We have pretty much been undisturbed so far, which can be interpreted as meaning that all is well”. Therefore, some managers do not even feel it is necessary to have a customer satisfaction survey since they believe that customers will use other channels, such as phone, e-mail or a designated feedback page on the Internet, to say if they feel something is wrong. Questionnaire respondents also considered direct feedback channels, such as phone, to be the most important source of customer satisfaction information since they provide a timely message regarding the current condition of the pipelines and water quality.

Finland has also a national Water Customer Satisfaction Index (WACSI), a customer satisfaction survey developed for all water and sewage service providers in Finland. Two hundred randomly selected households from each participating waterworks are interviewed and asked their opinions on water quality and waterworks operations. The survey is conducted once a year by Taloustutkimus
Oy and 42 waterworks have participated in it at least once. This is only a small fraction of the 1500 waterworks in Finland and should become more widespread.

Channels

Finnish waterworks tend to have quite similar distribution channels. The value proposition of delivering clean water and collecting sewage is handled through efficient and reliable water and sewage pipelines, water towers and pumps. Pipelines, pumps and automation may have different technical features but the main structure is the same across the country.

Even if the delivery of value proposition in itself is relatively simple, waterworks can, and should, take notice of other channels with which to reach customers, such as customer service interfaces. For example, purchase and payment transactions can be facilitated with electronic order forms, remotely read water meters, online notification of water meter readings, and electronic invoicing. In particular, remotely read water meters have already been introduced in some places in Finland. Additionally, waterworks could develop post-purchase support, which could include telephone helplines and different customer feedback channels.

3.4.2 Value creation system

In order to fulfil the value proposition offered to the customer, municipalities and waterworks need a working and reliable value creation system. Key activities, such as water acquisition and treatment, water delivery, sewage collection and sewage treatment, are essential for service provision. These activities require capital-intensive equipment that ranges from pumps and pipelines to complex sewage treatment plants. Without proper maintenance, design and construction, facilities and pipelines become obsolete, which leads to decreased service quality.

In principle, each of the four key activities mentioned above may be provided by different actors. Only about one-eighth of Finland’s waterworks provide all four core water services themselves (VELVET). Many have shared water or sewage treatment plants with neighbouring municipalities and even more deliver water to or receive sewage for treatment from other waterworks. In addition, more than 900 cooperatives provide water acquisition and delivery services in sparsely populated areas. They complement the services provided by the municipality in
more urban areas. This partly explains why there were more than 1500 water and sewage service providers in 342 municipalities in Finland (2010).

The main difference between different water and sewage service systems comes from their value creation system, what services they provide to the citizens and what they consider as their core competences. Thus, there are myriad different value creation systems in the Finnish water sector, of which the general model and some case examples are explained in further detail below.

Key activities

Waterworks provide one or more of the following key services: water acquisition and treatment, water delivery, sewage collection and sewage treatment. In addition, most waterworks have resources for maintenance and sometimes also for design and construction.

The first essential thing in terms of water supply is that a distribution network is created and kept in good condition. All other activities, such as quality water treatment, are secondary, if there is no channel through which the water can be delivered to the customer. In terms of sewerage, pipelines should be kept in good condition in order to minimise leakages and avoid environmental damage and health risks. Consequently, waterworks must take care of the regular maintenance, due to repairing and proper renovation of pipelines and pumps to keep them in outstanding condition.

One important set of key activities, therefore, is related to the design, construction and maintenance of pipelines and facilities. The share of in-house and purchased design and construction work varies greatly between different waterworks. In many cases, at least some smaller design works are done in-house, while large design works are put out to tender and bought from private consultants. Of the interviewed waterworks, Lahti Aqua Oy, Hämeenlinnan Seudun Vesi Oy, HSY Helsinki Region Environmental Services Authority and Vesikolmio Oy reported that they outsource practically all of their design work. Ylivieskan vesiosuskunta and Taivalkosken vesihuoltolaitos, on the other hand, do all pipeline and smaller design work in-house and outsource large facility renovation or construction designs due to a lack of knowledge in this area.

As is the case in design, smaller repair and construction works are often done by the waterworks’ own employees. However, major construction works, such as pipelines into new residential areas and new facilities, are tendered and bought
from private constructors. Oulun Vesi liikelaitos and Lahti Aqua Oy monitor and supervise the construction work themselves, even though this could also be bought from consultants. According to one interviewee, doing some of the construction work in-house allows waterworks to also employ staff during the “low season”; most importantly, it allows them to maintain the knowledge and skills of the staff related to new techniques and technologies. In many cases, waterworks also cooperate with the municipality in construction sites where roads, water pipelines, energy grids, etc. can be built at the same time. In these cases, even the tendering of the construction work can be done together with the municipality’s technical services.

The high cost of design and construction works means that many waterworks buy a high proportion of their services from the market. For example, 70 percent of the net revenues of Hämeenlinnan Seudun Vesi Oy are used to buy various services and materials from the market.

While design and construction are often outsourced, maintenance is considered to be core knowledge, which is why it is usually done in-house. This is due to the fact that the waterworks’ personnel have historical data and tacit knowledge about the network’s condition and an excellent practical knowledge of its maintenance. As one interviewee said, “Purchasing operations and maintenance from the market is irrelevant because we already have the employees in-house. HSV has 50 employees who have been trained specifically for this job”. One exception is the Jyväskylän Energia Oy water unit, which buys maintenance services from the subsidiary company JE-Urakointi Oy without competition. In addition, the technical unit of Jyväskylä city does a lot of the construction work in the construction sites of Jyväskylän Energia Oy’s and the municipality’s joint sites. Another exception can be found in Oulu, where most of the maintenance is done by the technical service provider of the municipality (organised as a MOE). Only network automation, maintenance of pumping stations and work related to water meters are done with the waterworks’ own staff. In both of these cases, however, maintenance is done by the waterworks’ old employees, who are simply transferred to another organisation.

Once these conditions have been met, waterworks should concentrate on the quality of water and sewage treatment. Many of the interviewed waterworks consider their core competencies to be water acquisition and treatment and sewage treatment. These are considered to be tasks of an expert that require special knowledge of processes, which is hard to find from the market but which waterworks personnel do have. Water acquisition and treatment can be considered
as a public service that must be done according to the law and set quality standards. Sewage treatment is more like environmental work, where waterworks must take care that the sewage does not pollute the receiving watercourse or the environment in general. Both of these are overseen by the CEDTE, as well as municipal health protection and environmental protection authorities.

According to questionnaire respondents, the efficiency of waterworks operations is also affected by the decision regarding which services are provided in-house, which are outsourced and how core competencies are handled. As one questionnaire respondent stated, “The organisation is scaled so that the core tasks can be done in-house and all else is bought from the market with long-term service contracts. Staff has good knowledge and commitment to perform core tasks and reach the set targets”. Core tasks are often influenced by historical, geographical and political issues. In rural, sparsely populated areas, water cooperatives have had an important role in providing household water, while individual households have their own sewage disposal systems. In more densely populated and urban areas, however, water and sewage services have historically been developed and provided in conjunction with other municipal or municipally-owned service providers. One example of the geographical influence on service provision is the foundation of Vesikolmio Oy, a company that is owned by several municipalities. The main reason for establishing this wholesale water company in the river valley of Kalajoki was the fact that the municipalities of Nivala and Ylivieska do not have groundwater, while the municipality of Sievi has an abundant supply.

When waterworks consider what their core competencies are and what services are reasonable to make in-house, they evidently encounter make-or-buy decisions. Several questionnaire respondents considered make-or-buy decisions as an important factor that affected the overall efficiency of the waterworks. Most respondents and interviewees considered their core competencies to be water purification, sewage treatment and pipeline maintenance. Pipeline automation and larger construction works were considered as ancillary services. All respondents who raised the issue of make-or-buy decisions were clearly in favour of purchasing services that are not core competencies.

The decision to outsource is also influenced by political decision-making. According to this study, municipalities have a huge impact on what water and sewage services are provided, where and by whom. Municipalities may face pressure to employ existing personnel, which is why services are not necessarily
outsourced but rather done in-house. Political opinions also affect how open municipalities are towards regional cooperation and joint ventures with other municipal waterworks. It might be that a waterworks is more eager and willing to cooperate and find synergies with other waterworks than its owner, who might stall or even prevent such an operation.

**Key resources**

The most important resources a waterworks has are pipelines, treatment facilities and other physical infrastructure. In addition, skilful and motivated personnel are needed to operate and maintain these physical resources.

Without a sound pipeline network, water cannot be delivered to customers, sewage cannot be transferred away and the value proposition cannot be fulfilled. According to the questionnaire, good condition of facilities and pipeline networks, together with up-to-date and cost-effective maintenance, makes a significant contribution towards the total efficiency of waterworks operations. Long-term investment planning, proper maintenance and systematic repair investments minimises unexpected expenses but also enables costs to be shared evenly throughout the asset lifecycle. According to one questionnaire respondent, total efficiency requires that “all facilities are dimensioned and designed to meet the operational requirements. All facilities should be designed with the target of 100 years’ operating time”. Another respondent emphasised strategic planning from the society’s point of view, “so that right and necessary investments are done and they are in productive use soon after construction”.

As mentioned above, the most essential task of a waterworks is to keep the pipelines in outstanding condition. However, there are considerable differences in the ages and conditions of different distribution networks and in the knowledge of infrastructure conditions. HSY Helsinki Region Environmental Services Authority can be considered a good benchmark in this respect. Firstly, its municipalities were broken down into environmental categories according to whether the pipelines are situated in a detached house area, apartment house area or park, for example, all of which received their own expensiveness factors. Next, a typical cost of construction for each expensiveness class was estimated. This enabled the replacement cost of a certain pipeline to be calculated from the expensiveness class, typical price and the pipe specifications (e.g., diameter). Furthermore, the write-off period indicates the remaining value of the asset during the holding time.
Pudasjärven vesiosuuskunta and the cooperation area of Järvi-Pohjanmaa are good examples of small waterworks, in terms of mapping, modelling and knowing the condition of pipeline networks. Pudasjärven vesiosuuskunta has basic information about its pipelines in digital format but does not incorporate information about the condition of the pipelines, for example. In Järvi-Pohjanmaa, pipeline network information is still only in paper format. Pudasjärvi and Järvi-Pohjanmaa both assess the need for renovation on the basis of repair frequency in a certain area. When the repair frequency exceeds a certain limit, the entire pipeline is rebuilt. This way, only the necessary investments are made and money is not put into renovating 50-year-old pipelines that might hold out for 20 more years (which can be considered as a stranded investment). However, there is a risk that pipelines will start to break more often and worse, which could cause more severe damage and higher costs than predictive maintenance and renovation.

FIWA is very worried about the current condition of the infrastructure: “If more attention is not given to, for example, pipeline renovations, problems will start to emerge sooner or later and will be reflected in the quality of service. It is not only waterworks that are to blame, because they are certainly aware of the situation, but it is largely a political decision and whether there are political will to spend enough investment funds to renovate. ... Something needs to be done before it's too late”. The 2009 and 2011 ROTI projects (Finnish acronym for State of the Built Environment) highlighted future investment needs, estimating that more than 30 percent of water pipes and 37 percent of sewers are over 30 years old. According to one ROTI report (ROTI 2009), the current renovation level should be increased from 0.4–0.8 percent to 2.5 percent of pipeline length per annum in order to keep up with the ageing network.

In practice, this means that, for example, Hämeenlinnan Seudun Vesi Oy (according to one interviewee) should use almost all of its investment reserves (half of its turnover) to renovate old pipelines, which could mean that there would be no capital left for new construction. This kind of problem is encountered particularly frequently in areas where a growing population obliges waterworks to build new infrastructure. In areas with declining populations (or only a slow population increases), waterworks are also able to invest in the renovation of old pipelines and modernisation of treatment facilities. For example, Taivalkosken vesihuoltolaitos has no pipelines older than 30 years and it just invested in a new sewage treatment process. Haukiputaan Vesi liikelaitos has been able to renovate
all but one kilometre of its 300 km of pipelines and has also been able to invest in new facilities.

Water and sewage treatment facilities are the second largest area of investment and account for a significant proportion of total assets. Complicated sewage treatment processes often require a lot of technical knowledge which is why the treatment processes are considered to be tasks of experts and, according to this study, are done with the waterworks’ own personnel. In addition to pipelines, facilities also require continuous upkeep, modernisation and renovation in order to keep pace with technical developments and fulfil future permit conditions. In particular, smaller waterworks may have problems reaching future refinement and purification targets, which forces them to either make large investments in modernisation, build a new facility or find solutions outside their own organisation. The last option was considered to be feasible in the river valley of Kalajoki, where regional water wholesaler Vesikolmio Oy bought owner municipalities’ sewage treatment plants, now handles the sewage treatment in the municipalities in addition to water acquisition and treatment and will build a new treatment facility to replace the old outdated ones.

Human resources are also crucial for successful service provision. According to the questionnaire, the professional skills of the management and employees are among the most important factors affecting waterworks efficiency. Efficiency in the daily operation of waterworks reflects the know-how of the personnel. According to one respondent, “waterworks personnel should be adequately trained and experienced ... waterworks must ensure that there are skilled employees in the future”. Skilful personnel should also have a knowledgeable, skilled and committed manager. The manager can directly affect the efficient utilisation of resources and have the opportunity to encourage, motivate and empower employees to better performance. Although waterworks may have numerous external monitoring and metering requirements, it does not, according to one questionnaire respondent, reduce the need for self-imposed goal setting, measurement and monitoring. This is especially important if there is a conflict of interest between the owner and the manager. Clear and transparent information about the current condition of operation can be used as a basis for discussion and can help parties reach a satisfactory consensus regarding objectives and performance level.

In addition to maintaining the knowledge of current employees and managers, it is important to pay attention to the continuity of service provision and knowledge transfer between old and new employees. A municipality can provide
its employees with job security and long working careers. It is common, therefore, for employees to work for the same waterworks all their lives, which leads to a situation where the average age of an employee in many waterworks is over 50 years. According to one interviewee, water and sewage service provision is not physically very tiring, so it is not very difficult to prolong a career if more attention is paid to well-being of the employees. How the thin and ageing workforce then affects the operations of waterworks, and thus the quality of service and water safety, is not yet known, but it is an area of concern for FIWA. According to FIWA, the quality and hygiene problems and failures in operations of small waterworks in particular have clearly increased. Although the situation currently seems to be reasonably good, this may not necessarily be the situation in 10–20 years’ time without structural change and development. According to another interviewee, current employees are still fit for and willing to work, but young professionals are needed to work alongside the retiring ones so that the tacit knowledge can be transferred. This is especially important since waterworks are traditionally quite conservative in their operations and the documentation is not necessarily at a very high level. There is a danger that when the current employees retire and are replaced by new ones, tacit knowledge is not transferred if it is not secured in a document format. One future challenge that the interviewees addressed is how to attract young professionals into the conservative municipal sector, which often offers lower salaries than the private sector. This has also been addressed in FIWA and one objective of its image campaigns is to raise awareness of the water sector and to attract new young talent to the industry.

**Key partners**

Traditionally, waterworks have carried out most of the key activities themselves. The closest and the most important partner have been and often still is the municipality, along with its other units, MOEs and MOCs. The most popular way for waterworks to cooperate with the municipality is related to the design, construction and maintenance of pipelines. Water pipelines, power lines and, for example, telecommunication networks, are often constructed and maintained simultaneously, which creates obvious synergies.

In Taivalkoski, for example, streets and water pipelines are designed and constructed in tandem in the municipality’s technical services. Waterworks experts participate in the process from the town planning stage. In a small
organisation like this, the whole project can be completed quickly and flexibly without excessive negotiation or settlement, which is considered to be a strength. When these synergies and benefits are visible, it is easy to understand why waterworks organised as municipal units are usually situated under technical services in the municipal hierarchy.

Oulu has taken cooperation a step further by transferring the construction and maintenance employees of Oulun Vesi liikelaitos to the municipality’s technical service provider (also organised as a MOE). This is part of an internal restructuring within the city’s organisation, in which client and supplier organisations are separated from each other. This is also a means by which the existing personnel of the municipality are employed. According to one interviewee, “Oulun Vesi acts as a client procuring services from technical service provider. The model can be criticised in that technical service provider’s market share is too high, especially when it is known that it does not necessarily have competitive prices compared to companies operating in the market”. Most maintenance is carried out by the technical service provider. In pipeline construction and renovation, however, Oulun Vesi can also use private constructors in works that do not have to be internally procured from the technical service provider.

Cooperation in the waterworks is not confined to the municipal organisation. If cooperatives operate in the outskirts of the municipality, they are often in close contact with the municipal waterworks so as to arrange and develop the local service provision. Municipalities may also support cooperatives quite generously if their establishment and operations are in the municipality’s best interests. In Pudasjärven vesiosuuskunta, for example, the municipality funded 25 percent of the initial investments when the cooperative was established. In addition to financial support, cooperatives may receive technical assistance or other intangible support from the municipality. Furthermore, neighbouring municipalities’ waterworks are encouraged to be in contact to create water and sewage services regional master plans.

The Finnish water sector also has many jointly owned waterworks, water wholesalers and sewage treatment plants. A jointly owned water wholesaler is a sensible option when, for example, one municipality has a lot of good-quality water and the other does not. In sewage treatment, construction of a co-owned sewage treatment plant might be a good option if a waterworks has problems reaching the refinement and purification targets in its own ageing facilities. A good example of this is the water company Vesikolmio Oy, co-owned by six
municipalities, which provides water acquisition and treatment as well as sewage treatment services to its owner municipalities. Currently, each municipality concentrates only on water delivery, sewage collection and the construction and maintenance of pipelines.

Water and sewage treatment are easily definable, separable and priced with easily attainable economies of scale. The interviews offered some good examples of these: Ervastinrannan Keskuspuhdistamo Oy (sewage treatment) and Liikelaitos Haukiputaan Vesi; Pääkaupunkiseudun Vesi Oy (water wholesale) and HSY Helsinki Region Environmental Services Authority; Lakeuden Keskuspuhdistamo Oy (sewage treatment) and Kempeleen Vesihuolto Oy; and Jyväskylän Seudun Puhdistamo Oy (sewage treatment) and Jyväskylän Energia Oy. In many cases, only water acquisition and treatment or sewage treatment is bought from the regional operator, which leaves the other to the local waterworks to take care of. The ownership structure of the co-owned waterworks can vary. MOCs are usually 100 percent owned by municipalities or other MOCs (for example, Lakeuden Keskuspuhdistamo Oy) and the holdings can, for example, be divided in proportion to population.

One partnership model in Finland has been taken to another level. The concession agreement between Lahti Aqua Oy and the municipality of Hollola can be seen as a good benchmark. The 15-year concession agreement covers all water and sewage services in Hollola so that the municipality of Hollola owns the facilities and networks and Lahti Aqua Services Oy provides services with Hollola’s equipment. Hollola is responsible for the investments and, therefore, all capital expenditures that accrue in the concession period. According to one interviewee, this is the first model in Finland, where the waterworks takes a financial risk in order to provide a certain service level to neighbouring municipality at a certain price. It provides a good foundation with which to develop contracts of this kind further, although only the future will tell whether this model was successful and a win-win situation for both sides.

“This model can be recommended in situations where municipalities have not reached a consensus to cooperate or establish a jointly owned company. In this case, services can be provided through a contract; this is much easier to implement than establishing a company, where the entire service needs to be priced and municipalities must agree on revenue distribution, etc. Water and sewage services can also be flexibly provided between municipalities through a service agreement.”
Partners are also needed in the design, construction and maintenance of facilities and pipelines. There are many differences between waterworks in terms of how much design, construction and maintenance is done in-house and how much is bought from the market. In general, however, it can be said that most of the design and construction are outsourced while maintenance is often done with the waterworks’ own workforce. As mentioned previously, automation is often also bought from the market since it is not considered a core competence of waterworks either. Questionnaire respondents felt that service providers can contribute to the efficiency of waterworks by providing their competence in special services at a reasonable price.

A couple of questionnaire respondents emphasised the importance of competition when services are procured. Interviewees said that there are usually several available service providers, which makes it easy to receive good tenders. According to one questionnaire respondent, “through competition, waterworks can motivate, reward and sanction service providers to give their best from the point of view of the waterworks”. Through competition and the right kind of contracts, waterworks can also demand efficiency from their service providers and subcontractors. In addition to competence and the price of service providers, one respondent emphasised their innovativeness, willingness to develop and quality of service as important components of a waterworks’ efficiency.

In some cases, waterworks must make an indefinite contract because of the nature of the service required. In terms of automation, for example, each service provider has its own equipment and software and it is not possible for other service providers to operate with someone else’s equipment. In some other tasks, however, such as the construction of service pipes, a narrow service offering is perceived as problematic.

### 3.4.3 Revenue model

The Act on Water Services (119/2001) states that, in the long term, waterworks should cover all operational and investment costs, with revenue recovered from customers, and earn only a moderate return on capital.

**Revenue streams**

Waterworks receive the largest revenue stream from their customers. The Act on Water Services (119/2001) states that waterworks need to collect a utilisation fee
from their customers and that the fee should be set according to the amount of water used and the amount and quality of conducted sewage. In addition, waterworks can collect a connection fee, a fixed fee and other necessary payments from their services.

Waterworks typically have both fixed and volumetric pricing. The connection fee is determined by the type of real estate. Detached houses, townhouses, industrial buildings, etc., all have different connection fees. The fees are usually set according to the estimated construction cost and are intended to fund the basic investment incurred by the waterworks. Waterworks typically have a certain formula for calculating the connection fee. For example, Taivalkosken vesihuoltolaitos’ formula includes a factor for real estate type (six types), a factor for service type (whether the customer wants both water and sewage or either), total floor area and a unit price per floor area.

Another pricing strategy is related to the size of the water meter (m³ or pipe diameter in mm), which sets the fixed charge per year. The percentage of the basic charge of all water charges varies between waterworks. In Häämeenlinnan Seudun Vesi, for example, the basic charge is quite typical, about 8 percent of all income. However, the ratio between the income received through basic charges (8 percent) and utilisation fees (90 percent) is considered to be distorted since there are a lot of fixed costs that currently cannot be covered through basic charges. Also, HSY Helsinki Region Environmental Services Authority is going to raise its basic charges from 5–8 percent to 20 percent in order to realise the full cost recovery principle sought by the Act on Water Services (119/2001).

“The utilisation fee is based only on consumption. When the full cost recovery principle is considered, there are also other costs that do not change in relation to consumption. Realising the full cost recovery principle is only possible through a fixed basic charge."

Each customer must pay utilisation fees for both water and sewage according to the amount of water used (m³). The utilisation fees are the same for everyone, except in cases such as an industrial customer who might have “heavy sewage” that requires special treatment. In addition, waterworks can charge their customers for additional services and extra work, such as the construction of pipeline intersections and real estate connections. However, these extra revenues are marginal compared to the revenues received from connection fees, fixed charges and utilisation fees.
There is no general rule of thumb for setting the ratios between the different charges; all waterworks set the prices according to their own mind. However, pricing decisions are important because they can be used to meet the full cost recovery principle. Because waterworks operate as monopolies, their pricing structure is controlled by municipalities and usually constrained by municipal decision making (excluding cooperatives). According to one interviewee, even though the waterworks may calculate and determine the correct prices through incurred costs, politicians have the power to set the final price. In Oulu, for example, the owner intervenes in pricing, indebtedness and profit returns rather than the budget of the waterworks. For example, the owner may set a clear profit return target of 4.3 million Euros (19.5 percent of net sales) and limit the maximum increase in water charges to 10 percent per annum. If a MOE makes a profit in any given year, the municipal government can “write it off”, but in Oulu at least, the profit is often left to the waterworks to make investments and develop their operations. Making profit is considered to be okay in MOEs since they are not liable to tax on profits.

The situation is different with MOCs. For example, Hämeenlinnan Vesi Oy aims to break even so that it does not have to pay tax on profit. This also affects the pricing strategy since higher customer fees lead to higher profits and taxes. According to one interviewee, the *Limited Liability Companies Act (624/2006)* has not been made for capital-intensive companies such as waterworks: “If we need to renovate a lot in the future, we still cannot make an operating profit because we then need to pay taxes”.

On the other hand, some municipalities do not want to raise water rates, for one reason or another, thereby endangering the financing of future investments. In other municipalities, water fees are increased in order to balance municipal deficit, even though the waterworks may already be making losses and unable to cover costs. As the annual report of one municipality noted, “The 2010 budget has been approved in accordance with the economic rebalancing. Real estate taxes and water charges have been increased for 2010 in accordance with the economic rebalancing”. Therefore, pricing can be highly political. According to one interviewee, although the cost might be known quite accurately, the pricing can be “like a lottery, where the price is set beforehand and it is seen at the end of the year whether it was enough”.

Water and sewage services can also be supported from municipal, state and European Community funds. Currently, state support is often directed into projects that have a large environmental impact or advance service provision in
rural areas. Municipalities can provide waterworks grants for individual projects or investments. In addition, they can support and train waterworks employees through a centralised system and provide additional services or resources free of charge.

The revenue stream to waterworks is generally very stable. For example, economic recessions do not really affect how people use water. The current trend of decreasing water usage is mostly due to factors such as advanced water fittings and the awareness of environmental issues that has been going on for a few decades. A recession might affect the waterworks’ industrial customers and industrial decline may have a significant impact on the revenue of smaller waterworks in particular. Furthermore, a possible decline in construction due to recession also affects a waterworks’ connection fee revenues; at the same time, however, it reduces the need for new investments.

**Cost structure**

As mentioned above, waterworks should cover all operational and investment costs with the revenue recovered from the customers, and should only earn a moderate return on capital. This is outlined in the *Act on Water Services (119/2001)*, which requires that the waterworks are at least calculatory separated from the municipality’s bookkeeping in order to ensure transparency and accuracy. Despite the law, waterworks as municipal units still seem to have issues with transparency and there might still be some creative accounting practices that lead to decision making based on the wrong grounds and, at worst, endanger the long-term sustainability of waterworks.

A waterworks’ most expensive and most important resource is its pipelines and facilities. Initial investment, maintenance and renovation of pipelines and facilities represent a significant portion of a waterworks’ total costs of operation. The cost of providing water and sewage services therefore consists mostly of fixed costs such as maintenance, distribution and depreciation expenses and return on investment. Only a small proportion of costs are variable, depending on the amount of water provided and sewage treated. Consequently, operation costs per unit are relatively low. Keeping the pipelines in a good condition requires continuous maintenance and repair investments so that the product – water – can be delivered to the customer. Pipeline network leakages can be considered one of
the most significant inefficiencies of waterworks and the amount of water lost and not delivered to the customer can be seen as an opportunity cost.

The cost structure of a wholesale water company can be quite different than that of a waterworks that provides all four core water services. The wholesaler does not always have the “burden” of capital intensive pipelines; only the facility and costs that can be directly allocated to the product. Consequently, the operation of the wholesaler is easy to specify and economies of scale are easily attainable.

Planning of investments and their funding should carefully weight and prioritise various opportunities. Particularly in growing municipalities, waterworks must carefully calculate the financial needs and ensure that there are sufficient funds for both new investments and renovation. For example, Jyväskylän Energia Oy currently uses most of its investment funds to build pipelines into new housing areas, leaving only a minimum to renovate old ones.

“The problems and challenges could be addressed by putting rates at a level where there is sufficiently money for everything. However, raising prices is not really possible, so essentially we just seek to establish a profitable business. JE’s water rates are the second highest in Finland, which is due to large loans. When it still operated as a MOE, Jyväskylä waterworks’ economy was pretty much in balance. ... Jyväskylän Energia Oy’s water business does not have to be profitable in itself, but the goal is to look at it at the corporate level. Water business cannot be profitable because of large assets and the return the owner takes in relation to them”.

On the other hand, a small cooperative may receive state support for new investments. According to a few questionnaire respondents, these investments may then be used for “low priority” investments. Instead of simply concentrating on extensions and constructing new ones, some questionnaire respondents emphasised the importance of renovation investments for improving the total efficiency of waterworks. In any case, waterworks need to have good and safe financing opportunities if they want to make either new or renovation investments.

Another major issue related to the costs of waterworks is revenue transfers from waterworks to the municipality. This is especially the case in larger waterworks that are organised as MOEs. In the worst case, the income transfers to the municipality distort the cost structure of the waterworks and hinder the investments that should be made to keep the pipeline network in good condition. As one interviewee noted, “If the level of investment is inadequate, large waterworks should reduce the profit transfers to the owner and transfer the excess
amount to investments, and smaller waterworks should raise prices to become at least self-profitable. On average, prices should be raised and/or the owner’s earnings should be reduced”. It is especially important to pay attention to profit transfers if the municipality has financial troubles, since it then becomes attractive to raise the profit transfers from the waterworks in order to balance the municipal budget. However, this may lead to the deterioration of waterworks’ assets, which can cause trouble for both the waterworks and the municipality.

“The eternal conflict in water and sewage services is that there is price regulation and business control and, on the other hand, investment needs are provided and a ceiling is set on purchases. These cause huge efficiency improvement goals for the operation.”

“A lot of MOEs are directed and controlled by the municipality. They do not necessarily have the opportunity to borrow money, they cannot have negative results and they cannot use all the financial and operational arguments. A waterworks may be a single investment, which should be financed with a loan. A loan would not do any harm; on the contrary, it could be an advantage. In some municipalities, waterworks finances are not separate enough for the wise management of finances. They [finances] should be separate and transparent.”

According to several questionnaire respondents, cost efficiency is considered one of the most important factors that contributes to the total efficiency of waterworks. In a tight economic situation, however, the operational costs of waterworks are difficult to cut. For example, layoffs do not really have an effect since the personnel costs are a fraction of the total costs. An effective way of cutting costs is to look for synergies and cooperation within and outside the municipality. This has already been done in some small waterworks, where the municipality’s technical personnel also takes care of the waterworks’ operations. In the metropolitan area, for example, cooperation with the municipality’s technical services reduced investment costs almost by half when pipelines were renovated at the same time as roads. This makes it profitable to also renovate newer pipelines than would otherwise be the case.

According to the interviews and questionnaire responses, one evident shortcoming in waterworks is the lack of long-term planning. The water sector is very capital intensive and in many parts of the country the assets are beginning to reach the end of their lifecycle. Long-term investment and renovation planning
could be the key to quality service provision and securing supply in the future. However, what makes long-term planning difficult is the owner municipality’s strong impact on waterworks economy. Municipal units are in an especially tight position because they are part of the municipal budget and because they have to fight for a share of the municipality’s decreasing financial resources. In addition, municipal units, and often MOEs, are under the auspices of the municipal decision-making, which means that decisions are made on the basis of budget years and municipal council periods (four years); in reality, the planning time horizon should be considerably longer.

3.5 Analysis of financial performance

This chapter focuses on the financial performance of waterworks. Data was collected from selected waterworks (see Appendix 4) financial statements and balance sheets for at least a three-year period ending in 2009. Using the performance indicators developed for companies listed in stock exchanges, traditional analysis on the profitability of investments was conducted. The objective of the analysis was to understand the financial position and performance of waterworks. The first part of the analysis calculated key profitability ratios for each of the analysed waterworks; namely, return on investment (ROI), return on assets (ROA) and return on equity (ROE). Secondly, a set of ratios (free cash flow and cash flow adequacy) were calculated in order to find out whether waterworks can finance their operations and (part of their) investments with revenues. All ratios are calculated and shown in figures as averages over the period of available data. Formulas for calculating the key figures can be found in Appendix 5.

The analyses begin with return on assets (ROA), which measures the company’s ability to generate revenue on the total assets invested in the company. According to the Committee for Corporate Analysis (2006), a good ROA is above 10 percent, 5–10 percent is satisfactory, and below 5 percent is poor. A good ROA is the result of a high net result with respect to a low balance sheet total. Companies with a high ROA have a better revenue/asset value ratio than companies with a low ROA. A poor ROA is mainly the result of a low or a negative net operating result. In general, the studied organisations seem to have poor ROAs, as can be seen from Fig. 22. Only one-third of waterworks reached the level of satisfactory or good ROA rating. One reason for bad financial performance using ROA could be the capital intensive nature of the waterworks.
business. In addition, if the waterworks aim for zero net result as part of their operational strategy, the value of ROA is naturally close to or below zero.

Fig. 22. Return on assets (ROA).

Return on investment (ROI) measures relative profitability; that is, the yield that has been generated on the invested capital, which requires a formal return in the form of interest or equivalent. The value of ROI can be regarded as fairly good when, at a minimum, the value amounts to the average financial expenses as a
percentage of the interest-bearing liabilities (reference value in Fig. 23). A good ROI is mainly due to a large net result and a poor ROI value is due to a small or negative net result. More than half of the waterworks in this review have a ROI value above the reference value, as Fig. 23 shows.

Return on equity (ROE) measures a company’s profitability by showing how much profit is generated by the money that shareholders have invested. The required level of ROE depends on the rate of return required by the owners. This required rate of return is affected by the risks involved. If the owners think like an investor, they should require at least a risk-free return on their investments. Since waterworks are not listed in the stock exchange and they are public utilities, the risk-free return on equity can be set at the level of government bonds; in May 2010, this level was 3.58 percent. Only a few waterworks have reached this reference value, as Fig. 24 shows. Many waterworks even have a slightly negative ROE value. This again points towards the negative net operating results of many waterworks. If the municipality requires a return on invested capital, it does not
show in these analyses, as municipalities tend to receive the returns prior to financial statement adjustments.

Fig. 24. Return on equity (ROE).

For comparison purposes, Fig. 25 groups the profitability ratios of reviewed waterworks by their ownership and governance model. The figure shows that MOEs are the most profitable of all the models. The difference in financial performance between MOEs and MOCs can be partly explained by the fact that
MOEs do not need to pay taxes. MOEs can also have high net results compared to MOCs, which often pursue a zero operating result so that they do not have to pay taxes. Negative profitability ratios of cooperatives are a result of their not-for-profit nature.

![Fig. 25. Profitability ratios of ownership and governance models.](image)

*Free cash flow* represents the amount of cash that a company has left over after it has paid all of its expenses, including investment repayments and depreciation according to depreciation plan. Fig. 26 shows waterworks’ free cash flow measured against their net sales. A large positive free cash flow means an organisation can save money for future investments. A low amount of free cash flow indicates either that the company is investing a lot of its revenue or that the company has a very modest revenue stream.
One way to determine whether a waterworks is investing adequately (which could also explain the negative free cash flow) is to compare its capital spending with its long-term assets. This is not a perfect comparison but it does offer an idea of how aggressively a company is spending. Research results indicate that, on average, the reviewed waterworks’ capital spending as a percentage of current assets has been approximately 11 percent, which indicates that waterworks are not spending very aggressively. Naturally, this focuses attention on the negative free cash flow.
cash flows of many reviewed waterworks, which suggests that they cannot operate profitably. According to the qualitative results of this research, potential reasons for this kind of poor economic situation may be low customer fees and/or high profit transfers to the municipality.

One argument in the Finnish water sector relates to the adequacy of financing for operations. One measure of this adequacy is the financing of investments ratio, which measures how operational cash inflow and cash inflow from extraordinary items will cover investment expenses. The ratio is calculated from the cash flow statement and includes all financial expenses (including expenses to the owner municipality). Fig. 27 shows this ratio for the reviewed waterworks. Only six waterworks achieved a financing of investment ratio of over 100 percent; eight were between 80 and 100 percent and 14 were below 50 percent. Imatran Vesi was left out of the figure since its ratio (338 percent) was many times that of the other waterworks.
Another measure that can be used to evaluate cash flow adequacy is to compare cash after financing transfers with depreciations and other reductions in the value of assets. The basic assumption is that the operational cash flow is sufficient if the cash after financing transfers is at least equal to the value of depreciation of fixed assets. Of the selected group of 39 waterworks, 15 could not reach the “target” value (Fig. 28). This means that they could not, on average, cover depreciations with cash available after financing transfers. The best performers in this group were MOCs, all of which reached the target ratio. Imatran Vesi was again left out.
of the figure since its ratio (491 percent) was many times that of the other waterworks.

![Diagram showing cash after financing/depreciations](image)

**Fig. 28. Cash after financing/depreciations.**

Fig. 29 shows the differences between the financial adequacy ratios of different ownership and governance models (excluding Imatran Vesi). The financing of investment ratio indicates that, on average, only a few studied waterworks can finance their investment with income financing. However, financial adequacy to cover depreciations is good for most MOEs and for all MOCs and cooperatives, but is insufficient for most of the municipal units.
Unfortunately, the above-mentioned financial indicators cannot be used reliably and unambiguously to estimate financial performance. A company’s financial performance can be affected by circumstances beyond its control. The owner or manager also has the possibility for “creative accounting” by arranging various transactions under different headings in the financial statement, as has been the case of compensation to municipalities.

3.6 Potential avenues for development

On average, Finnish water and sewage services are in good condition. Raw water sources, especially groundwater areas, are well taken care of and good quality water is adequate for future needs.

This chapter discusses the potential avenues with which to develop Finnish water and sewage services at local and national levels by pulling together data from interviews, questionnaire and financial analysis. The main development areas are related to the transparency of operations and finance, proper maintenance of infrastructure, setting clear roles and responsibilities, cooperation and benchmarking. Each of these are discussed in their own subchapters.

3.6.1 Transparency of operations and finance

One of the basic principles of the Act on Water Services (119/2001) is to improve waterworks’ financial transparency by requiring financial separation of the waterworks from the municipality. The law also requires waterworks to cover all
operational and investment costs with revenues recovered from customers and to earn only a moderate return on capital. These principles have not been well realised, as noted by the working group preparing to readjust the Act on Water Services (MMM 2010).

First and foremost, implementation of the above principles requires transparency and accuracy in the bookkeeping. Without transparency, it is not possible for the waterworks to see the real money flows, which is why it is also difficult to make correct pricing and investment decisions, for example. Furthermore, it is not possible to achieve transparency without clear separation of waterworks accounting from municipal bookkeeping. When operating transparently, waterworks can clearly show their operational and future investment costs, which can further be used as leverage in political decision making.

It is necessary to pay special attention to the pricing of services because covering operational and investment costs with customer payments is a prerequisite for sustainable business. According to FIWA, although the waterworks may calculate and determine the correct prices through incurred costs, politicians usually have the power to set the final price. An example of undue usage of power is where the municipality decides to set the price of water below the national average, ignoring the waterworks’ operating and capital costs and future investment needs. This leads to a situation where the waterworks is not able to keep its assets in proper condition, which causes increased maintenance backlog and deterioration of assets.

On the other hand, municipalities may inappropriately exploit the monopoly position of the waterworks and their own controlling power to set the prices higher than necessary in order to support their own purposes. This is the case in municipalities where waterworks are highly profitable – due to economies of scale, for example – and are able to return reasonably high profit to the owner. Even the law requires that waterworks should return only a “moderate” profit to its owner but there is no agreed percentage of a “moderate” profit. However, if high profit returns jeopardise future investments and/or cause increases in customer fees, the profit returns are clearly unreasonable. Another example is where the municipality uses waterworks as “cash cows” to meet its budget deficit or to finance other sectors at the expense of quality water and sewage services. However, removing these cross-subsidies may be somewhat problematic because many municipalities have a lack of money and the politicians would rather fill the deficit by raising the water charges than the municipal tax rate.
In the energy and natural gas markets, the Energy Market Authority has defined the reasonable return on invested capital in natural gas market to vary from 6.07–7.41 percent for municipal operators (Kuntaliitto 2007). One interviewee was hopeful of a preliminary ruling on “moderate profit” in the water sector so that a common level and understanding could be reached.

What should be considered more thoroughly in many waterworks is that new investments could be financed almost exclusively with connection fees. By calculating the connection fee correctly and according to the real construction costs, waterworks could cover their initial investments with customer payments, leaving money for renovation expenses. Kiuru et al. (2001) suggested that renovation costs are then covered with income and loans so that yearly repair investments are approximately the same size as depreciation. Setting the connection fee close to the actual construction costs is one step towards complying with the full cost-recovery principle enacted in the Act on Water Services (119/2001). Another issue is to look at the ratio between fixed charge and utilisation fee of all revenues. Two interviewees have already considered increasing their traditionally low fixed charge to increase its relative proportion of all revenues. The interviewees rationalise higher fixed charges with the capital-intensive nature of the service and the low per-unit production cost. The interviewees would like to raise the percentage of basic charges from about 5–8 percent to 20 percent in order to realise the full cost-recovery principle. However, the decision to raise the fixed charge must be very well calculated, justified and explained to customers to reduce unnecessary resistance.

According to this research, current reporting practices are heterogeneous and depend to some extent on ownership and governance model and the interest of the owner and the manager in reporting. When searching for material for the analysis of the financial statements, the material of MOEs was most easily attainable and that of municipal units was usually quite easy to find from the municipality’s annual report. MOCs do not usually make their financial statements available on the Internet and when asked, some MOCs even refused to give out their financial statements. The main reason for the difficulty finding information about cooperatives was that they rarely have easily accessible websites or telephone numbers. Furthermore, operational information was clearly more difficult to find than financial statements. Many larger waterworks have their operational information available on the Internet (a good benchmark is Oulun Vesi liikelaitos),
but many waterworks did not have operational information even in their annual report, or what they did have was very limited.

More open and transparent operation and reporting practices would be useful for public authorities, such as the CEDTE and the relevant ministries, for compiling statistics or following up aspects such as investment levels and “moderate” profit returns. Currently, this is not possible given that all waterworks have their own reporting practices; although there is a statistical system for waterworks (VELVET), it does not presently have up-to-date information.

One solution for more transparent operation of waterworks could be uniform reporting practices. These make it easier to maintain high-quality statistics, follow up on waterworks’ finances, research and benchmark between waterworks. Because water and sewage services are public services and natural monopolies, transparency can be seen as a natural target. This idea is elaborated in Chapter 3.6.5.

3.6.2 Proper maintenance of infrastructure

The greatest future challenge for waterworks is asset management and maintenance of existing infrastructure. Without knowing the condition and investment needs of its main assets, the pipeline network and the facilities, it is extremely difficult to guarantee the high level of service that customers’ value.

Systematic mapping and modelling of infrastructure is a good instrument with which to assess the current condition and future investment needs. HSY Helsinki Region Environmental Services Authority can be considered as a good benchmark in this respect. When four municipalities in the metropolitan area decided to join forces in waste management and water and sewage services, assigned working groups went through all pipelines to determine the value and condition of the assets. In HSY, water and sewage pipelines are now classified according to their expensiveness class, pipe size and unit cost of construction so that the replacement cost can be calculated.

Systematic modelling and digital storage of asset data will also help transfer the tacit knowledge from ‘generation to generation’, when the career employees retire and new younger employees take their place. Improved asset management practices are also needed if the waterworks are to consider hiring, for example, an external maintenance contractor, who needs as much information as possible on pipeline networks in order to do his/her job. This is especially relevant when
opportunities for cooperation and new service provision options are considered (see Chapter 3.6.4).

Good asset management practices are also prerequisites for long-term planning of operations and investments. Interview results suggest that many waterworks have good knowledge of their short-term operational and investment costs. However, it became clear during the course of the study that there are evident shortcomings in the long-term planning of waterworks operations. Investment planning, for example, is currently only done for the five subsequent years, although the lifetime of the pipelines can be as long as 50 to 100 years. Long-term planning is the most difficult in waterworks that are close to the municipal organisation – that is, municipal units and some MOEs – where the municipality can have a strong impact on the finance. Municipal units in particular are under the auspices of the municipal decision-making, which means that many decisions are made on the basis of the annual budget and the planning horizon seems to be a maximum of four years, which is the same as the council period. In reality, the time horizon of the planning should be considerably longer.

The industry is very capital-intensive and, in many parts of the country, the assets are beginning to approach the end of their life-cycle. This, in addition to major pipeline breakages that have already occurred, emphasise the importance of long-term investment, renovation and financial planning, which are key to good quality services and security of supply. Additionally, a long time horizon for investment planning is strongly linked to the fact that waterworks need to cover all costs, including investments, through customer payments. Knowledge of the condition of assets makes it is easier to estimate future investment costs and set customer prices accordingly. This way, the waterworks does not need to make sudden price increases, for example.

Long-term investment planning is a prerequisite for maintaining and repairing old infrastructure before systematically breaks down and for paying off the already accumulated backlog. According to the results of the ROTI projects (2009, 2011) waterworks do not currently invest enough for pipeline renovation. The current renovation level of 0.4–0.8 percent of pipeline length per annum should be increased to 2.5 percent in order to keep up with the ageing network. Many waterworks with scarce resources currently concentrate on constructing new pipelines instead of renovating old ones. If pipelines are not renovated on time, pipeline breakages and repair needs increase in number as the pipes get older. To guarantee future service provision, waterworks must carefully calculate
their financial needs and ensure that there are sufficient funds for both new investments and renovations.

Another important issue to consider is how much the owner municipality interferes in waterworks investment decisions. In some municipal units, investments may become secondary to social and health sectors investments. Elsewhere, if the owner municipality has financial troubles, there is a temptation to start pumping money out of profit-making waterworks or increase existing profit transfers. In some municipalities, these can already be considered problems, which is why FIWA has stated that without reductions in income transfers and/or increases in customer prices, it is not possible to maintain the current level of high-quality service.

3.6.3 Clear roles and responsibilities

The waterworks’ governance model depends on its ownership model and related legislation. Each ownership and governance model (municipal unit, MOE, MOC and cooperative) has slightly different roles and responsibilities for different governing bodies. The division of tasks between administrative bodies is most accurately defined in the legislation of the MOE compared to the corresponding legislation of MOCs and cooperatives. According to this research, there is an established practice that the manager takes care of the daily business and all major issues are taken to the board for approval.

Representatives of municipal owner(s) currently use their voice in the annual meeting and the board (executive board in MOEs and board of directors in MOCs and coops). Because all the major issues are made at the board’s discretion, the competence and composition of the board has a significant impact on the efficiency of water and sewage services. According to this study, the board often comprises politicians who rarely have adequate knowledge about waterworks engineering and management, or the special characteristics of the business. Still, according to the results of this study, some boards are surprisingly eager to tackle even the most technical issues, which could lead to conflict between the board’s will and the waterworks interests.

In order to avoid unnecessary disagreement between the various governing bodies, all actors should agree on their roles and responsibilities in the provision of water and sewage services. According to the law, the municipality is responsible for organising water and sewage services, but it is free to choose how and by whom the services are provided. In addition, the municipality has a
supervisory role together with the CEDTE. However, responsibility for organising and supervising does not imply strict control over the operations. In this study, it became clear that the municipalities should not interfere so much in waterworks’ operational decisions and investment plans. Short-term politicking and a lack of industry-specific competence may be deleterious if it disturbs necessary investment, pricing and other operational decisions.

Reliable, good-quality water and sewage services are in the common interest of all stakeholders. Many interviewees and questionnaire respondents feel that there should be more open discussion between the municipality and the waterworks management regarding the efficient operational area and make-or-buy decisions. The results of this study indicate that municipality should be more open to new solutions, should concentrate more on strategic than operational decision making and should give waterworks more freedom to decide on operational issues. This requires mutual trust and understanding between the municipality and the waterworks management.

According to this study, many MOCs have taken a more business-oriented approach, but the safe haven of municipal organisation does not really encourage municipal units and some MOEs for business orientation.

Another important issue that was addressed in the interviews concerned the accountability of the waterworks as an entity. The board of directors, the executive board, the municipal board and the municipal council are often well informed regarding the activities of the waterworks. Upwards accountability is arranged through regular reporting, often with balanced scorecards or the like. However, accountability towards customers is often worse. Collection and analysis of customer feedback and measuring customer satisfaction is not very well realised in many waterworks. In particular, smaller waterworks do not monitor customer satisfaction regularly, but rely on customer complaints where “no complaints” is believed to equate to “everything is okay”. Additionally, an important form of accountability is to inform customers of current operations. It is the customers’ priority to obtain information about the water and sewage purification results (quality of the service) and notifications of disturbances in the delivery (reliability of service provision). The customer may also be interested in future investments plans, levels of unaccounted-for water (condition of pipelines), prices and other financial issues. Waterworks should be obliged to provide their customers with a certain amount of information so that customers can become
acquainted with the service provision. In addition, communication in emergency and crisis situations should also be developed further.

3.6.4 Opportunities provided by cooperation

Jointly owned waterworks or water wholesalers are sensible options when, for example, one municipality has a lot of good quality water and the other does not. In sewage treatment, smaller waterworks in particular may have difficulty reaching the refinement and purification targets in the future, which makes it reasonable to search for cooperation opportunities.

A good example is the river valley of Kalajoki, where jointly-owned Vesikolmio Oy provides both water acquisition and treatment and sewage treatment services to six municipalities. This kind of cooperation can be seen as a part of national development where certain activities, such as water acquisition and sewage treatment, are concentrated to a few regional operators so that quality product and services can be provided safely and efficiently while also exploiting economies of scale.

In the Hämeenlinna region, seven municipalities established a jointly-owned company for water and sewage service provision in 2001. The company was established not only to improve water supply but also due to a strong will to cooperate. According to an interviewee, the successful cooperation in the regional water and sewage service provision also contributed to the municipalities’ decision to merge in 2009.

In a water and sewage service business there is no one right way to work; instead, each waterworks should evaluate what it can do itself and whether there is need to look outside its own organisation for partnership and cooperation. Jointly provided services can bring scale advantages and can create synergies. In addition to ‘traditional’ cooperation and jointly owned businesses, more daring options could also be considered.

One of the rarer options that emerged during this study is resource pooling. Resource pooling contains several new opportunities related to the provision of operation, management and maintenance services of waterworks. As ageing personnel forces waterworks to consider new recruitment, one option is to consider pooling resources across waterworks within a region. It is highly unlikely that certain services are needed at multiple locations at one time, so it makes sense to set up teams for maintenance, etc. from a regional perspective. Waterworks could also pool resources other than personnel. Movable machinery
and equipment could be jointly purchased, used and maintained so that the initial investment would not only be a burden for one waterworks’ balance sheet. This could be particularly useful for smaller waterworks, such as cooperatives, which may have difficulty finding the right kind of personnel with the know-how and motivation. According to one interviewee, research pooling would also be the first step towards closer cooperation.

Another idea is for waterworks to cooperate in the provision of emergency services. Several waterworks that are located in the same geographical region could have a joint control room or could outsource monitoring and surveillance, for example, to security companies that have staff and vehicles available on call 24 hours a day. The advantage in this kind of cooperation is that the fact that facilities and pipelines do not usually need 24/7 care means that fewer employees are likely to be needed to take care of monitoring and maintenance of several waterworks. Barriers to this kind of operations may be a lack of available skilled personnel and the reluctance of municipalities to use outside service providers.

Another, more daring option, is operation and management (O&M) contracts, which are already used in the provision of some other infrastructure services. A good benchmark is the concession agreement between Lahti Aqua Oy and the municipality of Hollola. The 15-year concession agreement covers all water and sewage services in Hollola so that the municipality of Hollola owns the facilities and networks and Lahti Aqua Services Oy provides services with Hollola’s equipment. This is the first such model in Finland, where the waterworks takes a financial risk to provide a certain service level to a neighbouring municipality at a certain price.

This could be taken further by handing the operation and management over to a private company (such as Veolia Water in France). O&M models have been tested around the world and even in Finland in at least one separate sewage treatment plant located in the vicinity of an industrial plant. One real threat in O&M contracts is that the contractor could neglect the maintenance of the infrastructure in order to maximise its profit. This threat can be reduced only by a carefully thought-out and written contract that ensures the contractor receives a decent profit and the condition of infrastructure is not compromised. Full exploitation of O&M contracts may also require changes in the legislation.

For municipalities that consider full O&M contracts too adventurous, waterworks could consider outsourcing specific activities or a group of activities. This study raised a number of such services, including water meter reading and
changing, remote monitoring of water delivery and pumps, construction of service pipes, pipeline maintenance, and pumping station maintenance.

### 3.6.5 National follow-up and benchmarking

Current quality control of water and sewage services is at a high level. Tight and ever-tightening legislation aims to keep raw water sources in good condition and to provide high-quality water to customers. The service quality is monitored by the owners, municipalities’ health protection and environmental protection authorities and the CEDTE.

However, the follow-up and monitoring of waterworks operation in general is lacking. The statistical reporting of Finnish water and sewage services has been very good as recently as the 1990s, but the statistics have been neglected since a new statistical system was introduced in the 2000s. The present study was faced with the fact that information about the current state of water and sewerage systems is difficult to obtain. In Finland, there is no national entity that systematically follows up, compiles statistics and reports on the operation of waterworks and the current state of the water sector.

One option that was brought up in this study is to establish a new authority or strengthen the role of the CEDTE to follow up and guide the operation of waterworks. The authority could follow how well the waterworks complies with the requirements of the law; for example, by covering all expenses with customer fees and returning only a moderate profit to the owner. If the authority found deficiencies, it could interfere by giving guidelines and setting standards.

This kind of follow-up requires more open and transparent reporting of waterworks activities than is the case today. That is why one important task of the authority would also be to create uniform reporting practices to all waterworks. Currently waterworks provide information in different formats at least to Statistics Finland, the CEDTE, the Register of Companies and the municipality. In addition, 43 waterworks enter information into FIWAs benchmarking system.

If all the information were public, it would increase transparency and allow benchmarking. Because there is no real competition between waterworks, openness should be seen as an opportunity for each waterworks to find best practices, learn from the best and improve its own performance. According to the interviews and questionnaire respondents, many waterworks benchmark and compare their operations against those of other waterworks by comparing the price of water and sewage. This is considered a good benchmark method among
the questionnaire respondents because it is a simple, easily available and comparable measure. However, the price is highly influenced by many of the above-mentioned internal and external factors. According to this study, the municipality may, for example, set the price below or above the reasonable price calculated by waterworks manager. In addition, full cost recovery is one of the most important requirements for the price to even be suggested.

Throughout this study, it became evident that benchmarking waterworks against each other requires more than just comparing customer fees. It must also take into account the length of pipelines, volume of water supplied and sewage treated, unaccounted-for water, leakages, interruptions in delivery, replacement investments, profit returns to the municipality and so on. Furthermore, it is not enough to compare these individual numbers; a set of descriptive indicators is required that puts these figures into context. This is done in FIWA’s benchmarking system, which calculates 66 carefully selected indicators from 162 different basic figures of waterworks. The system is for FIWA members only and it is unfortunately under-used; only 43 waterworks are currently involved. The questionnaire respondents identified several possible reasons for this lack of enthusiasm. Many consider the system too complex, it requires information that might not be currently collected, there are so many other systems into which information must be entered, the system fees are considered too high or the waterworks are not willing to share their financial and operational information in public.

Many of the questionnaire respondents and interviewees considered this to be an excellent or good system but felt it might be too heavy for smaller waterworks. If the system was somehow “lightened” and made more attractive in a way that does not make the waterworks feel “threatened” when entering the information and instead revealed the benefits of the system, more waterworks might join and expand the range of reference. One option is to also make it part of the national follow-up and monitoring programme proposed above. In this way, it could be directed to all waterworks in Finland, not just FIWA’s members (of which there are approximately 300).

Although it can be difficult to compare different waterworks with each other because of the number of internal and external factors that affect the operations and finance, benchmarking and finding best practices can be highly beneficial with the right kind of indicators. First of all, waterworks can monitor their own performance and set future development targets based on historical data entered
into the system. Secondly, waterworks can compare their performance to other similar kind of service providers in order to find best practices and development targets. Thirdly, performance measures and accurate financial and operational information can be used as leverage against municipal decision makers. With truthful measures, waterworks can better justify the required investments, prices and other changes in the operations.
4 Discussion

4.1 Contribution

RQ1 What kind of framework can be used to analyse factors that affect waterworks’ performance?

In order to analyse waterworks, an analysis framework was required. The motivation for creating the framework was that the literature lacked a general or widespread framework for analysing public services and factors that affect their performance. This study took a comprehensive viewpoint to cover both internal and external factors that affect the performance of waterworks. With this broad perspective in mind, a framework was created with which to analyse the performance of waterworks. This framework is depicted in Fig. 30.

Fig. 30. Analysis framework.

The three main elements of the framework are ownership, governance and business model. Ownership was looked at mainly from a public perspective since water and sewage services in Finland have long been seen as public services that belong under public authority. Governance was also examined from a public perspective but also from a corporate governance viewpoint. The central units of analysis in this respect were the different governance models.
This study described the business model through three elements (offering, value creation system, revenue model), which were further divided into nine elements: value proposition, customer segments, customer relationships, distribution channel, key activities, key resources, key partners, revenue streams and cost structure for closer inspection.

It was noted that what makes the difference between waterworks and their ability to generate money and become efficient is the value creation system through which the value proposition is offered to the customer. This study examined the value creation system through five key building blocks: customer value, key activities, key resources, key partners and the interaction between the different actors.

The waterworks cannot influence some external factors through their own actions, including the environment and the existing legislation that set boundaries for operation. Legislation and environmental factors were studied in order to evaluate how they affect the performance of waterworks.

The framework was further used as a basis for creating the questions for interviews and the questionnaire, and in analysing the data. Elements of the framework were also used when presenting the research results, in order to maintain consistency throughout the research. On the basis of the empirical study, it can be concluded that value creating network elements proved more suitable than offering when analysing factors that affect waterworks performance. This is due to the offering being obvious when waterworks are obligated to offer services to all customers within their operational area. Consequently, analysing offering provides no additional value.

**RQ2 How do external factors affect the performance of waterworks?**

According to this study, the most important external factors that affect waterworks performance include the legislation, control by authorities, operational geographical area, and municipal planning. Table 11 summarises these factors and their impact, as identified in this study.
### Table 11. External factors that affect waterworks’ performance

<table>
<thead>
<tr>
<th>Factor</th>
<th>Effect</th>
<th>Implication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Legislation</td>
<td>Guidelines for how and where services should be provided</td>
<td>Basic framework for service provision</td>
</tr>
<tr>
<td></td>
<td>Roles and responsibilities of different actors</td>
<td>Unclear roles may cause conflicts of interest and inefficiencies in decision making</td>
</tr>
<tr>
<td></td>
<td>Quality requirements</td>
<td>Quality requirements affect operational costs</td>
</tr>
<tr>
<td>Control by authorities</td>
<td>Set and monitor the fulfilment of permit conditions</td>
<td>If permit conditions cannot be met, there is a threat of closure unless corrective actions are taken</td>
</tr>
<tr>
<td>Operational geographical area</td>
<td>Geography, topography, soil conditions and raw water source</td>
<td>Impact on costs of pipeline network and thus the profitability of service provision</td>
</tr>
<tr>
<td>Municipal planning</td>
<td>Decisions on community structure, land use and town planning</td>
<td>Impact on construction costs and efficiency of service provision</td>
</tr>
</tbody>
</table>

The *Act on Water Services (119/2001)* is the most important law influencing the operation of waterworks and it sets guidelines for how and where services should be provided and for the roles and responsibilities of different actors. In addition, it enacts that waterworks ought to cover all costs with customer payments and the waterworks should be financially separated from municipality to guarantee transparency. Three legislative issues are currently “hot topics”. The first is the government regulation from 2004, which sets the minimum requirements for household sewage treatment and may increase the workload of waterworks by the end of 2015. The second is legislation under preparation that may transfer the responsibility for rain-water from the waterworks to the municipality, thereby bringing financial benefits to the waterworks. The third issue is the preparation of the new Act on Water Services, which may bring many changes to the current operation. Therefore, legislation sets the basic framework within which waterworks need to operate (see Table 11).

Water and sewage services are subject to external control by the CEDTE and by municipal health and environmental protection authorities. These authorities set and monitor the fulfilment of the permit conditions given to the waterworks. Permit conditions have a major impact on waterworks and their performance since they set the refinement and purification targets that must be met for all conditions. If the waterworks does not meet the set requirements, the controlling authority can interfere in its activities and require waterworks to change their conduct to meet the permit conditions.
According to this study, the physical location and the geography of the operating area of the waterworks have an impact on its efficiency (see Table 11). It can be very costly to operate a waterworks in a large, sparsely populated municipality compared to dense metropolitan areas when the lengths of pipelines increase. In addition, the geography and topography of the municipality, soil conditions and raw water source have an impact on investment costs, as well as how and where the waterworks can acquire water and how they need to treat water and sewage. Community structure and municipal decisions on the waterworks’ operational area can also significantly affect the efficiency of waterworks (see Table 11). Efficient land use and town planning have a positive impact on the efficiency of waterworks, while a fragmented or large operating area that covers sparsely populated areas can increase pipeline network costs and thus weaken efficiency. The growth rate or decline of municipal population affects how waterworks are able to maintain old pipelines and how much new pipeline they need to build.

**RQ3 How do internal factors affect the performance of waterworks?**

According to this study, the most important internal factors affecting waterworks performance include political decision making, expertise of the CEO and board members, governance model, personnel policy, value-creating network and cost structure. Table 12 presents these factors and related implications identified in this research.
Table 12. Internal factors affecting waterworks performance.

<table>
<thead>
<tr>
<th>Factor</th>
<th>Effect</th>
<th>Implication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Political decision making</td>
<td>Municipality makes the decision of the operational area</td>
<td>Overly wide operational area is inefficient and unprofitable</td>
</tr>
<tr>
<td></td>
<td>Owner sets the operational targets</td>
<td>Quality and performance requirements affect the costs of service provision</td>
</tr>
<tr>
<td></td>
<td>Owner can affect the resources and investments</td>
<td>Lack of resources may endanger future service delivery</td>
</tr>
<tr>
<td></td>
<td>Owner has the right to require return on invested capital</td>
<td>May endanger future investments if disproportionate</td>
</tr>
<tr>
<td>Composition of the board</td>
<td>Expertise of CEO and board members</td>
<td>Lack of expertise and vision of long-term development may endanger future service delivery</td>
</tr>
<tr>
<td>Governance model</td>
<td>Freedom to do business</td>
<td>Impact on waterworks’ independence</td>
</tr>
<tr>
<td></td>
<td>Affects, e.g., taxation, procurement, cost awareness, internal motivation to innovate</td>
<td>Implications on profitability</td>
</tr>
<tr>
<td>Personnel policy</td>
<td>Opportunities to hire and fire employees</td>
<td>May limit employing the required amount of knowledgeable personnel</td>
</tr>
<tr>
<td>Value-creating network</td>
<td>Properly sized facilities and pipeline networks that are in good condition</td>
<td>Contributes directly to service quality and efficiency of service provision</td>
</tr>
<tr>
<td></td>
<td>Planned, correctly-timed and prioritised investments</td>
<td>Contributes to quality and accessibility of services and costs of service provision</td>
</tr>
<tr>
<td></td>
<td>Professional skills and motivation of the management and employees</td>
<td>Impact on quality of service and efficiency of daily operation</td>
</tr>
<tr>
<td></td>
<td>Make-or-buy decisions</td>
<td>Affects the costs of service provision and hence total efficiency</td>
</tr>
<tr>
<td>Cost structure</td>
<td>High level of fixed costs vs. variable costs</td>
<td>Makes reaching short-term cost savings difficult</td>
</tr>
<tr>
<td></td>
<td>Transparency and accuracy in the bookkeeping</td>
<td>Advances full cost recovery and enables benchmarking</td>
</tr>
</tbody>
</table>

According to this study, political decision making is one of the most influential factors that affects waterworks operation and performance (see details in Table 12). At worst, it can cripple the effectiveness of the waterworks if, for example, development measures are unnecessarily postponed; at best, it can be of great interest. Based on this study, there are four main ways in which the municipality/owner can affect the operation of waterworks: (1) the municipality makes the decision of the operational area of the waterworks, (2) the owner sets the operational targets, (3) the owner can affect the resources (mainly MU and MOE), and (4) the owner has the right to require a return on invested capital.
The CEO and the board members also seem to have an impact on waterworks’ performance. It appears crucial for the CEO and the board members to have sufficient expertise, a vision for the long-term development of the waterworks, and the ability to act accordingly (see Table 12). Otherwise, they may endanger future service delivery by not being able to maintain a proper level of service provision. The CEO may be given a great responsibility to, for example, prepare and explain necessary investments although he or she might not be capable enough. Even if he or she is capable enough, the owner is still able to decide against the proposal and drive his or her own short-term interest.

This research indicates that the roles and responsibilities of different actors, as well as the level of business orientation of waterworks, are largely defined by the governance model (see Table 12). The choice of governance model, whether it is a municipal unit, MOE, MOC or cooperative, seems to have a particular impact on the freedom of waterworks to do business. Waterworks that are organised as municipal units operate strictly under municipal administration with limited resources and tight political control. The results of this study indicate that MOEs and MOCs have moderately or considerably larger freedom than municipal units in making investment decisions, pricing and long-term planning. Other factors that the governance model seems to affect include taxation, procurement, cost awareness, internal motivation to innovate and, consequently, profitability.

The freedom of different governance models to do business also extends to hiring and firing new employees. According to this research, some waterworks managers seem to have problems carrying out similar development measures in this respect than the private sector would do automatically. The employees have strong status in the local government and waterworks managers cannot always give notice to employees. According to the interviewees, the age structure and knowledge profile is typically skewed in waterworks when old employees are retiring and there are too few young and well educated people available. Although it could make sense for production or for economic reasons to hire or fire employees, it might be impossible to do so since the municipality might not have the resources to hire new people. In addition, there may not be any young people who are willing to work in the public sector where the salaries are usually lower than in the private sector.

According to this study, properly sized facilities and pipelines that are in good condition contribute significantly to the total efficiency of waterworks operations. In addition, efficiency in the daily operation of waterworks reflects the
professional skills and motivation of the management and employees. Efficiency of waterworks operations is also affected by the decision regarding whether and to what extent water and sewage services are generated in-house, what is provided in cooperation with other waterworks and what is bought from the market. For example, processes that are easily definable, separable, priced, and for which economies of scale are easily attainable, such as water acquisition and sewage treatment, could be produced in collaboration with another waterworks (see Table 12 for details).

Cost efficiency was identified as one of the most important factors that contribute to the total efficiency of waterworks. It is quite capital-intensive to provide water and sewage services, and the initial investment, maintenance and renovation of pipelines represents a significant portion of the total costs of waterworks operation. Only a small proportion of costs are variable, which makes it difficult to achieve short-term cost savings. This is why it is important to concentrate on investments and allocate finances to the right places, and to make planned, correctly-timed and prioritised investments to achieve total efficiency. Consequently, it is necessary to know what is owned, in what condition the assets are and what the future investment needs are.

**RQ4 What are the potential avenues for development in the Finnish water sector?**

Table 13 summarises the development recommendations for water and sewage services in Finland identified in this study.
Table 13. Recommendations for development.

<table>
<thead>
<tr>
<th>Development target</th>
<th>Recommendation</th>
<th>Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ownership</td>
<td>Maintain municipal ownership</td>
<td>Ensures quality and reliability of service provision</td>
</tr>
<tr>
<td>Financial and operational</td>
<td>Transparency and accuracy in the bookkeeping</td>
<td>Advances full cost recovery and compliance with the law</td>
</tr>
<tr>
<td>transparency</td>
<td>Uniform reporting practices</td>
<td>Increases transparency and allows benchmarking</td>
</tr>
<tr>
<td></td>
<td>All information be made public</td>
<td>Opportunity to follow up and benchmark waterworks</td>
</tr>
<tr>
<td>Full cost recovery</td>
<td>Healthy pricing</td>
<td>Enables operational and investment costs to be covered by customer payments, as required by law</td>
</tr>
<tr>
<td></td>
<td>Removing distortions and subventions</td>
<td>More transparent operation and fulfilling cost recovery principle</td>
</tr>
<tr>
<td></td>
<td>Moderate profit to be determined</td>
<td>A clear limit for and common understanding of the moderate profit clarifies the rules of the business</td>
</tr>
<tr>
<td></td>
<td>Balancing basic charges and consumption fees</td>
<td>Better opportunities to meet the full cost recovery principle</td>
</tr>
<tr>
<td>Investment management</td>
<td>Professional asset management</td>
<td>Good instrument for assessing the current condition and future investment needs of infrastructure</td>
</tr>
<tr>
<td></td>
<td>Systematic asset data</td>
<td>Help transfer tacit knowledge when older employees retire and younger ones take over</td>
</tr>
<tr>
<td></td>
<td>Increased annual investment rate to 2.5 percent</td>
<td>Guarantees quality and reliability of service delivery</td>
</tr>
<tr>
<td>Board expertise</td>
<td>Increase management and engineering expertise</td>
<td>Improves board’s understanding of water and sewage services, which may lead to more justified decisions from both waterworks’ and owners’ perspective</td>
</tr>
<tr>
<td></td>
<td>Board members from other waterworks</td>
<td>Could help to spread best practices</td>
</tr>
<tr>
<td>Cooperation</td>
<td>Joint service provision with other municipalities</td>
<td>Obtains economies of scale</td>
</tr>
<tr>
<td></td>
<td>Resource pooling</td>
<td>May provide, for example, cost savings and more knowledgeable personnel</td>
</tr>
</tbody>
</table>

This study does not recommend the privatisation of waterworks as they are natural monopolies. It does suggest that municipal owners should concentrate on
ensuring that services are provided properly and that customers are not deprived
but give waterworks enough space to make necessary investment, pricing and
other operational decisions (see Table 13). However, there is no reason for
politicians to interfere with the day-to-day management of waterworks.

The results of this study indicate that board members rarely have adequate
knowledge on waterworks engineering and management. They are often eager to
tackle even the most technical issues, which has the potential to lead to conflict
between the board’s will and the waterworks interest. It became clear in this study
that, generally speaking, the municipalities could interfere less in waterworks
operational decisions and investment plans. When selecting board members,
management and engineering expertise should be valued over political merits (see
Table 13 for more details).

The study showed that one of the most important development targets relates
to financial and productive transparency of waterworks operations. The *Act on
Water Services (119/2001)* dictates that, in the long term, waterworks ought to
cover all operational and investment costs with the revenue they recover from
customers. This requires, above all, transparency and accuracy in the
bookkeeping so that all costs and revenues are visible and that the municipality
does not subsidise waterworks or transfer waterworks’ profits for other purposes.
One solution for more efficient operations of waterworks could be to define
uniform reporting practices at the national level. This would increase
transparency and allow benchmarking by waterworks management and others. In
addition, this could improve statistics and be used for research purposes. Because
there is no real competition between different waterworks, openness should be
seen as an opportunity to identify best practices.

Covering operational and investment costs with customer payments is a
prerequisite for sustainable business and is also required by law. This is why it is
necessary to pay special attention to the pricing of services in order to cover both
operational and investment needs (more details in Table 13). Currently,
municipalities may set the water price below their operational and investment
needs, or they may inappropriately exploit their monopoly position and their own
controlling power to set the prices higher than necessary in order to support other
purposes. Owners are entitled to a return on invested capital but the legislation
requires that waterworks should return only a “moderate” profit to their owners.
In the water sector, the term “moderate profit” has not yet been determined; in the
natural gas markets, for example, a “reasonable return” varies from 6.07 percent
to 7.41 percent (Kuntaliitto 2007). Another issue related to the pricing of service
and the full cost recovery principle sought by the law is the ratio between the
incomes received through fixed basic charges and utilisation fees, which is,
according to this research, distorted. Due to the capital intensiveness of the
service, there are many fixed costs but approximately 90 percent of income is still
received through utilisation fees. Typically, matching real costs with customer
billing leads towards cost awareness and efficiency. However, a few of the studied
waterworks are already considering raising their percentage of basic charges from
5–8 percent to 20 percent in order to correct this distortion.

In order to guarantee waterworks customers a high level of accessibility, it is
important to know the condition and investment needs of the main assets, pipeline
network and treatment facilities. Without a functional water service infrastructure,
customers cannot receive water and the waterworks will lose revenue.
Waterworks will also suffer losses if the pipelines are in bad condition and have a
lot of leakages. Systematic mapping, modelling and digital storage of asset data is
a good instrument with which to assess the current condition and future
investment needs, but also to help transfer the tacit knowledge when older
employees retire and younger ones take over (see Table 13). According to the
results of this study, professional asset management is often lacking in the water
sector. Investment planning is typically made for five years or less, although the
lifetime of pipelines ranges from 50 to 100 years. According to the ROTI project
(2009), however, there is a serious need for more systematic and wide-ranging
investments, which suggests that the current annual pipeline renovation level of
0.4–0.8 percent should be increased to 2.5 percent in order to keep up with ageing
networks.

Instead of municipalities having their own waterworks, they could consider
having joint water and sewage services with other municipalities to obtain
economies of scale. In some cases, merging municipalities could even be
considered.

4.2 Theoretical implications

There has been an active debate in the literature regarding whether public or
private provision of public services is more efficient (Rondinelli 2003, Shleifer
1998, Välilä 2005). It has been argued that public provision is especially justified
in the presence of market failures (Välilä 2005), although the private sector is said
to offer benefits such as stronger managerial capacity (Rondinelli 2003). This
discussion has also reached the provision of water and sewage services. As an example, privatisation of water and sewage services in the UK has been widely discussed (Summerton 1998). The results of this research are in line with previous studies that promote public ownership of water and sewage services. In fact, none of the interviewees proposed privatisation of waterworks. Water services are seen as natural monopolies, while on the other hand, they are seen as being of vital importance to society.

In addition to ownership, governance model is also seen as having an impact on service provision efficiency. Juhola (1990, 1995) and Muukkonen (2006) have studied the differences, advantages and disadvantages of governance models in the Finnish water sector. The present study modernises and complements the above-mentioned studies and describes the strengths and weaknesses of different governance models with the help of SWOT analyses. Although researchers such as Bakker (2003) and Al-Madfaei (2009) have conducted similar studies, they have mostly focused on the differences between public and private provision. The present study brings a new angle to the conversation by also considering different public governance models for organising water and sewage services in Finland.

This research also discusses the impact of governance on waterworks’ performance. Al-Madfaei (2009) has summarised the problems confronted in government operation and delivery of water services from PRINWASS research programs’ case study reports. The reasons for poor performance are seen to reside in the weaknesses of the institutional framework or the poor operation and maintenance and the lack of monitoring, which allow illegal connections and thefts, as well as in the ineffective pricing. This research is in line with previous reports in concluding that governance can have a serious effect on waterworks operations and its freedom to do business. The results of this study indicate that political decision-making can affect the resources, investments and pricing of services. Studies by Hahto (2005), Hukka and Katko (2007) and Windischhofer (2007) have also criticised this type of negative impact by municipal owners.

The results of this study indicate that municipal owners sometimes intervene inappropriately in waterworks’ operations, which undermines the waterworks’ ability to operate effectively. Many researchers have suggested that political impact can be dissolved and waterworks’ freedom to do business can be increased through privatisation (Hemming & Mansoor 1988, Jonninen 1994, Perotti 1995, Shleifer 1998) or public-private partnerships (Edwards & Shaoul 2003, European Commission 2003, Gidman et al. 1995, Rondinelli 2003). This research complements the existing literature by delving deeper into various public and
private governance models, instead of purely considering private or public ownership. According to the results of this research, MOEs and MOCs are more transparent, business-oriented and have more freedom to do business than waterworks that are organised as a municipal unit. Cooperatives’ independence from political regulation and decision-making can be considered as a clear strength. However, their weakness lies in small-scale operation and the threat is a lack of expertise if services are provided with volunteer work. This is also highlighted by Takala (2008). However, opportunities to do business are not determined only by the governance model but also by the attitude and business orientation of decision-makers and by public opinion.

One option to improve the performance of waterworks is to increase the amount of focus on asset management. According to this study, a number of waterworks still do not know exactly what they own, let alone the condition of their assets. It can be concluded that, without proper asset management, it is difficult to plan future investments and their financing. Additionally, if the waterworks is not self-sufficient and the municipality has a poor financial situation, investments are often postponed, which leads to the deterioration of assets and poor quality of service. Similar results are also presented by Heikkinen and Forsberg (2008), Välisalo (2008) and Välisalo et al. (2006, 2008). According to the present study, some waterworks are clearly under-investing, which increases the risk of deterioration of infrastructure. Therefore, the results of this study confirm the findings of, for example, Heikkinen and Forsberg (2008) and ROTI studies (2009, 2011).

An additional challenge that this study has identified is that no one really monitors the financial situation of waterworks, whether they are covering all costs through income financing and whether municipalities receive only a moderate profit for their investment. This is in line with the findings of Vinnari (2008) and the working group preparing a new Act on Water Services. This group has presented clear changes in order to increase the transparency of waterworks and introduce the possibility of establishing an external monitoring organisation (MMM 2010). This study also identified that the current statistical system (VELVET) is not comprehensive enough and FIWA’s benchmarking system involves only a small fraction of Finnish waterworks. Consequently, this research highlights how operational and financial transparency is of paramount importance to determine the real condition of waterworks. This study proposes a common reporting practice to all waterworks and public access to this information. This
would make it possible for waterworks to benchmark their operations against similar waterworks and learn from best practices. This is also supported by the literature (e.g. Berg & Padowski 2008). Transparency would also increase “internal control”, which could make external control by a national authority unnecessary.

This study also looked at waterworks operations from the business model perspective, not just as public services. According to the literature, the business model concept has previously been used in very broad contexts and even to replace corporate strategy (Hamel 2001, Magretta 2002, Timmers 1998). This study has primarily used the business model as a way of depicting the critical elements that affect companies’ performance, as intended by Osterwalder (2004). The business model is used as a conceptual tool that allows the business logic of waterworks to be expressed. This study has shown how the value creation part of the business model concept, in particular, proved a functional tool for analysing waterworks.

The national water programme 2008–2013 emphasises business potential and international growth prospects of water and sewage services (Vahala & Klöve 2008). Potential is seen, for example, in the areas of construction, equipment manufacturing and service provision. Service business is expected to grow, especially in the areas of planning, operations, asset management and measurement services. Combining the know-how of different service experts in unprejudiced projects has the greatest potential for innovation. The results of this research complement previous research by indicating the value of managers and owners of waterworks critically assessing what is reasonable to do in-house and what can be bought from the market. In addition, business model thinking makes it possible to identify different business potentials and opportunities for public and private operators.

4.3 Managerial implications

This research suggests that waterworks managers could more systematically manage their assets and have a better understanding over the current condition of the infrastructure. Without accurate knowledge of assets conditions, long-term planning of investments is difficult and the future service delivery ability is uncertain. In addition to asset data, waterworks managers ought to become more cost-conscious and accurately calculate whether, in the long-term, both operational and investment costs can be covered through income financing. If not,
managers should evaluate what kinds of actions are needed in order to fulfil this legal requirement. For example, they should look at whether prices are reasonable, efficiency improvements are needed or whether it is realistic to look new options for service provision; for example, from cooperation or mergers.

In order to see how waterworks are doing, managers could more actively start benchmarking their operations against other similar waterworks. Benchmarking could show managers the financial and operational performance of other waterworks and they could ask themselves whether they could make some improvements. Benchmarking should be seen as an opportunity to learn what is going on in the field and learn from the best waterworks. However, this requires open and congruent reporting practices and transparency. In this research, it became clear that some waterworks are not willing to share this kind of data, which indicates that there is an element of fear, even though waterworks are not competing against each other. Conducting efficiency analyses would be easier if legislation was developed to require a certain level of key data to be disclosed.

Municipal owners should concentrate on ensuring that services are provided properly and that customers are not deprived. However, they should also give waterworks enough space to make necessary investment, pricing and other operational decisions to avoid putting future service delivery at risk. Owners should support good governance practices and focus on their role as owners, not as operational managers. Governance is exercised through the board, which is why it is important that the board members have enough expertise to make justifiable decisions from both the waterworks’ and the owners’ perspectives. Currently, boards typically consist solely of municipal councillors who do not have sufficient managerial and engineering competence. To change this, municipal owners could attract and invite expertise from outside their own organisation. Because there is no competition between different waterworks, expertise could be shared between waterworks and their boards. This could also help to spread best practices. The general advice in selecting board members is to value management and engineering expertise over political merits.

The results of this study suggest that MOC and MOE are good governance alternatives, providing a better level of transparency compared to municipal units. However, municipal unit and cooperatives are relevant options for small waterworks.

Owners and managers of waterworks should ensure that the ageing workforce is kept in good health and that young professionals are attracted to
work beside the older ones. According to this study, skilled employees are an important factor in the efficiency of waterworks. Ageing employees present a risk, as the organisations may lose tacit knowledge when they retire. This is a challenge, especially when combined with the current low level of information digitalisation. The danger is that when the current employees retire, tacit knowledge will not be transferred if it is not secured in a document format. This is also why, as noted earlier, systematic recording of asset data is necessary in order to guarantee the transfer of tacit knowledge between the old and new employees.

Owners and managers could also more actively discuss the current state of the waterworks and the level and quality of service provision. If it is no longer possible to provide high-quality service, owners and managers should discuss the possible development paths. Economies of scale are attainable in the water sector, which is why cooperation and mergers should not be seen as intimidating, as is sometimes the case. Owners and managers should not obstruct this kind of development if the other one can justifiably plead the case.

The findings of this study also support the aims of the on-going reform of water sector legislation. According to the working group currently considering new water legislation, the old Act on Water Services (119/2001) was a step in the right direction but it did include some ambiguities. New legislation could help the development of the efficiency of the water sector by requiring uniform reporting practices. Additionally, legislation should promote transparency by defining what is to be included in annual financial and operational reports. It became evident in the course of this study that some waterworks were not willing to share all relevant data. This was the case even though, due to the nature of the business, no true competition exists. However, legislators must be careful not to unintentionally increase the administrative burden of waterworks. Reporting practices could possibly be slightly different for small waterworks. The working group is proposing a centralised database for waterworks to enter certain key data. According to the results of this study, it is essential that the key information is publicly available because it would enable benchmarking and planning development activities. Transparency also supports legislators’ aims to have both operational and investment costs covered by reasonable fees while allowing moderate profit. On the other hand, enough money should also be directed to investments. According to this study, some waterworks are clearly under-investing, which presents the risk of deterioration of infrastructure.
4.4 Validity, reliability and generalisability

According to Kirk and Miller (1986), the language of validity and reliability was originally developed for use in quantitative social science. Classic textbooks distinguish between three main kinds of validity: construct, internal and external validity. Construct validity tests whether correct measures are used for the concepts being studied; internal validity test for causal relationships, through which certain conditions are shown to lead to other conditions. External validity establishes the domain to which a study’s findings can be generalised (see e.g. Yin 1994). However, there has been discussion among qualitative researchers concerning the relevance of these criteria for qualitative research and different researchers have used slightly different terminology to assess the reliability and validity of qualitative research (Bryman & Bell 2003).

The present study has used terminology presented by Easterby-Smith et al. (2002) to examine the study’s validity. Easterby-Smith et al. (2002) used the terms validity, reliability and generalisability, where validity is similar to the concept of construct validity, and generalisability is similar to external validity. The difference is that Easterby-Smith et al. (2002) have different meanings for these terms when different philosophical viewpoints are adopted (see Table 14). This makes it easier for researchers to ask the correct questions when assessing the “believability” of their research. The present study is positioned between relativism and constructionism; however, since it is slightly closer to constructionism, questions from the last column of Table 14 are selected for the assessment task. When the analysis of the financial statements is the focus, questions from the positivist column are used because they are more relevant.
Table 14. Perspectives of validity, reliability and generalisability.

<table>
<thead>
<tr>
<th></th>
<th>Positivist</th>
<th>Relativist</th>
<th>Constructionist</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Validity</strong></td>
<td>Do the measures correspond closely to reality?</td>
<td>Have a sufficient number of perspectives been included?</td>
<td>Does the study clearly gain access to the experience of those in the research setting?</td>
</tr>
<tr>
<td><strong>Reliability</strong></td>
<td>Will the measures yield the same results on other occasions?</td>
<td>Will other observers reach similar observations?</td>
<td>Is there transparency in how sense was made from the raw data?</td>
</tr>
<tr>
<td><strong>Generalisability</strong></td>
<td>To what extent does the study confirm or contradict existing findings in the same field?</td>
<td>What is the probability that patterns observed in the sample will be repeated in the general population?</td>
<td>Do the concepts and constructs derived from this study have any relevance to other settings?</td>
</tr>
</tbody>
</table>

Validity

This study has used multiple data collection techniques to gain empirical evidence. The primary data collection method was semi-structured interviews. The objective was to create a flexible and responsive interaction between the interviewer and interviewees in order to cover a variety of angles and allow questions outside the research setting. The interviews were taped and only minimal notes were taken, so as to create as relaxed and informal discussion as possible. The validity is somewhat weakened because only waterworks managers were interviewed. A more extensive view of local situations could have been achieved if owners and other stakeholders had also been included in the study. Additionally, although the interviewer did not attempt to influence the answers of interviewees, her impact is still worth questioning.

The validity and reliability of the questionnaire is dependent on whether “the question is understood by the respondent in the way intended by the researcher and the answer given by the respondent is understood by the researcher in the way intended by the respondent” (Foddy 1994). Ambiguous questions and answers are perhaps the most problematic issues; they have been addressed by creating questions that were as understandable as possible and by giving a few examples to help the respondent. It can be seen from the answers that many respondents considered the open-ended questions to be too broad and the questions were answered in a hurry. In some cases, this gave the researcher a lot to interpret. In addition, the sample size was only 278 and the response rate only 13.7 percent, from the population of approximately 1500 waterworks; this can be
considered a clear weakness. Regardless of the relatively small group of respondents, there is no reason to doubt that this group is particularly skewed. Because the aim was not to make a statistical analysis, but rather to focus on making qualitative observations from the data, the amount of data can be considered satisfactory.

The validity of financial analysis should be determined by its usefulness to the decision-making process (Salmi & Martikainen 1994). The problem with financial analysis is that it shows the financial performance of a company in the period under review, but it does not identify what has happened before and what will happen in the future. Nor does it identify the underlying reasons for good or bad financial performance. It could be argued that the period under review in this study is too short, since large investments may notably skew the financial results if only three- or four-year averages are used. Therefore, the investment-related financial ratios should be seen only as indicative because it was not possible to collect enough data for it to be definite. However, the results of this study can be considered to represent a good foundation for future research and scientific debate.

The objective of this research was to identify the internal and external factors that affect the performance of waterworks and how, as well as to clarify the kinds of actions that are needed in order for the performance of waterworks to be improved. The analysis framework for studying the factors that affect waterworks’ performance was constructed to become gradually deeper and the generic literature is consistent in this regard. Additionally, the empirical part of this research is based and constructed on this framework. Empirical data was collected with a number of different data collection methods and the conclusions were made on the basis of this data. The triangulation of data clearly increased the validity of this research and it can be concluded that, with this kind of research process, it is possible to gain the required information.

Reliability

Easterby-Smith et al. (2002) described reliability in the sense of whether alternative researchers would reveal similar information from the same kind of research setting. Reliability of interview data is mostly related to interviewer and interviewee bias. Interviewer bias is where the interviewer’s comments, tone of voice or non-verbal behaviour affects how the interviewee responds to the questions being asked, while interviewee bias may be caused by, for example, the
In order to overcome data quality issues, the interview questions were carefully created to avoid leading the interviewees and they were sent to the interviewees ahead of time to give them an opportunity to prepare. The interviewer did not seek to lead interviewees in any particular direction, but instead let them speak freely about the issues concerning the matter. During the interviews, it was noted that some issues are more sensitive than others (for example, in a political sense), which is why an interviewee bias was perceived on some occasions. Due to the uniqueness of the encounters between the interviewer and interviewees, it is not possible to replicate them completely and asking the same questions might have led to somewhat different answers.

In order to assess the reliability of questionnaire, the best way is to compare the collected data with other data from a variety of sources (Saunders et al. 2009). The present study did not use the answers, as such; instead, the answers were mirrored against, and used together with, interviews and secondary data. This improved the reliability of the study. In addition, Mitchell (1996) considered it useful to assess the internal consistency of the questionnaire, which involves correlating responses of each question to those of the other questions in the questionnaire. In this study, the questions were closely related to each other and consistency between different answers was easily recognised. However, the reliability of the questionnaire is weakened by the number of open-ended questions, which meant that respondents and the researcher had a lot to interpret.

The replication of the financial analysis is possible and everyone should end up with the same results if the same formulas for different financial ratios are used. This study employed a widely used handbook for the analysis of financial statements by the Committee for Corporate Analysis (2006), which is based on underlying legislation. Profit-and-loss statements and balance sheets are publicly available for a fee from the Trade Register, and some waterworks also have their financial documents available on their websites. However, if a different period of review is used, the results may vary and lead to different conclusions. Additionally, the reliability of results when comparing different waterworks’ financial reports is somewhat compromised because waterworks can calculate their capital value with very different principles.

In order to increase the reliability of this research, the research process is described in as much detail as possible in Chapter 1.4, with a description of the research approach, data collection and data analysis. This increases the ability to replicate the research. In addition, there has been an effort to carefully describe
the empirical material and how the conclusions are drawn. Still, it is not possible to completely replicate the research findings since they reflect reality at the time they were collected (see Saunders et al. 2009).

Generalisability

Qualitative research frequently conducts research in a specific milieu, the representativeness of which is unknown and probably unknowable. Therefore, according to Bryman and Bell (2003), the generalisability of such findings is also unknown. The objective was not to find a “one and only” solution for improving waterworks performance but to identify the problem areas and identify what kind of actions could be taken to improve the situation in the national and the local level.

The study’s main results were formed on the basis of the opinions of the waterworks managers who were interviewed and who answered the questionnaire. The opinions of the few does not generally tell the truth about the opinions of the public, which is why the generalisability of the results can be debated. The number of interviewed managers (12), interviewed specialists (two) and questionnaire respondents (38) represents only a small fraction of the total number of waterworks experts in Finland. Furthermore, all waterworks have different backgrounds and business environments, so each should consider the solutions that fit best for them.

In addition, it could be questioned how natural a choice it is to select only waterworks that provide all four core water services to the financial analysis, since a great majority deal only with some of the core services. However, this was a necessary delineation to reach at least some level of comparativeness between selected waterworks. Consequently, the results of the financial analysis cannot be generalised to all waterworks in Finland.

The results can, to some extent, be generalised to other sectors. For example, some of the governance issues might be applicable to other municipal businesses, such as the energy and road sectors. However, because of the uniqueness of the water sector and its special market position, care should be taken when making generalisations to other fields.
4.5 Recommendations for further research

If a decision is made at the national level that the water sector should introduce a more transparent and open approach and apply common reporting practices, one of the most important future research needs is to create a template for this report. The template could be created based on Finnish accounting practices, the VELVET report and FIWA’s benchmarking system. This would mean that the waterworks would have only one report to fill out and that all stakeholders, such as authorities, could easily find the required information in the report.

Future research could also create a set of measurements for comparing waterworks and their efficiency. Although FIWA’s benchmarking system is good, it could be used on a wider scale than it is currently. In addition, now that the system has been up and running for a couple of years, the meter could be checked to determine whether it is really measuring what was intended. Future research could then endeavour to benchmark waterworks nationally and also internationally. It would also be interesting to benchmark waterworks to other infrastructure networks.

Since this study qualitatively perceives the current state of the waterworks and factors impacting their efficiency, future research could involve a quantitative study of Finnish waterworks efficiency and the kind of improvements that could be achieved through development. Waterworks efficiency has been studied to some extent, but it has proved to be quite difficult because of the special nature of water and sewage services and all the impacting factors that affect their efficiency. In addition, in order for the efficiency comparison to work, the researchers must have accurate and transparent information as presented in this research. The effort and results of wider efficiency study made in the water sector would certainly increase international interest.

Another interesting research topic would be a closer review of the integration of waterworks. It has been argued that there should be fewer waterworks in Finland, which could be accomplished by merging waterworks into larger units. Merger planning currently tends to involve an intention to also integrate waterworks physically. Future research could look at whether physical integration is always necessary or whether, for example, mere administrative integration could bring some of the desired benefits. The research could identify the internal and external drivers for integration and the different integration options for Finnish waterworks. The hypothesis is that integrating Finnish waterworks into
larger units is possible and the research could concentrate on finding the real options for integration in Finland’s fragmented municipal structure.
References


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Appendix 1 Interview questions

C-Business – yhteiskunnan teknisten verkostojen omistaminen, hallinto ja toiminta

HAASTATTELU

Arvioitu haastattelun kesto on noin 2 tuntia.

Haastattelu nauhoitetaan ja litteroidaan analyysiä varten. Haastateltavalle lähetetään pyydettäessä sähköpostitse nauhoitus, litterointi ja mahdollinen analyysi, jotta haastateltava voi halutessaan muuttaa haastattelun sisältöä. Haastateltavalle luvataan, että yksittäisen vastaajan mielipiteitä ei julkaista.

1. Mitä tuotetta/palvelua organisaatio tuottaa ja keille?
2. Kehittekö uusia palveluja tai tuotteita, miten?
3. Tuotteen/palvelun korvautuvuus, kilpailevat tuotteet/palvelut?
4. Tuotteen/palvelun laadun mittaus ja varmistus?
5. Miten palvelu/tuote hinnoitellaan?
6. Miten palvelu tuotetaan ja toimitaan kuluttajalle/asiakkaalle käytännössä? Mitkä ovat tärkeimmät toiminnot palvelun tuottamisessa?
7. Mitkä ovat organisaation ydinosaamiset? Kehitetäänkö niitä, miten?
   Ydinosaamisen johtaminen?
   Vastaavatko ydinosaamiset markkinatarpeita?
   Pohditaanko ydinosaamisten ulkopuolella olevien asioiden ulkoistamista?
8. Mitkä toimijat ovat toiminnassa mukana suoraan tai välillisesti (kunta, yksityiset toimijat, ym.)? Mikä juridinen asema kullakin toimijalla on (liikelaitos, valtionyhtiö, ym.)? Mikä asema kullakin toimijalla on (omistaja, johto, palvelunharjoaja, rahoittaja, ym.)?
9. Ostetaanko organisaation tarjoamat tuotteet/palvelut kilpailun perusteella vai suorana hankintana neuvottelun perusteella?
10. Mikä on tuottajan, tilaajan ja käyttäjän markkina-asema ja neuvotteluvoima?
11. Miten organisaation tulos mitataan ja kuka mittauksen tekee?

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Onko vuosittaisia suorituskykymittareita, joita seurataan?


13. Mitä ongelmia ja haasteita on havaittu omistus- ja hallintorakenteessa?
   tuotteen/palvelun tuottamiseen liittyvissä rahavirroissa?
   tuotteen/palvelun hinnoittelussa?

14. Miten näitä ongelmia ja haasteita on yritetty korjata? Miten sinä parantaisit tilannetta?

15. Muita kommentteja
Appendix 2 Questionnaire

Vesihuoltolaitosten toimintamuoto ja tehokkuus

Tutkimuksen tarkoitus

Kyselytutkimus toteutetaan osana C-Business tutkimusprojektia, joka on parhaillaan käynnissä Oulun yliopiston tuotantotalouden osastolla. C-Business tutkimushanke pyrkii tunnistamaan erilaisten yhteiskunnan teknisten verkostojen, kuten teiden, vesihuoltoverkostojen ja satamien, omistamisen ja hallinnan mallien hyvät ja huonot puolet.

Perinteisesti Suomen vesi- ja jätevesihuollon taso on ollut maailman huippua kansainvälisissä vertailuissa, mutta vesihuollon tulevaisuutta uhkaavat lukuisat ongelmat, joihin on löydettävä ratkaisuja vesihuoltopalvelujen korkean tason säilyttämiseksi. Vesihuoltolaitosten tehokkuutta on tutkittu maailmalla paljon, mutta laitosten tehokkuuden määrittelemien ja tutkimuksista yleispätevien ja luotettavien tulosten saaminen on osoittautunut vaikeaksi. Teorian ja tähänastisten tutkimusten pohjalta olemme olemme luoneet mallin laitosten tehokkuuden mitaamiseen ja vertailuun, minkä kehittämisessä edelleen myös Te pääsette kyselyssä vaikuttamaan.


Perustiedot

1. Toimintamuoto

Laskennallisesti eriytetty kunnallinen vesihuoltolaitos
Kirjanpidollisesti eriytetty kunnan taseyksikkö
Kunnan liikelaitos
Liikelaitoskuntayhtymä
Kuntayhtymän liikelaitos
Kuntayhtymä
Osakeyhtiö (yhden kunnan omistama)
Alueellinen osakeyhtiö (usean kunnan omistama)
Tukkuosakeyhtiö
Avoin yhtiö tai yhtymä
Osuuskunta

2. Tuotettavat palvelut ja tuotantomäärät

Vedenotto ja puhdistus (m³)
Puhtaan veden jakelu (m³)
Jäteveden keräys (m³)
Jäteveden puhdistus (m³)
Muu, mikä?

3. Vesihuollon piirissä olevien asukkaiden lukumäärä (liittyneet asukkaat toiminta-alueella ja toiminta-alueen ulkopuolella)

   **Hallintotapa**

4. Mitkä seuraavista päätöksentekoelimitä ovat käytössä?

   Johtaja
   Hallitus
   Johtoryhmä
   (Liikelaitoksen) johtokunta
   Lautakunta (tekinen tms.)
   Hallintoneuvosto
   Yhtiö-/yhtymä-/osuuskuntakokous
   Muu, mikä?

5. Mitkä henkilöstö- ja/tai sidosryhmät ovat edustettuina kussakin päätöksentekoelimessä? (esim. työntekijät, kunnanvaltuutetut, asiakkaat, muut sidosryhmät, jne.)

   Mitkä ovat eri päätöksentekoelinten roolit ja tehtävät?
Vesihuoltolaitoksen tehokkuus

ISO 9000:2000 standardin mukaan tehokkuus tarkoittaa saavutettujen tulosten ja käytettyjen resurssien suhdetta.

6. Mitä vesihuoltolaitoksen tehokkuus Teidän mielestänne tarkoittaa?

7. Mistä tekijöistä vesihuoltolaitoksen kokonaistehokkuus Teidän mielestänne muodostuu?

8. Miten eri toimijat ja päätöksentekoihelmet voivat vaikuttaa vesihuoltolaitoksen tehokkuuteen ja/tai tehokkuuden mitattamiin ja seuraamiseen? (esim. asiakas, palveluntuottaja, alihankkija, omistaja, valvontaviranomainen, muu julkinen toimija, regulaattori, rahoittaja, johtaja, hallitus, johtoryhmä, johtokunta, jne.)

9. Miten erilaiset ulkoiset tekijät voivat vaikuttaa vesihuoltolaitoksen toiminnan tehokkuuteen? (esim. toiminta-alueen laajuus (taajama vs. haja-asutusalue), poliittinen päätöksenteko, yksi/useampi omistaja, tuotettujen palvelujen laajuus, rahoitusmahdollisuudet, jne.)

10. Tuleeko mieleenne keinoja tai mittareita, joiden avulla kaikkia vesihuoltolain määrittelemiä vesilaitoksia voitaisiin vertailla keskenään tehokkuuden suhteen?

“Yhdyskunnan vesihuolosta vastaavina laitoksina pidetään laitoksia, jotka toimittavat vettä tai vastaanottavat jätteitä yli 10 m³ päivässä tai palvelevat yli 50 henkilöä edellyttäen, että ne palvelevat useampaa kuin yhtä kiinteistöä.” - Vesihuoltolaki 9.2.2001/119

11. Mitä haasteita/ongelmia vesihuoltolaitosten tehokkuuden mitattamiin ja keskinäiseen vertailuun sisältää?
## Appendix 3 Interviewed waterworks’ key figures

<table>
<thead>
<tr>
<th>Waterworks (in alphabetical order)</th>
<th>Water acquisition (m³)</th>
<th>Sewage treatment (m³)</th>
<th>No. of personnel</th>
<th>Water price (€/m³)</th>
<th>Sewage price (€/m³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liikelaitos Haukiputaan Vesi</td>
<td>MOE 18,500</td>
<td>951,540</td>
<td>281,549</td>
<td>4</td>
<td>1.00</td>
</tr>
<tr>
<td>Helsingin seudun ympäristöpavelut HSY</td>
<td>FoM 1,200,000</td>
<td>83,700,000</td>
<td>110,100,000</td>
<td>300</td>
<td>1.31</td>
</tr>
<tr>
<td>Hänneeninnan Seudun Vesi Oy</td>
<td>MOC 75,800</td>
<td>4,802,267</td>
<td>8,058,544</td>
<td>48</td>
<td>1.10</td>
</tr>
<tr>
<td>Jyväskylän Energia Oy</td>
<td>MOC 130,000</td>
<td>5,371,697</td>
<td>-</td>
<td>78</td>
<td>1.57</td>
</tr>
<tr>
<td>Järvi-Pohjanmaan yhteistoiminta-alue, tekninen toimi</td>
<td>dept. 903,936</td>
<td>585,405</td>
<td>585,405</td>
<td><strong>7</strong></td>
<td>1.57</td>
</tr>
<tr>
<td>Kempeleen Vesihuolto Oy</td>
<td>MOC 15,300</td>
<td>1,012,990</td>
<td>-</td>
<td>10</td>
<td>0.78</td>
</tr>
<tr>
<td>Lakeuden</td>
<td>MOC 42,700</td>
<td>-</td>
<td>1708,120</td>
<td>2</td>
<td>0.99</td>
</tr>
<tr>
<td>Lahti Aqua Oy</td>
<td>MOC 120,000</td>
<td>4,863,044</td>
<td>11,273,027</td>
<td>86</td>
<td>1.06</td>
</tr>
<tr>
<td>Oulun Vesi liikelaitos</td>
<td>MOE 131,600</td>
<td>10,818,508</td>
<td>13,953,248</td>
<td>65</td>
<td>1.12</td>
</tr>
<tr>
<td>Pudasjärven vesiosuuskunta</td>
<td>coop 5000</td>
<td>320,373</td>
<td>549,340</td>
<td>5</td>
<td>0.83</td>
</tr>
<tr>
<td>Taivalkosken vesihuoltolaitos</td>
<td>dept. 2200</td>
<td>225,034</td>
<td>215,890</td>
<td><strong>7</strong></td>
<td>0.77</td>
</tr>
<tr>
<td>Vesikolmo Oy</td>
<td>MOC *48,000</td>
<td>3,566,790</td>
<td>3,496,000</td>
<td>10</td>
<td><strong>0.30</strong></td>
</tr>
<tr>
<td>Ylivieskaan vesiosuuskunta</td>
<td>coop 13,700</td>
<td>804,827</td>
<td>-</td>
<td>10</td>
<td>0.82</td>
</tr>
</tbody>
</table>

* No. of water customers (no. of sewage customers 22,600)
** No. of personnel in municipal technical unit
*** Average municipalities
**** Prices in the municipality of Hollola: water €1.48/m³, sewage €2.42/m³
***** Wholesale price
Appendix 4 Reviewed waterworks for financial analysis

<table>
<thead>
<tr>
<th>Waterworks</th>
<th>Waterworks</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MUNICIPAL UNITS</strong></td>
<td><strong>MUNICIPALLY-OWNED ENTERPRISES</strong></td>
</tr>
<tr>
<td>MU 1 Heinolan kaupungin vesihuoltolaitos</td>
<td>MOE 1 Joensuun Vesi -liikelaitos</td>
</tr>
<tr>
<td>MU 2 Imatran Vesi</td>
<td>MOE 2 Kokkolan Vesi</td>
</tr>
<tr>
<td>MU 3 Nokian kaupungin vesihuoltolaitos</td>
<td>MOE 3 Kuopion Vesi</td>
</tr>
<tr>
<td>MU 4 Raisio kaupungin vesihuoltolaitos</td>
<td>MOE 4 Liikelaitos Haukiputaan Vesi</td>
</tr>
<tr>
<td>MU 5 Vaaraksen kaupungin vesihuoltolaitos</td>
<td>MOE 5 Oulun Vesi</td>
</tr>
<tr>
<td>MU 6 Aaltonen kunnan vesihuoltolaitos</td>
<td>MOE 6 Porin Vesi</td>
</tr>
<tr>
<td>MU 7 Kankaanpäänsä saaren kaupungin vesihuoltolaitos</td>
<td>MOE 7 Porvoon vesi</td>
</tr>
<tr>
<td>MU 8 Kemijärven kaupungin vesihuoltolaitos</td>
<td>MOE 8 Seinäjoen Vesi</td>
</tr>
<tr>
<td>MU 9 Liikasen Vesi vesihuoltolaitos</td>
<td>MOE 9 Tampereen Vesi</td>
</tr>
<tr>
<td>MU 10 Mäntsälänen kunnan vesihuoltolaitos</td>
<td>MOE 10 Pieksämäen Vesi</td>
</tr>
<tr>
<td>MU 11 Siiliinjärven kunnan vesihuoltolaitos</td>
<td>MOE 11 Uudenkaupungin Vesi</td>
</tr>
<tr>
<td>MU 12 Alajärven kaupungin vesihuoltolaitos</td>
<td>MOE 12 Liikelaitos KRS-Vesi</td>
</tr>
<tr>
<td>MU 13 Ilomantsiin kunnan vesihuoltolaitos</td>
<td>MOC 1 Hameenlinnan Seudun Vesi Oy</td>
</tr>
<tr>
<td>MU 14 Liperin kunnan vesihuoltolaitos</td>
<td>MOC 2 Kymen Vesi Oy</td>
</tr>
<tr>
<td>MU 15 Sonkajärven kunnan vesihuoltolaitos</td>
<td>MOC 3 Lahti Aqua Oy</td>
</tr>
<tr>
<td>MU 16 Talvikosken kunnan vesihuoltolaitos</td>
<td>MOC 4 Raahen Vesi Oy</td>
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<tr>
<td>MU 17 Tohmajärven kunnan vesihuoltolaitos</td>
<td>MOC 5 Keminmaan Vesi Oy</td>
</tr>
<tr>
<td><strong>MUNICIPALLY-OWNED COMPANIES</strong></td>
<td></td>
</tr>
<tr>
<td>Coop 1 Kiteen vesikunta</td>
<td>MOC 6 Orimattilan Vesi Oy</td>
</tr>
<tr>
<td>Coop 2 Pudasjärven Vesiosuuskunta</td>
<td>MOC 7 Inarin Lapin Vesi Oy</td>
</tr>
<tr>
<td></td>
<td>MOC 8 Vihannin Vesi Oy</td>
</tr>
</tbody>
</table>
Appendix 5 Formulas for the analysis of the financial performance

Return on assets

Return on assets (ROA) measures how profitable a company is relative to its total assets. The ROA figure gives investors an idea of how effectively the company is converting the money it has to invest into net income. The higher the ROA the better, because it indicates the company is earning more money on less investment.

\[
\text{ROA} = \frac{\text{Net result} + \text{Financial expenses} + \text{Taxes (12 mths)}}{\text{Average adjusted balance sheet total}} \times 100
\]

where

Financial expenses = interest and other financial expenses + foreign exchange losses.

The ROA compares the operating result with the total capital that is used in the business operations. The ROA is a profitability measure that is not affected by either the company’s tax policy or the tax characteristics of the corporate form of the business. As shown in the adjusted profit and loss statement, ROA does not consider taxes paid.

The ratio measures the company’s ability to generate profits compared to the total capital tied up in the business operations. The ROA is more useful than the ROI, especially when it is impossible to clarify the division between the interest-bearing and the non-interest-bearing external capital. According to the Committee for Corporate Analysis (2006), the ROA can be given the following benchmark values:

- Above 10% = good
- 5–10% = satisfactory
- below 5% = poor
Return on Investment (ROI) measures how profitable a company is relative to its invested capital. ROI measures a company’s profitability and its managements’ ability to generate profits from the funds investors have placed at its disposal.

\[
\text{ROI} = \frac{\text{Net result + Financial expenses + Taxes (12 mths)}}{\text{Average invested capital of the fiscal period}} \times 100
\]

where

Average invested capital = adjusted shareholders’ equity + long-term liabilities + short-term interest-bearing liabilities + other short-term interest-bearing liabilities to corporate group companies.

The ROI measures relative profitability; that is, the yield generated on the invested capital that requires a return in the form of interest or something similar. Comparing this ratio of different companies may be difficult if there is a lack of information from which to separate the interest-bearing liabilities (that is, capital requiring return) from the non-interest-bearing liabilities. Large investments and revaluations of assets create difficulties in trend analysis. ROI can be regarded as fairly good when, at a minimum, it amounts to the average financial expense percentage of the interest-bearing liabilities.

\[
\text{Required minimum} = \frac{\text{Financial expenses}}{\text{Average invested capital of the fiscal period}} \times 100
\]

Return on Equity (ROE) indicates the amount of net income returned as a percentage of shareholders’ equity. ROE measures a corporation’s profitability by revealing how much profit the company generates with the money shareholders have invested.

\[
\text{ROE} = \frac{\text{Net result (12 mths)}}{\text{Average adjusted shareholders' equity of the fiscal period}} \times 100
\]

The required ROE depends on the return required by the owners. This required return ratio is essentially affected by the risks involved. The company must be
able to generate profits in order to be able to service the external invested capital and the owner’s investment. Of all the return on capital ratios, the ROE is the one that is most affected by revaluations of assets.

**Free cash flow**

Free cash flow represents the amount of cash that a company has left over after it has paid all of its expenses, including investments repayments and depreciation according to its plan. Free cash flow is important because it allows a company to pursue opportunities that enhance shareholder value. The presence of free cash flow indicates that a company has cash to expand, develop new products, buy back stock, pay dividends or reduce its debt. High or rising free cash flow is often a sign of a healthy company that is thriving in its current environment.

\[
\begin{align*}
\text{Operating profit (loss)} & \quad + \quad \text{Shares/Similar rights of ownership in associated companies} \\
& \quad - \quad \text{Operating taxes} \\
& \quad - \quad \text{Tax effect of financial expenses} \\
& \quad + \quad \text{Tax effect of financial income} \\
= \ & \text{Operating cash flow} \\
& \quad + \quad \text{Depreciation} \\
= \ & \text{Gross cash flow} \\
& \quad - \quad \text{Change in working capital} \\
& \quad - \quad \text{Gross investments} \\
= \ & \text{Free operating cash flow} \\
+/\,- \ & \text{Other expenses (after taxes)} \\
= \ & \text{Free cash flow}
\end{align*}
\]

**Financing of investments ratio**

Financing of investments (FOL-%) ratio measures how operational cash inflow and cash inflow from extraordinary items will both cover the investment expenses.

\[
\text{FOL-%} = \frac{\text{Cash flow after financing activities}}{\text{Investments in fixed assets} + \text{investments in shares/similar rights of ownership and in other non - current receivables (net)}} \times 100
\]
When the ratio is reduced from 100, it indicates the share that is left to be covered by capital financing; for example, equity financing, mutual funds or asset liquidation. The average percentage of financing of investment ratio should approach 100 percent.

**Cash after financing**

Another measure for evaluating cash flow adequacy is to compare cash after financing into depreciation and other reductions in value. The basic assumption is that the operational cash flow is sufficient if the cash after financing is at least equal to the depreciation of fixed assets. Depreciation indicates the average annual need for replacement investments. If the cash after financing covers depreciations (replacement investments), the municipality does not need to incur debt, liquidate the fixed assets or long-term investments or reduce the margin to keep its production services in good working condition. If the annual contribution remains negative, cash flow financing will not be sufficient for current expenditure.

**References**

Appendix 6 Laws and enactments

Key laws, policies and directives related to water and sewage services (in alphabetical order).

Kuntalaki /Municipality Act (365/1995)
Laki avoimesta yhtiöstä ja kommandiittiyhhtiöistä / Partnership Act (389/1988)
Laki kuntalain muuttamisesta (519/2007)
Laki julkisista hankinnoista / Act on Public Contracts (348/2007)
Laki vesi- ja energiahuollon, liikenteen ja postipalveluiden alalla toimivien yksiköiden
hankinnoista (349/2007)
Laki vesihuollon tukemisesti (686/2004)
Maankäyttö- ja rakennuslaki / Land Use and Building Act (132/1999)
Osakeyhtiöllaki / Limited Liability Companies Act (624/2006)
Osuuskuntalaki / Co-operatives Act (1488/2001)
Pelastuslaki /Rescue Act (468/2003)
Terveydensuojelulaki / Health Protection Act (763/1994)
Valtioneuvoston asetus julkisista hankinnoista (614/2007)
Valtioneuvoston asetus talousjätevesien käsittelyystä vesihuoltolaitosten viemäriverkostojen
ulkopuolisilla alueilla (542/2003)
Vesihuoltolaki / Act on Water Services (119/2001)
Ympäristönsuojelulaki / Environmental Protection Act (86/2000)
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377. Malinen, Iikka (2010) Improving the robustness with modified bounded homotopies and problem-tailored solving procedures

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