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Cleaning services in local authorities

Thesis for the degree of Philosophiae Doctor

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Preface

Cleaning is a topic which has followed me throughout my life, from childhood until the present. Growing up, my family owned a small cleaning company, and as I was supposed to take it over, I educated myself accordingly. This education includes a certificate of apprenticeship in cleaning, a bachelor's degree in facility service management and a master's degree in real estate and facility management (FM). During my studies, I met my love and a change in plans occurred with regard to the cleaning company. Towards the end of my PhD project, the family company was sold to another local provider who wanted to expand the services offered.

As a result of my education, my interest is not only in cleaning, but also in more or less every topic related to FM. When I started in higher education, I never thought I would end up where I am now. I only wanted some more education, which turned into more and more yet. This hunger for knowledge is still present, and I would like to follow the topic further at all levels possible – from industry dynamics down to cleaners' everyday lives.

A few months after submitting my master's thesis, I started working at a consulting company as an FM consultant; while there, I learned that there were PhD openings in a research programme in public FM. A few days before the deadline, I sat down and formed the first ideas for this PhD thesis. These thoughts involved a survey and case studies based on interviews and walkthroughs, as well as early ideas about gaining experience abroad. At this early stage, the focus was on building usability and organisation. Later on, organisations became the primary focus; thus, issues of usability were only briefly addressed without any direct reference to this concept, and the intended walkthrough method was changed to that of direct observation.

I found that I needed to preserve a more general and basic approach than I had originally intended. As the topic of cleaning was to be pursued and little work seemed to have been done previously, I decided that there was a need to provide a more substantial basis for further research. Thus, I started with mapping the knowledge Norwegian researchers had brought forward since the 1800s, and then considered how Norwegian local authorities were dealing with FM and cleaning, particularly with regard to the organisation of these services. Shortly after obtaining the first results, I continued with qualitative studies. What was interesting to me was how the municipalities organised and practiced cleaning. The conducted literature review detected little such research; thus, a gap was identified.

My hope is that this research will be of use to others and that it may attract some attention to the topic of cleaning. At the beginning of this project, two main decisions were made. First, I wanted to write in English. Most of the work I knew regarding cleaning had been done in Norwegian, which meant that a broader community was not able to access the content. The summary of the Norwegian cleaning research history is an example of this. Yet another motivation to summarise the Norwegian cleaning research history was the following comment: *"[W]e will not find any record of the cleaning history written in any book of history nor in any encyclopaedias"* (Hagesæther and Danielsen, 1996, p. 9 [1]). Second, I wanted to write an article-based thesis, as this would enable the research to become available relatively soon and well in advance of the final thesis.

The thesis work has been financed by the Norwegian Ministry of Local Government and Regional Development (KRD [2]) through a research and development (R&D) programme on facility management in local authorities (KRD, 2008) at the Centre of Real Estate and Facility Management of the Norwegian University of Science and Technology (NTNU). New knowledge in Norwegian society regarding how to make buildings more efficient and support the operation of local authority buildings was called for by NOU 2004:22, Valen *et al.* (2007) and the Research Council of Norway (2009). More cost-efficient buildings and more knowledge on efficient operations were among the objectives. In this regard, both energy and cleaning were specifically mentioned in the R&D programme proposal by Valen *et al.* (2007). The Research Council of Norway (2009) determined that there was a *"great need for knowledge regarding how buildings should be shaped, operated and managed in ways that correspond with high standards of architectonic practice and quality in our built environments"* (p. 49 [3]). This need for knowledge on efficient buildings and cleaning services had also been expressed by the Norwegian cleaning industry. In 2007, a representative within the Norwegian cleaning products supplier association, RELE (Renholdsprodukters Leverandørforening), stated that "*[i]n 20 years, cleaners will be trained for other activities within the field and work in new ways. Then architects will have to become even more clever than they are today in order to think of cleaning when they draw buildings"* (Renholdsnytt, 2007, p. 14 [4]). This need for knowledge, along with my own personal experiences with the topic, formed the background of this thesis.

It made sense to research cleaning services in more detail, as this was a service with which I was familiar, as well as a service where little knowledge seemed to be developed. Pursuing public services was also of interest, as this was the sector with which I was the least familiar. I also found researching the public sector to be less challenging, as doing so would not lead me to a situation in which I was researching competitors; thus, I deliberately avoided researching private companies providing services to the public and chose to focus on public service supply. This was also a natural choice resulting from the focus in the R&D programme.

This thesis assembles knowledge on cleaning by bringing forth past and general wisdom and describing the contemporary situation in the public sector. Such knowledge can provide insight into how organisations, buildings and technologies may positively or negatively influence the performance of cleaners and cleaning services. This is how a product – whether an organisation, building or technology – can hinder or support a cleaning service and relate, as such, to the concept of usability. Studying operational practice, the management thereof and organisational structures can provide valuable insights into the current situation. This can facilitate indirect insights concerning how technology and buildings impact cleaning services. The hope is that this knowledge can later be utilised in processes such as reorganisation, service innovation, briefing and building design.

Acknowledgements

This project would not have become a reality without those who participated in the research and those who financed it. First, I would like to express my gratitude to the Centre of Real Estate and Facility Management at NTNU for giving me the opportunity to pursue a PhD and to KRD for financing the research project I have been a part of. Second, I would like to thank everyone who took part in my research, including all of the local authorities who responded to the survey, the managers who agreed to be interviewed and the cleaners who allowed me to shadow them. Third, I would like to thank Prof. Edward Finch and the University of Salford Manchester for hosting me in the UK and Rob Bailey, with the Association of Public Service Excellence (APSE), for opening the door to the UK public sector. Thanks also to the APSE for providing me with internal benchmarking reports and allowing me to refer to them.

Thanks to everyone who took an interest in my work and gave me insights along the way. Your feedback gave me the confidence to follow my ideas. In particular, I would like to thank those who responded to my requests, those who took the time to read my publications and comment on them, those who invited me to present my work to their colleagues and all the researchers who were kind enough to send me pieces of their work when I could not find them. Some took the time to meet with me and discuss my work at a short workshop at the very beginning of this PhD project, while others met with me on a one-to-one basis, either face to face or by email. The main enablers in this regard were Geir Karsten Hansen, Olav Egil Sæbøe, Håkon Kvåle Gissinger, Kirsten Arge, Antje Junghans, Arne Nesje, Marit Støre Valen, Ola Edvin Vie, Gaute Knutstad, Anita Moum, Petter Furulund, Steinar Nilsen, Kjell Bård Danielsen, Oddbjørn Sjøvold, Shaun Ryan, Mary Bente Bringslid, Annemor Kalleberg, Gudrun Linn, Marja Aulanko, Astrid Sandvik, Kjersti Lie, Siri Hustad, as well as countless others who have not been mentioned. Thank you for taking an interest in my research and apologies for not doing justice to all of our conversations.

I also owe many thanks to my fellow PhD colleagues and friends. A special thanks to Kari Marie Avdal Prestegård, Kari Eldegard, Audrey Schultz, Marianne Knapskog, Eli Hatleskog, David Anthony Collins, Hillevi Laugsand, Torleif Holte and Samson Degago for your understanding and support.

The last thank-you notes go to those who have had the most influence on me and my progress: my supervisors and my family. My family, in particular my mum and my love, have given me profound support throughout my PhD studies, and I am forever grateful for their divine support.

Thanks to Prof. Siri Hunnes Blakstad for all of the positive engagement and confidence in my idea to look at cleaning, the access to your personal library, introducing me to your network in the world of FM and including me in that network. Without your positive commitment and confidence in my ideas, this PhD project would not have become a reality. Your involvement began a year and a half prior to the completion of my master's thesis. This was one of the reasons why I chose to pursue my PhD at the Centre. I had the opportunity to become familiar with you during the preparations for my master's thesis work and throughout that work, and I could not imagine doing a PhD without you. It was for this reason that I applied. So, thank you! Thank you for coming to NTNU and for being there until I completed my PhD, albeit only as adjunct professor in recent years. After you went back to practice, I missed you deeply. Again, thank you for noticing me when I was a master's student. Thank you for liking my ideas at that time and for your desire to be my supervisor through both my master's and PhD studies. Finally, thank you for recommending Nils as a co-supervisor.

Thanks to Prof. Nils OE Olsson for coming to the Faculty of Architecture and Fine Art as a ‘visiting academic’ and for staying there more or less throughout my PhD work. Thank you for challenging me and for your confidence and interest in my work. Thank you for teaching me what an academic article is and how it may be written. Thank you for taking the time. Last but not least, thank you for your quick responses and ability to see potential. Working with you is a delight. One of your great qualities is your ability to admit when you don’t know something. Another is your ability to ask, “How come?” Such questions and answers give this research fellow the desire to dig deeper.

Abstract

This thesis discusses cleaning services in local authorities and is a response to calls for new knowledge on public facility management (FM). The research was financed by the Norwegian Ministry of Local Government and Regional Development (KRD). The aim is to describe and explore cleaning in order to provide new knowledge which may contribute to developing and improving FM in local authorities. The research undertaken was based on a descriptive and exploratory mixed-method approach consisting of a thorough literature review, a national survey and two case studies. The outcomes are presented in this thesis, including its attachments; it includes additional references and analysis of what is presented in the five peer-reviewed publications which are attached. On the whole, the thesis provides an enhanced understanding of cleaning services' organisation and practice in local authorities from the 1800s to the present decade.

The focus of the research is on Norwegian local authorities. In addition, empirical experiences from the United Kingdom (UK) have been collected, along with knowledge from international research. Three research questions (RQs) were formulated to research the objective of studying the organisation and practice of cleaning in local authorities. These three RQs enabled 1) an overview of cleaning-related research knowledge in a Norwegian context covering a time period of 200 years, 2) a quantitative and national overview of organisational models used for cleaning services in Norwegian local authorities from the 1990s onwards and 3) qualitative and local insights into the organisation and practice of cleaning services in two local authorities as of 2010–2011. These local insights provide examples of how cleaning services can be organised and practiced in local authorities, and should thus *not* be regarded as examples of how cleaning services should be organised and practiced. The examples include strategic, tactical and operational insights. The most detailed level of research includes observations of cleaners at work.

Chapter 1 defines cleaning services and offers insight into the knowledge base which FM research has developed regarding cleaning. Predominantly, this knowledge base is old, as cleaning used to be focused on during the early days of FM. Until the present, however, this knowledge base has also been limited, although cleaning services represents one of the most cost- and labour-intensive services within FM. In addition, this chapter describes the thesis framework, as well as the aim, objective and RQs of the research.

Chapter 2 explains the research design and ethical actions employed throughout the research. The study is based on a pragmatic philosophical world view wherein all research approaches may be used. A semi-concurrent research strategy was applied consisting of a descriptive and explorative mixed-method approach which predominantly emphasised qualitative research. First, an all-embracing understanding of cleaning was sought, and studies on cleaning in the Norwegian context were assembled and categorised. This thorough literature review identified 80 publications as cleaning-related research. Second, a national survey was initiated; this obtained a 33.9% response rate after targeting all Norwegian municipalities. This survey requested information on organisational models used for cleaning and facility management, along with information on planned changes in organisational models. In this context, the term *organisational models* refers to structures such as traditional departments, municipal undertakings, inter-municipal collaborations and limited companies. Third, descriptive case studies were initiated, predominantly based on interviews and shadowing. Two case studies were conducted, one in Norway and one in the UK. The inclusion of a UK case enabled an external perspective on the Norwegian research.

Chapter 3 contains theoretical and international perspectives on the organisation and practice of cleaning. The chapter addresses issues related to organisational theories such as bureaucracy, the market and networks, and discusses issues related to cost-efficiency in cleaning and the concurrent development of FM and new public management (NPM). The predominant discussion in this chapter revolves around the in-house outsourcing debate, wherein governmental efforts are also linked to operational cleaning practice. The issues addressed in this chapter include market testing, trust in providers, sustainable FM, cost factors in cleaning, cleaners' work conditions, building design and longevity and management practices in cleaning (both strategic–tactical and tactical–operational).

Chapter 4 continues the theoretical approach, but emphasises the Norwegian context and limits the discussion to the organisation and practice of cleaning in local authorities. The chapter highlights historical perspectives, as it conveys a 200-year-long history of cleaning services. This history is brought into a wider FM and management perspective and linked to the developments which the society experienced after the Napoleonic wars. This includes the establishment of Norwegian local authorities, taking into account their infrastructure and welfare systems. A major component of this chapter is its consideration of the developments in Norwegian cleaning research. These developments are linked to those in management theories and FM, identifying several transformations in Norwegian public FM.

Chapter 5 presents the results from the national survey and discusses Norwegian municipalities' use of organisational models for FM and cleaning, including planned changes in the use of models. These models include traditional departments, municipal undertakings (KF), inter-municipal alternatives (IKS), municipal-owned limited companies (AS) and the use of private or voluntary providers. In both cases of FM and cleaning, in-house organisational models were preferred. Private providers were used little, and when they were evident, they were more commonly used by the municipalities' FM organisation than their cleaning organisation. The municipalities' reported plans to change do indicate a move towards more decoupled and market-inspired models in the future. At the same time, changes in the organisational model can relate more to tactical–operational interactions than to strategic choices.

Chapter 6 presents the results from the two descriptive case studies. These serve as representatives of common ways to organise cleaning services in local authorities within two different national contexts: Norway and the UK. The cases are considered as examples of how cleaning can be organised and practiced in local authorities. Describing in-house cleaning service organisations, the cases illustrate that the organisation and practice of cleaning can be different form one local authority to another. Highlighted topics within the cases include how the case organisations link to their councils, manage and supervise their cleaning services and keep in touch with their customers. The cases span from strategic via tactical to operational practices. The most detailed level of the cases describes on-the-job cleaners' everyday work experiences.

Chapter 7 provides the concluding discussion of this thesis. It addresses each of the three RQs prior to satisfying the thesis objective of studying the organisation and practice of cleaning services in local authorities. The chief conclusion is that both in Norway and in the UK, cleaning services in local authorities are labour-intensive, manual services which are predominantly organised in-house. Finally, suggestions for further research are provided in *Chapter 8*.

Sammendrag

Denne avhandlingen diskuterer renholdstjenester i kommuner og er et svar på behovet for ny kunnskap innen kommunal eiendomsforvaltning (FM). Forskningen har vært finansiert av Kommunal og regional departementet (KRD). Målet har vært å beskrive og utforske renhold med den hensikt å fremskaffe ny kunnskap som kan bidra til å utvikle og forbedre eiendomsforvaltningen i kommuner. Den gjennomførte forskningen har vært basert på en beskrivende og utforskende fler-metode tilnærming bestående av en grundig litteratur studie, en nasjonal spørreundersøkelse og to case studier. Resultatene er presentert i denne avhandlingen, inklusive vedleggene. Avhandlingen inneholder flere referanser og analyser enn det som fremkommer i de vedlagte, fagfellevurderte publikasjonene. Sett under ett gir avhandlingen en økt forståelse av kommunale renholdstjenesters organisasjon og praksis siden 1800-tallet og frem til i dag.

Fokuset i forskningen har vært på norske kommuner. I tillegg, har det blitt innhentet empiriske erfaringer fra Storbritannia (UK), samt kunnskap fra internasjonal forskning. Tre forskningsspørsmål (RQs) ble formulert for å besvare målsetningen om å studere kommunale renholdstjenesters organisasjon og praksis. Disse tre forskningsspørsmålene muliggjorde 1) oversikt over renholdsrelatert forskning i en norsk sammenheng over en tidsperiode på 200 år, 2) en kvantitativ og nasjonal oversikt over organisatoriske modeller som benyttes for renholdstjenester i norske kommuner fra 1990-tallet og fremover, og 3) kvalitativ og lokal innsikt i to kommuners renholdsorganisasjon og praksis i tidsperioden 2010-2011. Disse to lokale studiene betraktes som eksempler på hvordan renholdstjenester kan organiseres og praktiseres i kommunene, og bør derfor *ikke* betraktes som eksempler på hvordan renholdstjenester skal organiseres og praktiseres. Eksemplene omfatter strategiske, taktiske og operasjonelle perspektiver. Det mest detaljerte nivået på forskningen omfatter observasjoner av renholdere på jobb.

Kapittel 1 definerer renholdstjenester og gir innsikt i kunnskapsgrunnlaget som FM forskning har utviklet om renhold. Denne kunnskapsbasen er i hovedsak gammel ettersom renhold pleide å være fokusert på i de tidlige tider av FM. Dette kunnskapsgrunnlaget har, frem til i dag, også vært begrenset, selv om renholdstjenester representerer en av de mest kostnads- og arbeidskrevende tjenester innen FM. I tillegg beskriver dette kapittelet avhandlingens rammeverk, målsetninger og forskningsspørsmål.

Kapittel 2 forklarer avhandlingens forskningsdesign og etiske handlinger foretatt gjennom forskningen. Studien er basert på en pragmatisk filosofisk verdensanskuelse, hvor alle forskningstilnærminger kan brukes. Det ble brukt en delvis samtidig forskningsstrategi bestående av en beskrivende og utforskende flermetode tilnærming hvorav hovedvekten lå på kvalitativ forskning. Først ble en altomfattende forståelse av renhold søkt, og studier på renhold i norsk sammenheng ble samlet og kategorisert. Denne grundige litteraturgjennomgangen identifiserte 80 publikasjoner som renholdsrelatert forskning. Deretter ble en nasjonal spørreundersøkelse igangsatt. Denne oppnådde 33,9% svarprosent. Spørreundersøkelsen inviterte alle norske kommuner til å delta og ba om informasjon vedrørende organisatoriske modeller som brukes for renhold og eiendomsforvaltning, samt informasjon om planlagte endringer i organisasjonsmodeller. I denne sammenheng viser begrepet organisasjonsmodeller til strukturer som tradisjonelle etatsalternativer, kommunale foretak, interkommunale samarbeid og aksjeselskaper. Til slutt ble beskrivende case-studier, i hovedsakelig basert på intervjuer og direkte observasjon, initiert. To case studier ble gjennomført, en i Norge og en i Storbritannia. Inkludering av et britisk case muliggjorde et eksternt perspektiv på den norske forskningen.

Kapittel 3 inneholder teoretiske og internasjonale perspektiver på renholdsorganisering og praksis. Kapittelet adresserer tematikk knyttet til organisasjonsteorier som byråkrati, marked og nettverk, og drøfter problemstillinger knyttet til kostnadseffektiviteten i renhold og den samtidige utviklingen av eiendomsforvaltning og New Public Management (NPM). Den bærende diskusjonen i dette kapitlet er debatten rundt egenregi og outsourcing. I dette kapittelet blir statlige tiltak knyttet til operativ renholdspraksis. Tematikken som behandles i dette kapitlet omfatter slikt som markedstesting, tillit til leverandører, bærekraftig FM, kostnadsfaktorer i renhold, renholderes arbeidsforhold, byggdesign, bygningers levetid og renholdsledelse (både strategisk-taktisk og taktisk-operativ).

Kapittel 4 fortsetter den teoretiske tilnærmingen, men endrer fokus til norsk sammenheng og begrenser diskusjonen til organisering og praktisering av renhold i kommuner. Kapitlet belyser historiske perspektiver og formidler en 200 år lang historie om renholdstjenester. Denne historien er brakt inn i et bredere FM og ledelsesperspektiv og knytter denne utviklingen til samfunnsutviklingen etter Napoleonskrigene. Dette inkluderer etableringen av norske kommuner, samt utviklingen av infrastruktur og velferdsordninger. En viktig del av dette kapitlet er behandlingen av utviklingen i norsk renholdsforskning. Denne utviklingen er knyttet til utviklingene i eiendomsforvaltning og generelle ledelsesteorier, og identifisere flere transformasjoner i den kommunale eiendomsforvaltningen i Norge.

Kapittel 5 presenterer resultatene fra den nasjonale spørreundersøkelsen og diskuterer norske kommuners bruk av organisatoriske modeller for eiendomsforvaltning og renhold, inkludert planlagte endringer i bruken av modeller. Disse modellene inkluderer tradisjonelle etatsalternativer, kommunale foretak (KF), interkommunale alternativer (IKS), kommunalt eide aksjeselskaper (AS) og bruk av private eller frivillige leverandører. Resultatene viser at egen regi ble foretrukket både for eiendomsforvaltning og renhold. Private tilbydere ble brukt lite, og når de ble brukt, ble de brukt oftere av kommunenes eiendomsforvaltningsorganisasjon enn deres renholdsorganisasjon. Kommunenes svar angående planer om endringer i organisasjonsmodeller indikerer en bevegelse mot mer frikoplet og markedsinspirerte modeller i fremtiden. Undersøkelsen viser også at endringer i organisasjonsmodellen kan så vel knyttes til taktiske-operative aktiviteter som til strategiske valg.

Kapittel 6 presenterer resultatene fra de to beskrivende case-studiene. Disse ansees som representanter for vanlige måter å organisere renholdstjenester i kommunene i to forskjellige nasjonale kontekster: Norge og Storbritannia. Casene anses som eksempler på hvordan renhold kan organiseres og praktiseres i kommuner. De beskriver interne renholdsorganisasjoner og illustrerer at organisering og praktisering av renhold kan variere fra en kommune til en annen. Belyste emner omfatter hvordan case organisasjonene er knyttet til sine kommunestyrer, hvordan case organisasjonene leder og følger opp sine renholdstjenester, samt hvordan de holder kontakten med sine kunder. Adresserte temaer spenner fra strategisk via taktisk til operativ praksis. Det mest detaljerte nivået beskriver renholdere sin arbeidshverdag.

Kapittel 7 gir den avsluttende drøfting av denne avhandlingen. Det besvarer hvert av de tre forskningsspørsmålene før målsetningen om å studere kommunale renholdstjenesters organisasjon og praksis adresseres. Hovedkonklusjonen er at kommunale renholdstjenester, både i Norge og i Storbritannia, er arbeidskrevende, manuelle tjenester som i all hovedsak er organisert i en intern organisasjonsmodell. Til slutt i avhandlingen, i *kapittel 8,* gies det forslag til videre forskning.

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List of abbreviations

AS	=	Limited Company, an abbreviation used for both public and private companies
CEO	=	Chief Executive Officer
CFM	=	Chief Facility Manager
Etat	=	Traditional Public Department
FCD	=	Fully Centralised Department
FDD	=	Fully Decentralised Department
FM	=	Facility/Facilities Management
FTE	=	Full-time equivalent
IKS	=	Inter-Municipal alternatives – various collaborations and a corporation
KF	=	Municipal Undertaking
KPI	=	Key Performance Indicator
LA	=	Local Authority
MMO	=	Management, Maintenance and Operation (of buildings)
N	=	Norway
NPM	=	New Public Management
PDD	=	Partly Decentralised Department
SLA	=	Service Level Agreement
VAT	=	Value-Added Tax
UK	=	United Kingdom
US	=	United States
EU	=	European Union

List of publications

This thesis is based on five attached publications described below. For simplicity, to distinguish these publications from other references in the text, they will be referred to in **bold**, for example, **Article 1**, **Article 2**, **Article 3**, **Paper 1** and **Paper 2**. In this list of publications, *article* refers to a publication in a peer-reviewed journal, whereas *paper* refers to a publication from a peer-reviewed conference.

Article 1 **Klungseth,** N.J. and Olsson, N.O.E. (2013), "Norwegian cleaning research: an overview and categorization", *Facilities*, Vol. 31 No. 7/8, pp. 290-313.

Article 2 **Klungseth,** N.J. (2014), "Organising cleaning in Norwegian public FM", *Journal of Facilities Management*, Vol. 12 No. 4, pp. 382-410.

Article 3 **Klungseth,** N.J. and Blakstad, S.H. (to be published), "Organising in-house cleaning services in public FM".

Paper 1 **Klungseth,** N.J. and Blakstad, S.H. (2012), "The silent army: a story from practice", in Michell, K., Bowen, P. and Cattell, K. (Eds.), *Proceedings of the Joint CIB W070, W092 & TG72 International conference on facilities management, procurement systems and public private partnership: delivering value to the community, Cape Town, South Africa, 23-25 January 2012,* Department of Construction Economics and Management, Faculty of Engineering & the Built Environment, University of Cape Town, Cape Town, South Africa, pp. 711-720.

Paper 2 **Klungseth,** N.J. (2012), "Shadowing: a valuable approach to facility management research", in Junghans, A. and Jensen, P.A. (2012), *Proceedings of the 11th EuroFM research symposium in Copenhagen, Denmark, 24–25 May 2012,* Polyteknisk forlag, Lyngby, Denmark, pp. *52-63.*

Authors' contribution to the publications

Article 1 *Nora Johanne Klungseth* was the main author and responsible for designing the research method and the theoretical framework, including collecting and analysing the data. *Nils O.E. Olsson* provided guidance on how to write an article and was part of control checking the analysis, including discussing the findings and conclusions.

Article 2 *Nora Johanne Klungseth* was the only author and responsible for designing the research method, and the theoretical framework, including collecting and analysing the data.

Article 3 *Nora Johanne Klungseth* was the main author and responsible for designing the research method and the theoretical framework, including collecting and analysing the data. *Siri Hunnes Blakstad* was part of discussing the research method, theoretical framework, research findings and conclusions.

Paper 1 *Nora Johanne Klungseth* was the main author and responsible for designing the research method and the theoretical framework, including collecting and analysing the data. *Siri Hunnes Blakstad* was part of discussing the theoretical framework, as well as the research findings and conclusions.

Paper 2 *Nora Johanne Klungseth* was the only author and responsible for designing the research method and the theoretical framework, including collecting and analysing the data.

1 Introduction

Cleaning services in local authorities are the focus of this thesis. Cleaning is an attractive topic for research, as it is one of the least studied services within facility management (FM), while at the same time, it is one of the most cost- and labour-intensive services.

Cleaning is in this thesis viewed as a service, whereas the various activities comprising a cleaning service enabling a clean facility is regarded as tasks. At an operational level, a task can be the cleaning of door handles or the vacuuming of a textile floor cover. At a management level, a task can be the distribution of labour or the training of staff. A routine, on the other hand, comprises a set of tasks purposely performed in a specific sequence (**Paper 1**). A set of routines, including the management thereof, comprises a service. A service is delivered by an organisation, and this – the organisation and practice of cleaning in local authorities – represents the focus of this thesis.

Norwegian local authorities, which are at the core of this thesis, tend to both own and manage their own buildings, which represent a significant part of the national capital asset (Bjørberg, 2009). Workplaces and buildings will always require cleaning to provide their occupants with a healthy environment. Irrespective of how cautious occupants might be, surfaces inevitably become soiled. Hawes (1993, cited in Alnæs, 1995, p. 52) indicated that to avoid the need for cleaning, buildings would have to be made of glass and shaped like pyramids, concurrently emphasising that even then, this type of building would require cleaning – witness the glass-pyramided Louvre museum in Paris. Attempts made to reduce the need for cleaning in recent years have included developments in *self-cleaning surfaces* to reduce soiling, *robotics* to ease manpower and *ergonomic tools* to reduce work-related issues (Jung *et al*., 1998; Oh and Watanabe, 2002; Blossey, 2003; Palacín *et al.*, 2005; Kumar, 2006; Cheng *et al.*, 2006; Lee *et al.*, 2009; Liu and Jiang, 2012). Yet another technological development has taken place over the last few years: cleaners and cleaning services are using information technology (IT) solutions such as mobile phones, apps and iPads placed on their trolleys (Tolman *et al.,* 2009; Tulla *et al.*, 2009; Renholdsnytt, 12.08.2013, 19.03.2014, 10.06.2014, 04.11.2014).

Although an increasing body of cleaning-related research is evolving, cleaning still represents one FM service which has been little researched (May and Pitt, 2012; **Article 1**; **Article 3**). In the early days of FM research, scholars examined cleaning services in particular (*Facilities*, 1984a, 1984b; Kemp, 1984; Buckley, 1989; Butler, 1989, 1991; Eley, 1989a, 1989b; Wilson, 1989; Bywater, 1990a, 1990b; Campbell, 1990; Wilde, 1994); since then, however, few publications have preserved a main focus on this service. Those that do have predominantly researched UK healthcare sector issues (May and Smith, 2003; May and Suckley, 2005; Liyangage and Egbu, 2006; Whitehead *et al.*, 2007; May and Pitt, 2012). Notable FM studies focussing on cleaning services outside the hospital environment include Campbell's (2005) study on how innovative custodial safety [5] can contribute to a reduction in facility maintenance costs (in the United states, US) and Stoy and Johrendt's (2008) research on cleaning management of owner-operated buildings (in Switzerland), which predominantly relates to estimations of cleaning cost.

Cleaning is one of the most cost-demanding and labour-intensive services within FM, and not only from a Norwegian perspective (**Article 3**; **Paper 1**). Cleaning services' high dependency on labour makes them particularly vulnerable to the challenges inherent in buildings, organisations and practices, as labour costs

(that is, salary-related costs) account for approximately 70–95% of the total cleaning costs (Byggeriets utviklingsråd, 1983; *Facilities*, 1984a; Campbell, 1990; NOU 1993:10; Ryan and Herod, 2006; Stoy and Johrendt, 2008; NHO Service, 2009; Trygstad *et al*., 2012). Small obstacles may have great impacts leading to such as wasted time. Such time could instead be used to improve service quality or to make a service add value. The concept of adding value includes an element of surprise which should go beyond expectations, demands and instructions (Jensen *et al.*, 2008). Value may be added with something as simple as a smile (**Paper 2**).

The major contribution of the thesis is the bridging of a research gap on cleaning in national and international FM research. Incorporated topics touch upon issues of relevance for settings outside local authorities. Local authorities can procure the cleaning services they need from external providers. Local authorities can also produce them within their own organisation. In particular, when a service is produced, there is a need for a deeper understanding of this practice. Such decision and topics are dealt with in many organisations. The thesis provides both general and specific insights concerning operational cleaning practice in relation to strategic, tactical and operational management of cleaning. The research includes an all-embracing knowledge overview of cleaning research in a Norwegian context. Covering a period of 200 years, this overview is followed by explorations of organisational models used in Norwegian local authorities. The research ends with descriptive insights from local authorities' actual practice, wherein the most specific level includes detailed practical descriptions of on-the-job cleaners' experiences and work situations. The predominant context is Norwegian. To give perspective to these national descriptions and explorations, however, knowledge from international research has been added and brief empirical insights from one local authority in the United Kingdom (UK) is included.

1.1 Research questions and the aim of the research

The aim of this thesis is to describe and explore cleaning in order to provide new knowledge which may contribute to developing and improving FM in local authorities. In FM research, it is common to focus on the management of services, customers or assets (Alexander, 2003a). This thesis focusses on issues related to the management of services.

The thesis discusses cleaning from a historical and a contemporary perspective, seeking to provide the research community with a stronger basis on the topic of cleaning. A broad research approach enables an overview of present knowledge regarding cleaning services and the current structure of this service. As a consequence, the *objective* of this research is as follows:

Objective: To study the organisation and practice of cleaning in local authorities.

This objective, which does not aim to determine the *best* way to organise and practice cleaning, has been split into three research questions (RQs):

RQ 1: What types of cleaning research exist in a Norwegian context?

The first question calls for a historical overview of research on cleaning from a Norwegian perspective. In this approach, the aim is to gain an overview of Norway's cleaning-related research topics, approaches and disciplines.

RQ 2: How is cleaning organised in Norwegian local authorities at a national level?

The second question calls for a national overview which brings the Norwegian research history into the present-day context by researching Norwegian cleaning organisations from a macro-perspective. In this context, *organisational model* refers to the following types of organisations: traditional departments, inter-municipal arrangements and public limited companies, or whether the cleaning service is outsourced [6] to the private market or voluntary organisations. This is done by assembling the available knowledge on the use of organisational models in Norwegian local authorities. The research related to this RQ is quantitative. The aim of RQ 2 is to assess how FM and cleaning services in Norwegian local authorities *can* be, *have* been and *are* organised, including what *changes* local authorities are planning with regard to organisational models. This RQ also brings attention to whether FM and cleaning services within each local authority are organised according to the same organisational model. Moreover, it seeks to determine whether building categories or the size of a local authority have any influence on the organisational models applied.

RQ 3: How can cleaning be organised and practiced at the local level?

The third question calls for local insights which continue to research present-day cleaning service organisations. In this context, the research is qualitative and cleaning organisations are viewed from a micro-perspective *describing the most common way* of organising and practicing cleaning in local authorities. In this RQ, it is the organisation's internal environment which is highlighted. The aim of this RQ is to provide examples of what cleaning services can be like in local authorities and to describe the situation as it is, as opposed to taking a normative approach focussing on what the situation could be like if certain things were changed.

1.1.1 Object of study and out-of-scope issues

The object of study is the day-to-day cleaning services performed inside buildings. Indoor building cleaning services account for the major part of day-to-day cleaning services and can be divided into daily and periodical cleaning. This refers to whether cleaning tasks are everyday actions or activities performed on a monthly or annual basis. Exterior building cleaning is commonly part of periodical cleaning tasks. Although exterior cleaning has been identified as an important part of upholding a corporation's image (Eley, 1989a, 1989b), knowledge regarding the cleaning of a building's external surroundings and façade has not been pursued, as this type of cleaning can be provided by bodies other than a cleaning service organisation such as caretaking units or specialist companies. In this regard, it may be worth mentioning that cleaning is one of the FM services that have not been consistent in their definitions: Some argue that it is a soft FM service closely related to people, while others state that it is a hard FM service closely related to buildings (De Toni *et al., 2009*). In this thesis, cleaning is defined as a soft service, which is a natural consequence of the research describing practices in Norway and the UK [7]. This definition contrasts with that of EN 15221-4:2011, which classifies cleaning as part of "Space and Infrastructure", that is, hard FM.

Depending on the stakeholder, researching cleaning offers diverse meanings. Thus, adding precision by defining what is out of scope is appropriate. Out-of-scope issues include unionism, discrimination and gender equality. In terms of the RQs, out-of-scope issues also include how thorough a cleaner may be, how good the cleaning service quality actually is, how the cleaning services are perceived by end users and how a clean building can ensure secure and pleasant surroundings. Other issues falling out of the scope of this thesis are cleaners' health and place in society (i.e. the perception that they have low status) and issues such as sanitation and the health of building users (e.g. sick building syndrome). To some extent, such issues have already been addressed by others.

The last limitation relates to the specific sector under investigation – the public sector. More specifically, it is limited to local authorities, which tend to be defined by geographical borders within a country. A local authority is governed by a local government (O'Neill *et al.*, 2006), as opposed to a central government which commonly governs a country or a collection of countries. Figure 1 has been developed as an illustration of this, and its development is based on Hansen (2013), Engelstoft and Larsen (2013), Wilson and Game (2011), KMD (2012) and the Local Government Association (2011). Local authorities can be two-tier authorities consisting of counties and municipalities, as in the case of Norway, which has a rather consistent two-tier structure throughout the country. Local authorities can also be single-tier authorities which do not distinguish between the two tiers of local authorities.

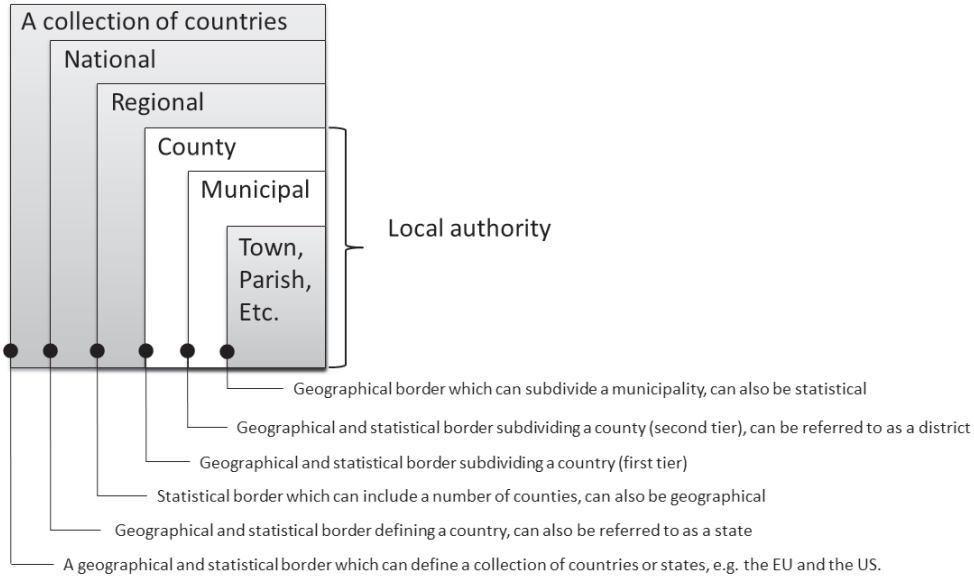

Figure 1 Borders within countries define local authorities

This thesis mainly focusses on Norwegian municipalities, the second tier in Norwegian local authorities. In addition, experience from a single-tier authority in the UK has been collected. Thus, for simplicity, the term *local authorities* has been used, although it refers to both counties and municipalities.

1.2 The thesis framework

In order to facilitate a broad, up-to-date overview on organisation and practices of cleaning in local authorities, a descriptive and exploratory multi-method approach was chosen and both quantitative and qualitative methods were applied. To accomplish this, a thorough literature review, a national survey and two case studies were conducted.

The resulting data has been analysed and presented in five peer-reviewed publications (three journal articles and two conference papers); see Figure 2 for the connection between the publications and RQs and Figure 3 for an overview of how the three RQs were further broken down.

In essence, the interrelations between the RQs, including the corresponding publications, are as follows. Each major answer to the individual RQs in this thesis is presented in the publications. Answers to RQ 1 were reported in **Article 1**, answers to RQ 2 in **Article 2** and answers to RQ 3 in **Article 3**, **Paper 1** and **Paper 2**. This thesis addresses the objective and binds the attached publications together into a greater unity.

RQ 1, which relates to the type of research which has existed historically, represents the most general level of this research, as it targets an all-embracing understand of cleaning in a Norwegian context. This RQ served as a foundation for the empirical research by establishing an overview and categorisation of Norwegian cleaning-related research in **Article 1**. This article identified that there has been little research on organisation and practice of cleaning in local authorities. In this thesis, the findings of this article have been supplemented so that the knowledge base related to the thesis objective covers the period from 1814 to 2014. The subsequent empirical research set out to bridge this knowledge gap on organisation and practice of cleaning in local authorities. RQs 2 and 3 bridge this research gap at two different levels: general and specific. RQ 2 takes a macro-perspective and considers the general national situation. Meanwhile, RQ 3 takes a micro-perspective and focusses on a specific and local level. Further, the papers address the most specific level of this research – operational cleaning practices in real-life contexts. **Paper 1** considers this issue directly, whereas **Paper 2** takes an indirect approach, preserving a methodological focus and using examples from cleaning practice to illustrate how such insights could be conveyed to a research community.

The empirical research focussed on interactions in FM. In FM, it is common to categorise organisations into strategic, tactical and operational interactions, that is, according to whether the interactions relate to long-term, medium-term or day-to-day perspectives (EN 15221-1:2006). According to the EN 15221-1:2006, s*trategic interactions* are concerned with aligning the FM strategy to the strategy of a core business [8], supervising the FM organisations and upholding relations with various stakeholders such as authorities and strategic partners. Moreover, such interactions include monitoring business performance and initiating service level agreements (SLAs). According to the same standard, tactical interactions in FM involve translating strategic objectives into requirements, managing FM staff and optimising the use of resources; in contrast, operational interactions relate, for example, to service delivery and the creation of the required day-to-day environment for end users. As illustrated in Figure 2, strategic perspectives are addressed in both RQ 2 and RQ 3, while RQ 3 also addresses tactical and operational perspectives. These three interactions are depicted in the figure as three levels of management. It is worth nothing that, according to Hansen (2012), this conceptual model of strategic, tactical and operational management was one of the important contribution of Haugen's (1990) doctoral thesis.

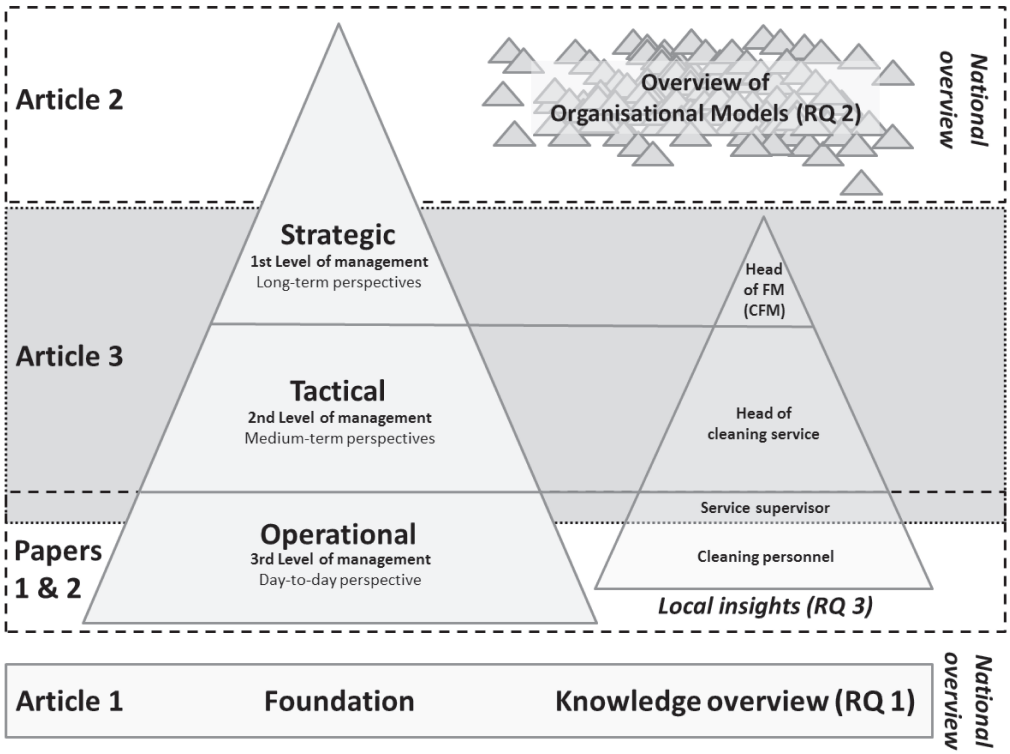

Figure 2 FM perspectives within this thesis and its attached publications

1.2.1 Structure of the thesis

The subsequent sections will present the theoretical and empirical findings of the attached publications. These findings will be elaborated on and brought into the larger context of FM and general management theories before a final conclusion is presented. Thus, this thesis includes additional analyses and references to those presented in the attached publications. *Chapter 2* will explain the overall research design, including the researcher's philosophical worldview, the applied research methods, ethical actions and an evaluation of the quality of information. *Chapter 3* predominantly employs a cost perspective to focus on the organisation and practice of cleaning. This chapter seeks to assemble some of the available knowledge on this topic [9], as cleaning costs were found to represent a significant part of buildings' total operational costs. The chapter starts with an introduction to common organisational theories and links these to international research on cleaning, FM and new public management (NPM). Thereafter, this chapter presents research studies which relate to the cost perspective. These studies address procurement practices and operational management practices, but also technologies and buildings as cost factors in cleaning. Some of the recent studies presented in Chapter 3 were conducted in Norway in the same timeframe as the empirical research for this thesis. These recent Norwegian studies focussed on outsourcing and local authorities' exposure to competition; thus, they add theoretically to the objective of this thesis.

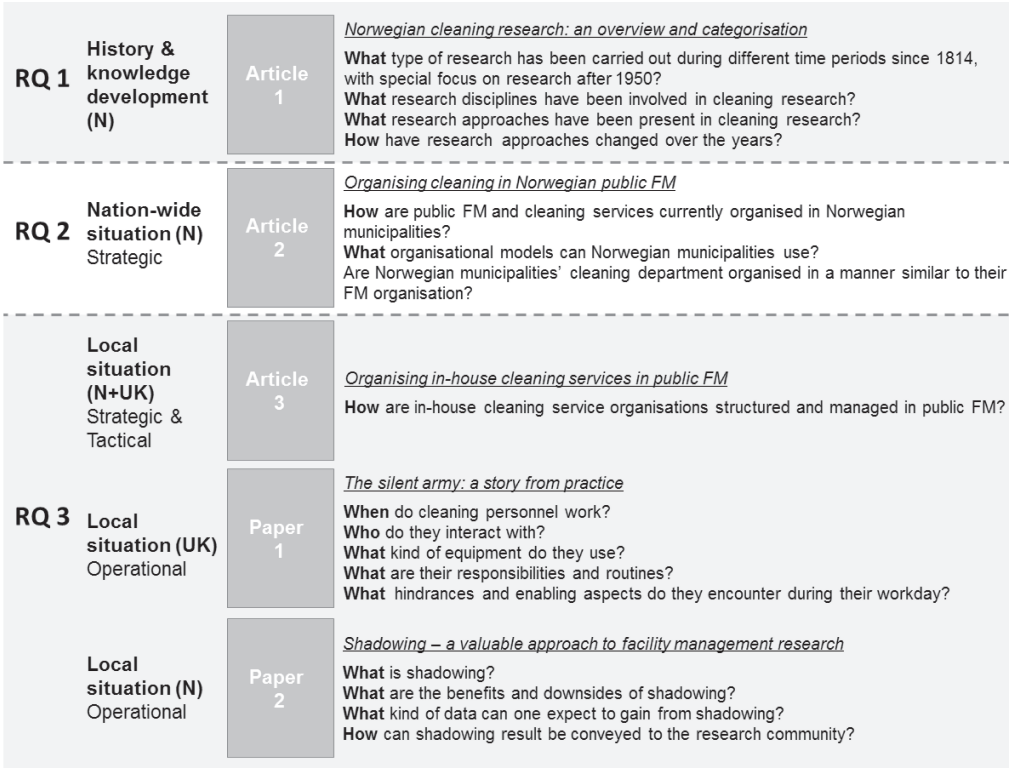

Figure 3 Publications and corresponding questions

Chapters 4–6 present the findings from the publications. As each individual study in this thesis has been presented separately in the attached publications, limited references are made to these in the chapters; thus, the attachments can be consulted for a full overview of the research. The focus in *Chapter 4* is historical management perspectives on cleaning in a Norwegian context. The chapter takes a theoretical perspective which elaborates on and adds to some of the findings from **Article 1** by placing the Norwegian history of cleaning within that of FM and general management theories. *Chapter 5* emphasises on strategic perspectives and presents the findings of the national survey of 2010 which explored the Norwegian situation regarding the organisation of cleaning in local authorities. Following this, *Chapter 6* includes tactical and operational perspectives and presents two case studies of the thesis. These cases studies are presented collectively and serve as example of actual cleaning practice in two local authorities as of 2010–2011.

In *Chapter 7*, a concluding discussion addresses the objective of studying the organisation and practice of cleaning in local authorities. Finally, in *Chapter 8*, suggestions for further research are provided.

2 Research design

In this chapter, the overall research design is presented. First, the researcher's philosophical worldview is delineated. Following this, the individual research methods are presented, together with an overview of why and how the empirical evidence was collected. Reasons for *why* evidence was collected are considered primarily in Section 2.2 Literature review, whereas questions of *how* evidence was collected are predominantly dealt with in Sections 2.3 National web survey and 2.4 Case studies. Finally, the quality of the obtained information is evaluated in Section 2.5 Quality of information and ethics.

2.1 A pragmatic philosophical worldview with a mixed-method approach

A researcher's philosophical worldview influences the assumptions brought to a study, the practice of research and the applied strategy of inquiry (Creswell, 2009). This thesis takes a pragmatic philosophical worldview. This is a pluralistic and real-world practice oriented worldview which allows all available approaches to be used to understand a problem; thus, the researcher is not committed to any one system of philosophy or reality. The research is based on the same understanding as Flyvbjerg (2006) expresses regarding surveys and case studies; sound research requires both large-*N* quantitative studies and small-*N* qualitative studies, as one has the advantage of breadth, while the other has the benefit of depth.

Typically, pragmatism applies a mixed-method approach employing both qualitative and quantitative methods. As in this thesis, most of the research questions in pragmatism are *how* and *what* questions, and the purpose of mixing methods is to gain insight from various perspectives. Inspiration has been drawn from positivism and social constructivism. Positivism is oriented towards measurements and theory verification, and can allow the possibility of generalisation. Most of this thesis does not seek such generalisations; a quantitative approach, however, has been applied to gain insight on a larger scale – the entire population of Norwegian municipalities. Social constructivism, on the other hand, focusses on understanding, social/historical construction and theory generation, and is, according to Neumann (2006), one part of interpretivism. In social construction, theory is generated through qualitative approaches emphasising the real-life context (Creswell, 2009). Qualitative research can be described as a developing process which tends to be interpretative and to use a theoretical lens. In this thesis, the main emphasis is placed on the qualitative approach.

The thesis aimed to describe and explore cleaning in order to provide new knowledge which may contribute to developing and improving FM in local authorities. This aim has been accomplished by assembling theoretical knowledge, bringing past wisdom forth and presenting current practices. As a whole, the thesis provide insights into Norwegian cleaning-related research carried out in 1814–2014; it establishes an overview of available knowledge from a Norwegian perspective and serves as a foundation for empirical research on cleaning organisations in local authorities. An outside perspective has been added to the national studies through the collection of experience from the UK, in addition to theoretical contributions. The chosen strategy has been semi-concurrent, starting with identifying prior knowledge and theory development in **Article 1**, continuing with quantitative explorations in **Article 2,** and moving on to qualitative descriptions in **Article 3, Paper 1** and **Paper 2**. Overall, three main research methods have been

applied: literature review, survey and case studies based on interviews and an observation technique termed “shadowing”; Figure 4 illustrates the connections between the research methods and publications.

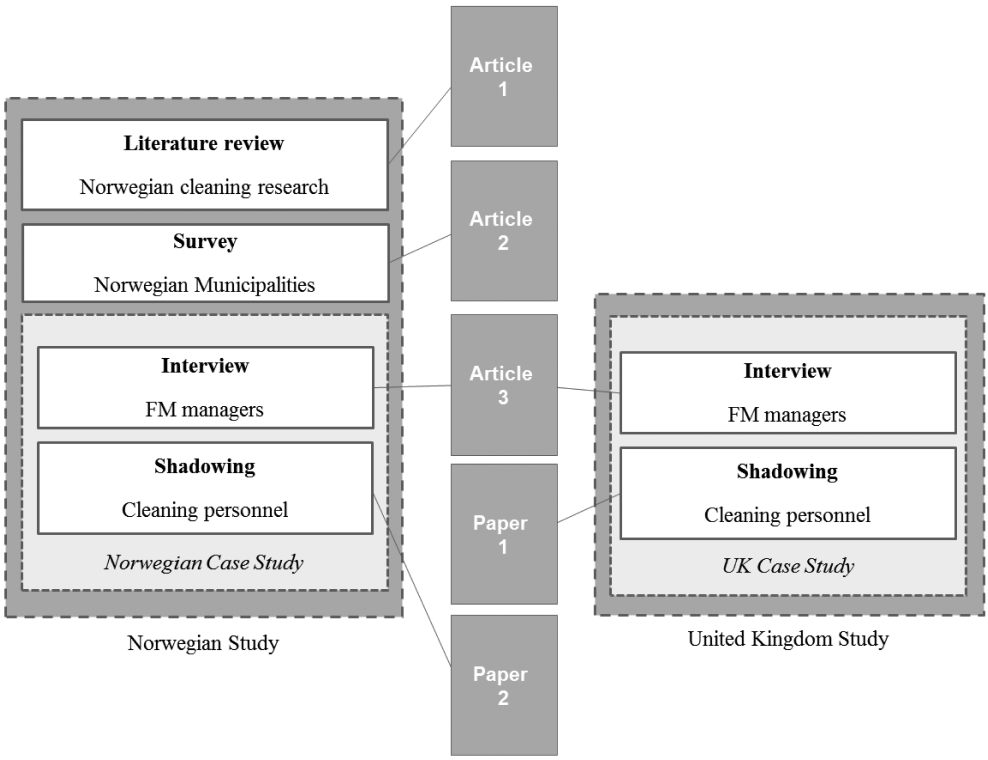

Figure 4 The research design and its connections to publications

2.2 Literature review

A literature review can relate a study to the big picture, connect results to former research and ongoing discussions and help to identify potential gaps, creating a framework or benchmark for new research (Creswell, 2009; Yin, 2014). The research design aimed to bridge the gaps of knowledge identified through a literature review. These gaps shows *why* the empirical evidence in this thesis was collected; to assemble available knowledge on cleaning; to gain an overview of researched cleaning topics, including the research approaches and disciplines involved; to address limitations in available knowledge on cleaning; and to broaden the spectrum of applied research methods in cleaning research.

The publications in this thesis all include literature reviews. **Article 1** took a Norwegian perspective and targeted an all-embracing understanding of cleaning. This article is what Yin (2014) defines as a *history* and Creswell (2009) defines as an *integrative* literature review summarising broad themes in the literature. The remaining publications predominantly upheld an international perspective and include what Creswell (2009) defines as *theoretical* reviews. These theoretical reviews aimed to relate existing theory to ongoing

research. **Paper 2** is also a representative of a *methodological* literature review (Creswell, 2009), focussing on definitions and methods.

The literature review method in **Article 1** was more substantial than in the other publications. Here, a nationwide search was conducted across disciplines with the aim of identifying all cleaning-related research in Norway from 1814 to 2009, albeit emphasising the period after 1950. Prior to searches in various search engines, keywords and key authors were identified from the specialised cleaning literature. The subsequent searches identified over 300 publications. These were all investigated to determine whether they could be defined as cleaning-related research. A total of 80 publications were identified as cleaning-related research, two of which were published during the 1800s. These publications were then examined to determine the following: *what* type of research had been carried out, *what* research disciplines had been involved, *what* research approaches had been present and *how* these approaches changed throughout the studied period.

On the whole, the literature review of **Article 1** identified little research relevant to the objective of this thesis. Very few studies had directly targeted this particular topic on the organisation and practice of cleaning in local authorities. As an example, no national overview of cleaning in local authorities was found; thus, the basis for **Article 2** was created. A major outcome of the literature review in **Article 1** was the finding that significantly more research has been inspired by positivism than by interpretivism [10]. For that reason, a call was made for a broadening in research approaches, with the use of observation techniques such as shadowing and a focus on cleaning work from the perspective of cleaners. Consequently, interpretivistic research which included shadowing and cleaners' perspectives stood out as options for further research; thus, the basis for **Article 3**, **Paper 1** and **Paper 2** was created. Together, the two approaches of a positivism-inspired, national overview coupled with interpretivism-inspired, detailed insight were considered to provide valuable contributions to the thesis objective. Such descriptions and explorations were also deemed valuable in providing deeper understandings, addressing the aim of the thesis of providing new knowledge which may contribute to the development and improvement of FM in local authorities.

The literature review for **Article 2** identified national studies on organisational models used in Norwegian local authorities. This review provided knowledge on how FM and cleaning *can* be, *have* been and *are* organised nationally, in addition to some insights on situations in other countries. The review detected that cleaning and FM are often retained in-house, and that little knowledge is available on how, and whether, cleaning organisations are organised similarly to FM organisations. The literature review did not indicate to what extent building category or municipal size influenced public bodies' use of organisational models. These gaps served as the basis for exploring how FM and cleaning are connected in Norwegian municipalities, for example, to determine whether a municipality uses the same organisational model for both FM and cleaning services. The literature review and empirical research for **Article 2** resulted in arguments for pursuing in-house cleaning services in the subsequent research.

The literature review in **Article 3** identified a possible gap of knowledge within FM, that is, how particular cleaning and FM organisations are structured internally. Thus, **Article 3** reviewed more general theories of how organisations could be structured internally. In this context, internal structure refers to elements such as hierarchy, chain of command, reporting lines, span of control, division of labour and routines. There was also some focus on the importance of such information in the facilitation of benchmarking.

Paper 1 reviewed literature on the importance of cleaning in terms of costs, health and value to core businesses. The main focus in **Paper 1** was empirical, as the paper presented the shadowing data from the UK case. **Paper 2**, on the other hand, was predominantly concerned with developing the shadowing method employed to study operational cleaning practice. The literature review in this paper was therefore a *methodological* review limited to questions such as *what* shadowing is, the *benefits and downsides* of shadowing, *what* data shadowing can provide and *how* shadowing results can be conveyed. Empirical findings from the Norwegian case were also used in **Paper 2** to illustrate how shadowing data could be conveyed.

2.3 A national, voluntary web survey: targeting an entire population

This thesis includes the results of a *voluntary web survey* based on both closed and open-ended questions (Fellows and Liu, 2008; Creswell, 2009; Fowler, 2009; Fan and Yan, 2010); respondents volunteered when they opened the emailed web survey, which appeared as a link at the end of an email. The email stated who the desired respondents were: the chief facility manager (CFM), or if the CFM was not able to respond, the chief executive officer (CEO).

The survey was sent to all the Norwegian municipalities, which represent the second tier of Norwegian local authorities. A total response rate of 33.9% was obtained. To enhance the response rate, information about a forthcoming survey was sent a week prior to the actual survey. The survey mainly included closed, quantitative questions regarding applied organisational models; however, it also contained some questions of an open and qualitative nature. Follow-up emails were sent to non-respondents; respondents with incomplete responses who had left contact information were phoned and encouraged to complete the survey. The questions were designed to be as similar as possible to those in a previous study, the NOU 2004:22, so that the manner of questioning would be familiar to the respondents; this was done to reduce the risk of potential misinterpretations. Inspiration was also drawn from the Norwegian government's regular surveys on local authorities. The English summaries within these reports including the government's unofficial translation of the local government act (referred in **Article 2**) and other research literature in English assisted in the verbal translation of the findings to an international context.

The survey results presented in this thesis set out to explore the contemporary situation of Norwegian municipalities as of 2010 from a macro-perspective; that is, they targeted *how* Norwegian municipalities organised their FM and cleaning services in 2010, *whether* FM and cleaning services were organised similarly (in identical municipalities), *what* changes in organisational model were planned and *whether* building category or municipal size could have any influence on their use of organisational models.

The survey respondents were asked to state their occupation and to name their local authority. Later on, the local authority name was linked to the size of the local authority as it was reported in the database of Statistics Norway (SSB) for the year 2010. Both in this thesis and in the publications, reports concerning local authorities' size are given as approximates, as the findings should not identify individual local authorities. In the survey, each respondent was asked to respond according to five building categories, as follows: 1) school buildings, 2) day care and preschool buildings, 3) healthcare facilities, including institution for the elderly, 4) administration buildings and 5) "other" buildings.

For each of the building categories, respondents were asked to identify what organisational model they used for a) the FM organisation and b) the cleaning organisation. The number of organisational models available for the response can be seen in Table 1. The first seven models were available for responses in relation to both the FM organisations and the cleaning organisations. The last three and additional models shown with *italicised text* in Table 1 were available only for cleaning organisations. All of the abovementioned response options were given in closed question format. Subsequently, the respondents were asked to state what changes they were planning in terms of the organisational models in Table 1. For the FM organisations, these planned changes could be reported through a closed question format. For the cleaning organisations, they could be reported through an open question format. For more information on the survey, see the attached publication.

Abbreviation	Description
FDD	Fully decentralised department, in which each institution/core business is responsible for managing its own buildings
PDD	Partly decentralised department, in which each central department (school, day care, health care, etc.) manages its buildings on behalf of the institutions/core businesses
FCD	Fully centralised department, with an FM unit (*or a cleaning unit*) within the municipality's central administration
KF	Municipal undertaking
IKS	Inter-municipal alternative
AS	Wholly/partly municipal-owned limited company
"Other"	Other organisational model
Partly Private	*A portion of the cleaning services are obtained from the commercial market*
Entirely Private	*All of the cleaning services are obtained from the commercial market*
Voluntary	*Cleaning services are entirely/partly obtained from non-governmental organisations or non-profit organisations*

Table 1 Organisational models provided by the survey (based on Figure 7 in Article 2)

2.4 Case studies: providing local insights

A case study can overlap with a history, as in the case of this thesis and **Article 1**. This overlap occurs when the history includes studies of recent events. Two characteristics distinguish a case study from a history (Yin, 2014). First, a case study emphasises contemporary events which cannot be manipulated (Yin, 2014). Second, a case study applies methods suitable for studying contemporary events: "*The case study relies on many of the same techniques as a history, but it adds two sources of evidence not usually available as part of the historian's repertoire: direct observations of the events being studied and interviews of the persons involved in the events"* (Yin, 2014, p. 12).

Case studies can be part of a larger mixed-method study, as in the case of this thesis, and are preferred when posing *how* or *why* questions (Yin, 2014). They are valuable when existing knowledge is limited and involve "*in-depth investigation of particular instances of a phenomenon"* (Fellows and Liu, 2008, p. 110). It can be challenging to separate this phenomenon – the "case" of a case study – from its real-life context. Narrow results are produced through a variety of methods (Fellows and Liu, 2008). This variety is what Yin

(2014) refers to as the six sources of evidence. This thesis includes two case studies where, with the exception of the language used, the same research procedure was adopted. The primary data collection methods were interviews and direct observations, supported by collection of documents and photographs.

Yin (2014) recommends starting case studies with a thorough literature review prior to the development of research questions and objectives. This theoretical lens can guide both the collection and the analysis, as it did with the literature review in **Articles 1, 2** and **3**. The detected research gaps were addressed through two separate and holistic single cases (Yin, 2014). Collectively, they comprise a multiple case design of cleaning organisations and their practice as of 2010–2011. Typically, descriptive case studies, address *how* questions (Yin, 2014, p. 48), and according to Yin (2014), *"a descriptive case study has no especially important outcome. When used well, the suspense approach is often an engaging compositional structure"* (p. 189). In this regard, it can be noted that descriptive case study "*is not directly aimed at testing a theory or hypothesis but at recording an object of study"* (Fellows and Liu, 2008, p. 112).

2.4.1 Selecting the case

The case selection was based on three criteria. The cases needed to come from countries with similar governmental systems, represent larger local authorities within their countries and demonstrate common ways to organise cleaning. In terms of the organisation, general and *common cases* were preferred (Fellows and Liu, 2008; Yin, 2014), as little research was identified on the organisation and practice of cleaning in local authorities in **Article 1**. In relation to the size of the local authorities, it was considered important that they be large to ensure that the cases were representative of some of the better organisations in their countries; larger local authorities are expected to be more professionally managed. This expectation was supported by the awards that these studied organisations had won for their FM services, as well as by van der Valk *et al.* (2009, cited in Huuskonen, 2014). In **Article 2**, in-house organisation was found to be the most common way to organise cleaning in both national contexts within which the cases were selected.

One case was selected from Norway, a natural choice as a consequence of the national perspective of the research design. The other case was selected from a different context, as empirical insight outside of Norway was desirable to secure an external view on the national situation for the research design of the thesis. The final selection of the cases included a case from Norway based on convenience and one from the UK based on snowballing. The UK stood out as a country of choice because the governmental system there is similar to that of Norway, and since the UK is regarded as a trendsetting country leading the developments in FM (Ventovuori *et al.*, 2007; Jensen and Balslev Nielsen, 2012a). Norway, on the other hand, has been described as slow in FM developments (Haugen, 2003). The UK, like other Anglo-American countries, is known for its private-sector focus, as opposed to Nordic countries, which emphasise the public sector (**Article 3**). Such a context could therefore provide insight into a forthcoming Norwegian situation, as Norwegian developments tend to follow Anglo-American developments. In terms of governmental systems, both Norway and the UK are unitary states with representative democracies which are constitutional monarchies with monarchs as the head of state. They also have parliamentary systems, with a prime minister as the head of government (Halligan, 2013; Hansen, 2013).

2.4.2 Defining the "case"

Five components are important in case studies (Yin, 2014, p. 29), as follows: the questions asked, the propositions directing attention to the "case", the unit of analysis that is the "case", the logic that links the data to the propositions and the criteria for interpretation. The case study research question, in this thesis, was RQ 3: *How can cleaning be organised and practiced at the local level?* The case study propositions addressed the *internal environment of in-house cleaning organisations in local authorities.* The units of analysis, in this thesis, are *common cleaning organisations in larger local authorities within countries with similar governmental systems*. This unit of analysis is limited by a timeframe – the period of 2010–2011 – and bounded by the persons included in the cases, as indicated in Figure 2.

The logic linking data and propositions in this thesis is the cases' descriptive nature. The intention of the case studies was to describe and discuss. The motivation was to facilitate deeper insight, and a narrative approach was chosen, as the discussion should be appropriate for both an academic audience and a non-specialist audience. Criteria and topics included in the thesis case interpretations are as follows:

Management perspectives such as:

- The size of the FM organisation and cleaning organisation;
- Operational model, including budgets;
- Chain of command, reporting line and information flow;
- Grouping of functions, division of labour, span of control and routines;
- Services supplied by the studied FM organisation and by the cleaning unit;
- Management of customers, including communication and contracts;
- Management of staff, including contracts, hierarchy amongst staff, education and hours of duty; and
- Cleaning quality control systems.

Day-to-day operational mop-floor practice perspectives such as:

- An operational, mop-floor view on service provision;
- The cleaners' everyday working environment, including
    - The cleaners' equipment and equipment rooms'
    - Cleaners' routines and responsibilities and
    - Cleaners' interactions with others; and
- The influence of the organisation, buildings and technology on the observed cleaning practice.

The term *mop floor* was coined by Ryan (2009) in cleaning research to refer to operational personnel; it is a spin-off from the metaphor *on the shop floor,* which denotes blue-collar workers working on the machine floor of a factory.

2.4.3 Interviews and documents: capturing managers' perspectives

A common research method in qualitative studies, as well as in case studies, is the interview (Johannessen *et al*., 2010; Yin, 2014). In Yin's (2014) perspective, documents are also relevant for most case studies. In this thesis, semi-structured, face-to-face, in-depth interviews were conducted (**Article 3**). These interviews followed a consistent line of inquiry, as Yin (2014) recommends, where the stream of questions was more fluid than rigid. The interviews requested general information about the organisations, such as their

structure, goals, vision and strategies, as well as their responsibilities, service delivery and collaborations with other units. All interviews were tape-recorded, transcribed and summarised, and all interview subjects were given the opportunity to review the data obtained. The interviews usually lasted one to two hours.

The interviews were supported by yet one more case study method – that of documentation, which was predominantly provided by the respondents. During the case interviews, several of the interviewed managers provided administrative documents and pointed out where other documents could be found which supported and elaborated upon the information they gave in the interviews. The documents included organisational charts and general information about the organisation, anonymised overviews of cleaning staff and the building portfolio and documents showing overall strategic goals and the cleaning quality system. For a more detailed overview of the provided documents, see Table 1 in **Article 3**.

In total, seven individuals were interviewed, three from the UK case and four from the Norwegian case. All of the interviewees were managers. In both cases, three of the interviewed managers were representatives for one of the three levels of interaction in their organisation. Thus, in both cases, a strategic manager, a tactical manager and an operational manager was interviewed. As indicated in Figure 2, this include the chief facility manager (CFM) who was the head of the particular FM organisation (the strategic manager), the head of the cleaning unit (the tactical manager) and one service supervisor (the operational manager). In addition, the Norwegian case was supported by an interview with the accounting manager.

2.4.4 Direct observation and photographs: shadowing on-the-job cleaners

Direct observation is one of Yin's (2014) two recommended observational methods for case studies. The second is participatory observation. In this thesis, the direct observations undertaken involved the shadowing of cleaners in their real-life context. Prior to the shadowing, this specific direct observation method was developed in **Paper 2**. The shadowing involved two primary forms of data collection: field notes and photographs.

One of the strong advantages of shadowing is that it can yield information which cannot be collected through interviews or surveys. Such information might include background noises, actual interactions with building users or specific details of procedures (**Paper 2**). This is particularly evident when image narratives and written narratives are combined. When the two forms of narratives are combined they can reveal profound details of procedures. In the two case studies, on-the-job cleaners were observed directly while doing their job on the mop floor. After the manager interviews, cleaners were recruited for shadowing. The shadowing provided insight into the cleaners' work day "as is" as opposed to "as told", and added information to the interviews regarding each organisation's cleaning practice. Both the nature of shadowing as a method and the level of observations (the time spent observing) make these examples of practices particularly context-dependent. Potential bias in shadowing can be reduced, although never eliminated, by conducting short interviews during the shadowing and recording what actually goes on through photos. During the shadowing, the cleaners were photographed and briefly interviewed. The brief interviews were carried out to verify the researcher's understanding of the situation, thereby facilitating enhanced understanding. Frequently, without being asked, the cleaners provided work-related information.

In Norway, one cleaner was shadowed; a small section of this cleaner's day was reported on in **Paper 2**. In the UK, a cleaning team consisting of two cleaners was shadowed; the cleaners' shifts comprising a working day were reported on in **Paper 1**. To ensure the cleaners' anonymity, the three shadowed cleaners are referred to by the pseudonyms "Annie", "Frank" and "Summer". The two shadowing experiences represent two different contexts, both in terms of country of location and building type. The context in the UK was an office building, whereas that in Norway was an institution for the elderly.

2.5 Quality of information and ethics

The research in this thesis is regulated by privacy data acts and the undertaken research projects were submitted to ethical committees. The initiation of the Norwegian studies was approved and registered in the database of Norwegian Social Science Data Service (NSD). The survey was given NSD project number 24132 "Facilities management in local authorities – a national survey" (translated by the author), while the remaining Norwegian studies were given the NSD project number 24348 "The municipal cleaning service" (translated by the author). The UK studies were submitted to the research ethics panel of Salford University, Manchester, which approved the initiation of the studies in the UK (REP 11/052).

Part of the data protection obligation was securing the participants anonymity. As a consequence, no directly identifiable information is given. This includes providing approximate information on the size of the local authorities with regards to their population; for example, all small local authorities in **Article 2** were given an approximate population to the nearest 500. No detailed descriptions of interviewees are provided. Moreover, there is no description of building locations where cleaners were shadowed and the presented images have been moderately adjusted. Such adjustments includes blurring people's faces and removing information that would identify their employer, for example, the logo on their uniform.

The research in this thesis has been conducted to ensure a high quality of information in terms of reliability, validity and generalisability (Fellows and Liu, 2008; Halvorsen, 2009; Yin, 2014); that is, whether a study is replicable (reliable), measures what it is supposed to (validity) and whether the findings are transferable beyond what is specifically studied (generalisability).

2.5.1 Research reliability: could another researcher replicate what I did?

The literature review, the national survey and the case studies have been conducted to ensure good reliability. That is, they were constructed so that other researchers following the same procedure should be able generate the same findings and conclusions as in this thesis (Halvorsen, 2009; Yin, 2014).

The literature review of **Article 1** is considered as having good reliability. The method of research applied and the findings should be replicable, with the notable exception of new and subsequent contributions and new and subsequent entries of publication into the database used for the literature search. It should, however, be emphasised that other researchers, using another framework or research approach, could find a different result than that in **Article 1**. Likewise, it should be possible for other researchers to replicate the national web survey in **Article 2**. The manner of questioning in the survey was also kept as close as possible to an earlier study in the field, the NOU 2004:22. Those parts of the national web survey which were more or less identical to this study and the Norwegian government's regular surveys conducted by Gravdahl and

Hagen (1997), Vabo and Stigen (2000), Hovik and Stigen (2004, 2008) and Blåka *et al.* (2012) showed similar results. Thus, the national web survey is considered as having good reliability.

The two descriptive case studies are considered to have acceptable reliability, as the biases included in the case studies do reduce their reliability. It is likely that the case studies presented in **Article 3, Paper 1** and **Paper 2** would be replicable if the same procedures were used (that is, if the same questions were asked to the same local authorities in the same timeframe). The reliability of case studies can be ensured through the use of case study protocol and a case study database, both of which were established for this project from the beginning (Yin, 2014). However, as indicated in relation to the literature review, another researcher using a different framework or alternative phrasing of questions could have come to a different result. A thorough analysis of reliability in qualitative studies, such as case studies, is limited compared to a quantitative research (Dalen, 2008), as small changes in the research context can influence the results. Case studies are particularly context dependent and reliant on both the researcher's interpretation and the research subjects' responses. As described in the attached publications, this is particularly the case for shadowing and the case studies are not regarded as providing an absolute "truth" (Flyvbjerg, 2006; Dalen, 2008), as the researcher's interpretation can be influenced by both subjective and arbitrary judgment. In an effort to reduce such biases, research subjects were asked to review the obtained material. The case studies are regarded as descriptions of the reality as it was described by the research subjects included in the case studies. The cases aimed to facilitate a deeper understanding of their contexts. Depending on the background of the reader, this understanding can also allow different interpretations and the payback of reading the cases "*is meant to be a sensitivity to the issue at hand that cannot be obtained from theory*" (Flyvbjerg, 2006, p. 238).

2.5.2 Research validity: did I ask the right questions to address the objective?

Validity is concerned with the extent to which a study measures what it is supposed to and can be assessed in three different forms: construct validity, internal validity and external validity (Fellows and Liu, 2008; Creswell, 2009; Halvorsen, 2009; Yin, 2014). Of the three validity measures, only construct validity can be assessed for each of the individual methods and the entire research design in this thesis. The research studied the organisation and practice of cleaning in local authorities and aimed at explorations and descriptions. As a consequence, internal validity is not assessed for any of the research, as this is to be used for *"explanatory and causal studies only"* (Yin, 2014, p. 47). External validity, also referred to as generalisability, has only been assessed for the survey, as this concept is challenging to evaluate for case studies and literature reviews. Neither of the studies included in this thesis aimed at generalisability; however, considering that the survey's response rate was less than 80%, it is considered appropriate to evaluate the external validity (Fowler, 2009). The literature review aimed at summarising and categorising research to provide a knowledge overview in a Norwegian context. This review did not pursue generalisability, nor did the case studies, which aimed at a deeper understanding of the organisation and practice of cleaning. These findings cannot be generalised to other local authorities, whether in Norway or in the UK. On the other hand, these findings do add a deeper understanding of the objective.

Construct validity can be secured through a) multiple sources of evidence, b) establishing a chain of evidence and c) having key informants review the draft report (Yin, 2014). Such efforts were made for the two case studies; interviews were supported by documents, and shadowing field notes were supported by

photographs. This increased the total quality of information obtained in the case studies. In addition, the case descriptions were reviewed and commented upon by the studied organisations. This included commenting on **Article 3** prior to its journal submission. Thus, the construct validity of the case studies should be acceptable. Likewise, the literature review in **Article 1** combined searches in lists of references from Norwegian cleaning literature with searches in various databases. Similarly, findings for the national web survey in **Article 2** were related to prior research which followed a similar procedure. For these reasons, the construct validity of the overall research design is considered acceptable.

2.5.3 Generalisability: can my results be transferred to any other context?

Generalisability is another term for external validity (Fellows and Liu, 2008; Creswell, 2009). Statistical generalisability is commonly used in quantitative studies where findings from a sample can be transferred to a population. As a consequence, it is natural to assess the statistical generalisability of the national web survey, as according to Fowler (2009), the purpose of a survey is to generalise from the gathered information. In order to provide reliable data to draw conclusions on the population (statistical validity), a survey needs to have a sufficient sample. The way in which a survey is conducted can influence the final response.

The national web survey in this thesis was a *voluntary* survey which targeted all Norwegian municipalities and obtained a response rate of 33.9%. Based on Baruch (1999), Baruch and Holtom (2008), Fellows and Liu (2008) and Fan and Yan (2010), the obtained average response rate of 33.9% should be suitable; thus, it should be possible to generalise from the survey's findings. This is further strengthened by the analysis of the respondents (see Figures 5 and 6 in **Article 2**) and non-respondents, which indicated that the results are unbiased. As a consequence, the *national web survey* in this thesis is considered to have a good external validity – that is, a good statistical generalisability. This means it should be possible to generalise the survey findings to the entire population of Norwegian municipalities' FM and cleaning organisations. Although the survey methodology can be replicated and applied to different types of services than those researched in this thesis, the survey findings cannot be generalised beyond the specific context of the organisation of FM and cleaning in Norwegian municipalities.

A response rate of 15–25% can be seen as appropriate for web surveys. On average, web surveys (sent by email) have an 11% lower response rate than other survey forms (Fan and Yan, 2010); for instance, in postal surveys, 25–35% is considered a usable response rates (Fellows and Liu, 2008). Fowler (2009) states that *"there is no agreed-upon standard for a minimum acceptable response rate"* (p. 51), but he does mention that when surveys yield less than an 80% response rate, researchers can be asked to provide a non-response analysis. The concern is that a low response will result in biased information. The analysis of survey respondents in **Article 2** of this thesis indicated that the results were unbiased. The view that the obtained response rate of 33.9% for this study is appropriate is further strengthened by the findings of Baruch (1999) and Baruch and Holtom (2008).

Baruch (1999) and Baruch and Holtom (2008) found the average response rates from organisations to be in the range of 16.6–55.8%. The response rate for this thesis' *voluntary web survey* falls within this average. Baruch (1999) analysed 175 different academic studies and found that "*the average response rate was 55.6 (the median was 60) with a standard deviation of 19.7"* (p. 432), and further, that surveys sent by mail and surveys sent to senior management (CEOs) tended to have lower response rates (an average response rate

of 19.7% was obtained in 10 mail-based surveys). This is a lower response rate than that obtained for the *voluntary web survey* in this thesis. The survey was sent to senior managers such as CFMs and CEOs, and the obtained response rate of 33.9% which is within what Baruch (1999) indicates as the norm for response rates from CEOs, MDs or organisation representatives: Such response rates can be 36 ± 13 (that is, between 23% and 49%), whereas the norm for other surveys may be 60 ± 20 (between 40% and 80%). Baruch and Holtom (2008) continued to study response rates in surveys to individuals (a total of 309 studies) and surveys to organisations (a total of 117 studies) for the years 2000 and 2005. Here, the average response rate in surveys sent out to organisations was 36.2% with a standard deviation of 19.6 for the year 2000, while it was 35.0% with a standard deviation of 18.2 for 2005. The survey response rate in this thesis is also close to this average identified by Baruch and Holtom (2008) in surveys sent out to organisations. Based on this, the *voluntary web survey* in this thesis should have had a sufficient sample (the entire population; that is, all municipalities), a sufficient response rate (33.9%) and unbiased responses; thus, this study's findings are considered to have good external validity.

2.5.4 Total quality of information

The total quality of information can be assessed through each individual study's quality of information. In this thesis, the studies' reliability, construct validity and external validity were assessed. This thesis aimed at describing and exploring; thus, assessment of internal validity has been omitted, as this concerns causal relationships. The research design did not aim to explain causal relationships concerning why X led to Y. The aim was to describe and explore. The quality of information within the individual studies can be considered problematic due to the limited control included and the biases which may have been present in the studies. In particular, for the case studies, it would be desirable to add more cases. This could also include more substantial case studies allowing a more comprehensive description of the organisation and practice of cleaning within the studied organisations. Considering these points, the total quality of information of the undertaken research is considered to be acceptable in terms of reliability and validity.

Quality of information	**Reliability:** *replicability*	**Validity:** *measuring the intended*
Can be ensured through	Following a procedure which allows other researchers to replicate the study, such as by using a case study protocol and database	Multiple sources of evidence A chain of evidence Informants reviewing the report
Literature review in Article 1	***Good;*** the literature review should be replicable	***Good;*** the study highlighted the questions asked, multiple sources of evidence were used; the list of references in specialist writings were supplemented by searches in several databases
National survey in Article 2	***Good;*** the survey should be replicable	***Good;*** the study highlighted the questions asked, multiple sources of evidence were used; the results were compared to results from earlier studies and the types of question were similar to earlier studies. The survey targeted the entire population of municipalities; obtained a response rate within the acceptable for web surveys targeting organisations and organisational representatives such as CFMs and CEOs; and had an unbiased distribution of responses
Case studies in Article 3, Paper 1 and Paper 2	***Acceptable;*** the exact same cases should be replicable, if the same procedures were used within the same timeframe. The information obtained, however, is influenced by the persons taking part in the research and the researcher him/herself	***Acceptable;*** the study highlighted the questions asked; multiple sources of evidence were used, mainly through interviews and observations; data were kept in a database; and informants were given opportunity to comment. However, further data collection methods could have been used, and additional observations and interviews could have been conducted
Interviews of managers	***Acceptable;*** the interviews should be replicable, but additional interviews could have been conducted	***Acceptable;*** interviews were supplemented with documents; further interviews could have been conducted on an operative level
Shadowing of cleaners	***Acceptable;*** the shadowing should be replicable, but additional cleaners could have been observed	***Acceptable;*** observations were recorded both through field notes and photographs; only one observer was in the field; few cleaners were observed; the time period of observation was short
Complete research design: the total quality of information	***Acceptable;*** the complete research design should replicable. However, another researcher with a different background could come to a different conclusion	***Acceptable;*** the studies highlighted the questions asked, which all address different aspects of the thesis objective; multiple research methods and sources of information were used. However, additional data collection could have been conducted, particularly for the case studies

Table 2 Total quality of information

3 The organisation and practice of cleaning

The issue of the organisation and practice of cleaning can be addressed in a number of ways. A classic discussion includes theories related to bureaucracy and the market. At a more detailed level, this discussion involves an in-house outsourcing debate. However, another discussion can be distinguished, that is, a network discussion related to structures within organisations (intra-organisational) or between organisations (inter-organisational).

Inter-organisational structures relates to market mechanisms such as how one can ensure good access to customers and provide them with better services, whether this involves improved service quality or reduced costs (Huuskonen and Nenonen, 2012; Coenen *et al.*, 2013; Huuskonen, 2014; Price and McCarroll, 2015). Intra-organisational structures relate to people, such as who has what authority (hierarchy) and what work relationships are like amongst the staff (networks). According to Barley and Kunda (2001), these two intra-organisational structures of hierarchy and networks will always co-exist, as they refer to the formal and informal organisation, respectively. These intra-organisational network discussions link to Max Weber's theory of the bureaucracy as it is concerned with what is going on within organisations.

Activities within organisations can be discussed according to the three levels of management addressed in Figure 2, as can activities between organisations. Topics relevant to these three levels of management will be addressed in the following, ranging from the rather general to the fairly specific – from common organisation theories through to the FM debate on outsourcing, which is linked to a specific management theory – that of NPM. Throughout the chapter, the two expressions of cost-efficiency and trust are highlighted, thus, there are also sections that address the cost of FM and cleaning. These sections include factors which the literature has identified as influencing the cost of cleaning. It should be noted that the chapter does not include an exhaustive list of influencing factors. Only those highlighted in the presented literature are brought forward. The chapter ends with a section which addresses specific management practices in cleaning.

3.1 Bureaucracy, the market and networks

Determining which organisational option that is right for a local authority is a matter of strategic choice. According to Huuskonen and Nenonen (2012), *"strategy is concerned with obtaining a fit between the external requirements and the internal capabilities of an organisation. Only a certain structure fits a certain strategy, thereby delivering superior performance"* (p. 66).

Weber's bureaucracy and theories concerning markets and networks are considered ideal types of organisational theories which can enhance the understanding of public organisations (Christensen *et al*., 2009; Bevir, 2012). These theories also provide a foundation for the in-house outsourcing debate, which is one of the primary choices concerning organisation models, as the discussion relates to the decision of producing or procuring.

Networks link to market theories and are known to connect public organisations and private organisations (Christensen *et al*., 2007, 2009). Networks have become known as *"the locus of innovation"* (Huuskonen and Nenonen, 2012, p. 74), and consist of multiple actors which develop long-term relationships to

exchange key resources (Bevir, 2012). Yet another link to market theories relevant to public organisations is NPM, a reform which brought market ideas into the public sector (Schaug, 2010; Christensen and Lægreid, 2013a; Halligan, 2013). In this regard, important changes for Norwegian local authorities occurred in 1992 and 2004: The new Local Government Act of 1992 introduced NPM ideas and gave Norwegian local authorities greater freedom regarding how they could organise their services (Schaug, 2010; **Article 2**). Since 2004, local authorities have also been compensated for the value-added tax (VAT) which was added to purchases from the private market (Norwegian Ministry of Finance, 2004); thus, it became easier for Norwegian local authorities to agree to external service supply. This is supported by Gravdahl and Hagen (1997), Vabo and Stigen (2000), Hovik and Stigen (2004, 2008) and Blåka *et al.* (2012).

The *market* is characterised by the exchange of goods for money (or other goods). Some of the criticism regarding the market, leaving out the issue of trust and uncertainties related to transactions and outcomes, is that it is too focussed on efficiency. In the *marketplace,* competition acts as a sort of a supervisor of the market, automatically facilitating a degree of coordination. Competition also provides people with wide-ranging individual choices as long as they are able to cover the cost (Bevir, 2012). Vital to markets' survival are both pricing information and competition. Within markets, time and effort (which also represent costs) need to be allocated to 1) gathering relevant information, 2) locating buyers and sellers, 3) discovering prices and 4) negotiating contracts. Another cost factor within the market is the need to reduce the potential uncertainty of transactions and outcomes. To avoid such costs, *"firms often keep tasks in-house rather than out-sourcing them"* (Bevir, 2012, p. 25). An additional reason to keep tasks in-house is to avoid the cost of repeated negotiations.

Bureaucracy has recently received renewed attention. One of the reasons for this is that research has identified that market theories, or more precisely NPM, do not work without bureaucracy as a basis providing essential trust (Pierre and Rothstein, 2013). In this regard, *essential trust* refers to the public servants' ability to act in society's best interest. Weber considered a bureaucracy to be an efficient and rational way to manage an organisation (Busch and Vanebo, 2003). Weber's bureaucracy relates to hierarchy, routines and the division of labour (Christensen *et al.*, 2009). According to Bevir (2012), a hierarchy needs a clear purpose to work well, as it relies on a pyramidal structure where higher levels (units, bosses, supervisors) direct and oversee lower levels. As such, hierarchies can become inappropriate when they have no clear criteria for success (Bevir, 2012). This makes management important within them.

3.1.1 The organisation of FM was influenced by neoliberalism, market theories and NPM

This section builds on Evers *et al.'s* (2002) argument that *"public real estate should not be addressed in isolation; it should be regarded as part of a dynamically political context"* (p. 37). In the 1970s and 1980s, both a new political climate and new management styles emerged (**Article 2**), including FM. This has been referred to as the era of neoliberalism. Neoliberalism, called a doctrine by some and an ideology by others, is also at times described as a mode of governance or a policy package (Harvey, 2007; Christensen *et al*., 2007, 2009; Steger and Roy, 2010; Boston, 2013). Neoliberalism arose around the 1980s as a synonym for the Washington Consensus, a term coined by economist John Williamson. According to Harvey (2007), a cardinal feature of neoliberal thinking is "*the assumption that individual freedoms are guaranteed by freedom of the market and of trade"* (p. 7). Market theories are often linked to classic organisational theories such as Taylor's scientific management, due to the focus on efficiency, productivity and economic

surplus. Taylor advocated that increased efficiency could be achieved by putting the system before man (Taylor, 1911/2011), stating that "*the principal object of management should be to secure the maximum prosperity for the employer, coupled with the maximum prosperity for each employee"* (p. 10). The latter part of Taylor's comment is notable; it indicates that Taylor did not want efficiency gains to be a consequence for employees. Traditionally, organisational theories focussed on the private sector and on the US (Christensen *et al*., 2007 and 2009). Although these theoretical developments can be traced back to the 1700s, their evolution did not really begin until the early 1900s (Busch and Vanebo, 2003; Bevir, 2012). In terms of FM, and thus also cleaning, changes occurring around the 1970s and 1980s are of special interest, as FM originated in the late 1970s and has continued to develop as a profession since the early 1980s (Barnes, 2014; Roper and Borello, 2014).

It could be argued that market theories and NPM changed the requirements for FM from being, as Barnes (2014) described it, a "*necessary service, out of sight, [and] out of mind*" (p. 5) to being a profession which aligns with core businesses objectives. In terms of FM, several changes were taking place around the 1970s and 1980s. These related to the organisation of FM and cleaning, as well as a change in the perception of FM from being regarded as predominantly concerned with operational issues to being a strategic discipline. At this time, single buildings started to be seen as a part of complete building portfolios. Discussions on how to manage and operate these buildings flourished. One influencing factor behind this change was a common idea related to *governmental efficiency* (Evers *et al.,* 2002). In this context, the term refers to factors such as scale economies, administrative efficiency and equity (Nelson, 1990). Referring to the late 1980s, Evers *et al*. (2002) state that "*many governments started rethinking the role and position of real estate. At the time, all countries had long-standing structural and management problems […] that made it more difficult for their property organisation to meet customers' needs. […] They all introduced some form of competition for real property services […] the users could go to other parties for services such as cleaning or security"* (p. 11).

These were not the only changes which occurred during this period. Inside buildings, new workplace practices were on the rise. Office workers moved out of their individual offices and into open space offices. IT entered the workplace. Today, it is hard to imagine a workplace without such technology. According to Roper and Borello (2014), these practices were the two primary drivers for the creation of FM. Based on Evers *et al.* (2002) and Roper and Borello (2014), the following four changes occurring in the 1980s can be highlighted in relation to FM:

1) Assets were managed more strategically (as investments) to meet customers' needs;
2) Building services were separated from asset management and policy oversight and development;
3) Workplace practices changed as open plan offices and information technology became common; and
4) Competition for property services (e.g. cleaning) was introduced.

3.2 The in-house outsourcing debate

Cleaning services, which are at the core of this thesis, are commonly referred to in debates over in-house outsourcing. Such debate is closely connected with both market-theories and NPM, and had already

emerged in the case of cleaning during the 1960s. A main component in this debate is cost-efficiency, and common topics with regard to cleaning have included which of these two options – in-house or outsourcing – is the best, the cheapest, provides the highest value for money and which of these two should be used (*Facilities*, 1984a; Loosemore and Hsin, 2001; Fitzgerald and Melvin, 2002; Stoy and Johrendt, 2008; Redlein and Zobl, 2014). A few scholars have argued that *"[r]etaining services in-house has to be the primary goal for the in-house team"*, but that the organisation "*is only likely to reach that goal if it delivers customer satisfaction and best value, and can demonstrate both"* (Atkin and Brooks, 2009, p. 100).

As with FM, market testing and NPM originate from Anglo-American countries and the in-house outsourcing debate illustrates how closely connected FM is with NPM and market theories. These three concepts emerged around the same time, predominantly after the economic crisis of the mid-1970s and onwards (Tay and Ooi, 2001; Amaratunga *et al*., 2002; Evers *et al.*, 2002; Ventovuori *et al.*, 2007; Jensen, 2008; Maliene *et al.,* 2008*;* Steger and Roy, 2010; Jensen and Balslev Nielsen, 2012a; Boston, 2013; Christensen and Lægreid, 2013a; Roper, 2014; Roper and Borello, 2014). Pitt and Tucker (2008) indicate that 1978 could be seen as the beginning of FM; in this year, *"the Herman Mille Corporation, the world's leading furniture manufacturer, staged a conference on 'Facilities Impact on Productivity'"* (Pitt and Tucker, 2008, p. 242). Other scholars, however, trace the origins of FM back to Roman times (Bröchner, 2010). With regard to NPM and market theories, the late 1970s also mark an important period; it has been argued that, at this time, "*the crisis of the state destroyed faith in hierarchic bureaucracy"* (Bevir, 2012, p. 15).

FM developed in the US and UK and then spread to Europe (Maliene *et al.,* 2008), so did also NPM. NPM represents a practitioner-driven reform which is applied differently around the world (Boston, 2013); to many, it is synonymous with market testing and contracting-out tendencies. At present, the UK stands out as the highest ranked country (in the Organisation for Economic Co-operation and Development [OECD]) in terms of the outsourcing of government services (Halligan, 2013). Margaret Thatcher in the UK and Ronald Reagan in the US were the first to introduce NPM reform ideas and measures in 1979/1980. Australia and New Zealand followed in the mid-1980s (Christensen and Lægreid, 2013a). The Anglo-Saxon countries (the UK, Australia, Canada and New Zealand) are known as NPM reformers, whereas Norway is regarded as a latecomer to both NPM reforms (Lægreid *et al.,* 2007) and FM developments (Haugen, 2003; Maliene *et al.,* 2008). The very first NPM components were introduced in Norway in 1986–1987 (Hansen, 2013), and later included in the new local government act of 1992. In this regard, it can also be noted that Maliene *et al.* (2008) link 1992 to the introduction of FM in Scandinavia.

3.2.1 Strategic steering – important to both FM and NPM

Many aspects of NPM can be found in FM debates. NPM favours strategic steering (Christensen and Lægreid, 2013b), as does FM (Price, 2002; Maliene *et al.,* 2008; Huuskonen and Nenonen, 2012). FM organisations need to steer according to a strategy. The FM strategy in particular is closely related to strategic development of technologies and buildings, including core business strategies (Evers *et al.,* 2002). The measures, ideas and aspects of NPM are a central part of FM discussions. One example of this is the increased emphasis on standardisation in FM through the EN 15221 series [11]. Part of being able to deliver what is required is measuring how one is performing. It is here that benchmarking becomes vital on every kind of level, and not only in terms of cost. This is also where there seems to be a clear link amongst general management theories, NPM and FM. The FM agreement and the SLAs relate to the need for

contracts in order to exchange goods in an open market (e.g. money for FM services), while benchmarking relates to quantification and the use of key performance indicators (KPIs).

Basic NPM ideas are related to managerialism, public choice theory, agency theory, transaction cost economics and the broad ideological movement of neoliberalism (Eisenhardt, 1989; Mueller, 2008; Boston, 2013; Christensen and Lægreid, 2013a). There are other aspects and measurements also associated with NPM such as 1) the efficiency drive, 2) downsizing and decentralisation, 3) the search for excellence, 4) public service orientation, 5) structural devolution, 6) quantification, 7) marketisation, 8) competition and 9) privatisation. In this regard, agency theory and transaction cost economics are particularly relevant to FM (Boge, 2012), relating to the separation of ownership and control through the use of contracts. Both theories offer guidance on whether services should be kept in-house or outsourced (Boston, 2013; Gregory, 2013). *Transaction cost economics* emphasises how to best organise and exchange services, and is regarded as a theory which reduces the amount of outsourcing (Boston, 2013). *Agency theory* addresses *"how best to negotiate, specify and monitor contracts"* (Boston, 2013, p. 26) and comes in two complementary versions (Eisenhardt, 1989) – a positivist agency version which identifies various alternatives and a principal-agent version which identifies the most efficient and optimal alternative. The difference between the transaction cost economics and agency theory perspectives on this issue is that agency theory is more concerned with contract specifics, whereas transaction cost economics is more concerned with optimal structures. From a transaction cost economics point of view, outsourcing is recommended when the supply is relatively contestable and the transaction costs are low; according to Boston (2013), cleaning is a typical example of a service to outsource.

3.2.2 A strategic debate: competitive tendering, best value and contract management

Market testing and contracting out were introduced in the British public sector in 1968, when Harold Wilson's Labour government decided to bring in a private company to clean the government departments (Rhodes, 1994). According to Rhodes (1994), Margaret Thatcher made this practice compulsory for UK local authorities and the UK health service in the 1980s. For building cleaning, this practice became compulsory in the UK through the 1988 Local Government Act (Greenwood and Wilson, 1994). In 1997, compulsory competitive tendering was refined and became known as "best value", stressing the four Cs – challenge, consultation, comparison and competition (Fitzgerald and Melvin, 2002) – and prescribing that the public sector ensure the best value for money, with an emphasis on efficiency, effectiveness and economy (Alexander, 2003b).

The compulsory competitive tendering practice influenced the discussions within FM research. An example of this is Steane and Walker's (2000) criticism of the compulsory competitive tendering regime in Australia. In Steane and Walker's (2000) view, the compulsory competitive tendering practice reduced the flexibility of both management and contracts, as it was "*underpinned by a belief that 'the market' is best placed to deliver value for money"* (p. 246). Lately, this has also been emphasised by Ryan (2007) and Holley (2014a, 2014b, 2015), who addressed issues related to compulsory competitive tendering and cleaners' work environment in Australia and New Zealand, thereby linking governmental requirements to the organisation and practice of cleaning. Recent Norwegian research (Berge and Sønsterudbråten, 2011; Trygstad *et al*., 2011, 2012, Alsos *et al*., 2012, 2013; Bråten and Nicolaisen, 2013) has also identified similar situations to what Ryan (2012) and Holley (2014a) describe.

Ryan (2007) provides critical links between outsourcing, work organisations and labour management in his study of cleaners within the New South Wales commercial cleaning industry. He argues that team cleaning is a cost-reducing approach which "*attempts to manipulate and expropriate time from the client/customer and cleaners […], especially where issues of quality and the management of performance are tied to the individual and not to the team*" (p. 259).

Holley (2014a) discusses the issue of contracting-out and regulation labour standards for governmental school cleaners in New South Wales, finding high injury rates, unpaid overtime and illegal subcontracting. She states that school cleaners *"suffered from excessive workload pressures*" (p. 295). This pressure is linked to contract management, both in terms of staffing contracts and service contracts. Holley's major finding is that "*the commercial contract has become at least as important as the contract in regulating labour standards when services are contracted out […] the combination of contract and labour law does not ensure compliance with prescribed labour standards"* (p. 295). She continues: "*[C]ontracts are designed to facilitate commercial objectives like competition and efficiency. This was evidenced in the emphasis on 'best value for money'; […] cleaning companies focusing their attention on meeting the onerous reporting demands because they were highly visible to the client; and the addition of clauses to constrain workloads, which were largely ignored"* (p. 295).

This illustrates that clients' way of demanding services, customers' satisfaction with the supplied services and cleaning staff's wellbeing are interconnected. The issues which these studies raise link to the aforementioned issue of trust. Trust in service providers has been identified as an important factor for customers' experience of value in FM (Jensen *et al.,* 2012b), as trust is one of the add-on benefits which make customers distinguish between providers. Despite being considered a rather subjective perception, customer satisfaction is at the heart of FM (Jensen *et al.*, 2012b; Coenen *et al.*, 2013), as a satisfied customer can enter into a prolonged relationship with the service provider.

3.3 Specific debate linking the three levels of management in FM

Cost-efficiency has been a dominant topic in FM and represents the traditional paradigm (Boge, 2012; Hansen, 2012). Cost-efficiency is still a dominant issue in the more recent debate on added value (Jensen *et al.*, 2012b). The discussions on outsourcing and added value are considered strategic debates which can bring FM into boardrooms. Outsourcing can be a strategic choice with regard to the organisation and practice of cleaning services, and cost-efficiency tends to be a prime argument. It can also be a necessity when it comes to ensuring operational service supply. Tactical–operational actions are some of the reasons for Norwegian local authorities' engagement in external supply networks (Trygstad *et al.,* 2011). For example, Norwegian local authorities use outside labour for sick leave and vacation coverage, but also do so because local authorities find it challenging to recruit staff (Alsos *et al.,* 2012). This and other recent studies illustrate that too-great a strategic–tactical emphasis is on cost-reduction can be counterproductive.

Local authorities' procurement skills have been identified an essential component for good service quality in outsourced cleaning services in Norway (Berge and Sønsterudbråten, 2011; Trygstad *et al*., 2011, 2012, Bråten and Nicolaisen, 2013). This research shows that Norwegian local authorities' procurement skills can

be developed (Berge and Sønsterudbråten, 2011; Trygstad *et al.,* 2011). Yet, it also makes clear that Norwegian local authorities' are being deprived of their agreed-upon and contracted services. For instance, the Norwegian local authority – which is perceived as a particularly professional and skilled procurer of cleaning services [12] – was only supplied with contracted service quality levels (SQLs) prior to *notified* service quality controls (Berge and Sønsterudbråten, 2011). Long-term and sustainable work conditions such as the facilitation of alternative work tasks for those with reduced working abilities (e.g. workers on part-time sick leave) are also low (Bråten and Nicolaisen, 2013). Further, companies were found to have a decreasing motivation for health, environment and safety (HES) work as the termination of the contract period approaches. This links to issues of trust. Trust, in that service providers are ensuring that their staff have a good working environment and conditions, yet also delivering the agreed-upon services.

Lately, it has been reported that the price competition in Norway is so strong that both individual cleaners and companies have started to develop various coping strategies. Such strategies have been linked to issues of greater workforce flexibility, reductions in overtime costs, usage of part-time positions and a separation of the fixed hours of duty into a split shift (Bråten and Nicolaisen, 2013). In this regard, it may be worth mentioning that the traditional hours of duty in Norway involve working 8 hours a day between 0700 and 1700 from Monday through Friday.

Holley's (2014a) study showed that the development of coping strategies is not unique to a Norwegian setting. The skilled Norwegian local authority which Bråten and Nicolaisen (2013) consider in terms of outsourcing also exhibits similarity to the descriptions by Holley (2014a) and Ryan (2012): External cleaners are forced to work when ill, and cleaners are not paid for all of their working hours. Like Holley (2014a, 2014b), Bråten and Nicolaisen (2013) link this issue to outsourcing, but also highlight the importance of the role of clients and customers role, who are the ones demanding services and thus setting the requirements for cleaners' work conditions and environment.

To cope with efficiency demands, cleaners in Norway have developed strategies such as "*working in their spare time to deliver good enough quality"* (Bråten and Nicolaisen, 2013, p. 104 [13]) and tactics resembling subcontracting, wherein cleaners have others go to work on their behalf for the considerably lower rate of 25 NOK an hour, in contrast to their own 150 NOK (Trygstad *et al.*, 2011).

Contractors have developed strategies as refraining from delivering quality services to the public sector, adopting tactics such as placing less-skilled cleaners with public customers and moving talented cleaners to work for private-sector customers who will acknowledge quality work (Berge and Sønsterudbråten, 2011).

When outsourcing, it is desirable to identify the right provider, which will not only deliver satisfactory services, but also be trustworthy. This has gained increasing attention in Norway, along with good pay and work conditions, as these measures can prevent issues related to social dumping (Alsos *et al*., 2012). One effort to deal with such issues includes new regulations; as of 2012, all cleaning companies need to be approved by the Norwegian Labour Inspection Authorities. An unapproved provider is regarded as operating outside regulations, and according to § 17 of FOR-2012-05-08-408, it is considered illegal to purchase services from such a provider except for private domestic purposes. One rule of thumb has been specified: Avoid engaging with night-time cleaning. Night-time cleaning, cleaning between the hours of

2100 and 0600 is, in Norway, considered an indicator of a potentially inappropriate provider, possibly attempting to avoid regulations (Trygstad *et al.*, 2011, p. 142 [14]). These issues illustrate that the in-house outsourcing debate connects to issues of trust, which represents one criticism of the market.

3.3.1 The cost of FM and its cleaning services

Cost-efficiency has attracted attention for several decades. In FM research, cost-efficient cleaning has been considered since the very first issue of *Facilities* (1983), and was at an early stage found to *"represent as much as 30 per cent of the total cost of a building over its life"* (Alexander and Marshall, 1987, pp. 6–7). Cost-efficiency can be improved in many ways. Increased reliance on outsourcing and below break-even prices, focussing more on efficiency than quality, were forecasted by Aulanko (1997, 2002) and are increasingly heard of within cleaning research (e.g. Aguiar, 2001; Aguiar and Herod, 2006; Berge and Sønsterudbråten, 2011; Trygstad *et al*., 2011, 2012; van Vlijmen and van den Hoogen, 2013; Alsos *et al*., 2012, 2013; Ryan, 2012; Bråten and Nicolaisen, 2013; Holley, 2014a, 2014b).

Few seem to be aware how cost-demanding cleaning services really are. Estimations in a Norwegian setting show that the managing, maintaining and operating (MMO) cost represents from 25% of a building's total lifecycle costs in housing to 50% in hospitals (Bjørberg *et al.*, 2005). Isolating the operational cost of an office building reveals that operations represent about 66% of the MMO cost. A further separation of the involved costs reveals that cleaning is the main operational cost (33%), followed by energy (19%). From a Norwegian perspective, estimations by Strand (2000) are of particular interest. These estimations, which show energy as the only cost that came close to the cost of cleaning, correspond to the more general analysis by Haugen *et al*. (1996 [15]): In both of these studies, cleaning tended to be more costly than energy.

Several authors have addressed the cost of cleaning; an overview of their findings is presented in Table 3. Collectively, these studies show that this cost is significant. There are many factors that impact cleaning cost. A few main categories seem to be distinguishable, as follows: buildings, technologies and management, including market and competition (*Facilities*, 1984b; Bywater, 1990a; Campbell, 1990; Aulanko, 1997; Linn, 1995, 2002).

Stoy and Johrendt (2008 [16]) find that both building characteristics and usages impact the cost of cleaning. Buildings, or if you like facilities, are at the core of FM, and building longevity and lifecycle costs have been central topics (Hansen, 2012). In the last two decades, sustainable FM has been increasingly discussed (Jensen *et al., 2012b*), and this also links to added value, cost-efficiency and cleaning. A cleaner's use of time (i.e. work practice) is significant in terms of cleaning cost and influences both the quality and the efficiency of cleaning (**Paper 1**). Strategically, a comprehensive understanding of cleaning services should have significance regarding costs for local authorities. Good cleaning services are part of good management. Generally, of Norway's entire public sector, municipalities own and manage the most square metres per capita (KS, 2008; Bjørberg, 2009); the built area per capita in the Norwegian municipalities ranges from 9.5 m^2 in small municipalities to 5 m^2 in large ones. Good management of these buildings is crucial, as it will ensure their longevity (Bjørberg, 2009). The relevance of cleaning in relation to a building's longevity is addressed by Aulanko (1997), who argues that buildings' longevity can be impaired by a strong emphasis on cleaning cost, as this reduces cleaning quality. Aulanko (1997, 2002) and Linn (1995) also pointed towards building and workplace designers as facilitators of sustainable practices, enabling

reductions in the use of chemicals and lowering the lifecycle costs of buildings. Alexander and Brown (2006) also indicate that engagement with local communities during a building's construction phase can be a necessity for later service deliveries. The design phase of buildings has been at the core of the Swedish architect Linn's (2007, 2002, 1995) research on cleaning. Linn (2007, 2002, 1995) argues that architects, architect education and national cleaning organisations need to address the issues of how building design can facilitate efficient building operations, as operational practices such as cleaning tend to be overlooked in the building design process. Several research studies have addressed this issue in the past (Granath, 1982; Lönn and Lööf, 1982; Nielsen *et al*., 1982; Byggeriets utviklingsråd, 1983, 1985; Linn, 1985a, 1985b, 1985c, 1985d, 1995, 1997a, 1997b, 1999; Behre, 1986; Linn *et al.*, 1990, 1991).

Cleaning costs as a % of operational costs	Norway[1,2]	The UK[3,4]	Australia[5]	Austria[6,7]	Germany[8]
Culture and sport facilities	28%	-	-	-	-
Administrative (office) buildings	37%	-	19%	-	-
Day care	49%	-	-	-	-
Schools	43%	-	-	-	-
Day hospitals/Conference centres	-	38%	-	-	-
Health care, e.g. institutions for the elderly	33%	31%	-	39%	-
Hospitals	30%	44%	-	-	21%

[1]Nesje (2002) [17], on hospitals, cited in in Shohet and Lavy (2004). [2]Strand (2000), based on data from 114 municipalities for the full years of 1996–1998. [3]Pickles (2000), on the approximate average of a given cleaning cost for the average of annual occupancy cost per 100 m^2, i.e. Hospitals = £3500 Cleaning/£7897 Occupancy; Health care = £1800/£5747 and Day hospitals/Conference centres = £2200/£ 5415. [4]Williams (1996), on cost of cleaning per ft^2. [5]MacSporran and Tucker (1996) based on data from 104 office buildings in New South Wales for the full year of 1987. The given percentage is based is on the following information, which is the measure of $/$m^2$ total rentable area: median cleaning cost (8.11)/median total operating expense (43.10) = 0.1881. [6,7]Madritsch et al. *(2008) and Madritsch (2009) based on data from 18 residential homes for the elderly in Tyrol. [8]Diez and Lennerts (2009) based on data from four hospitals in 2005 and 2006.*

Table 3 The cost of cleaning as a percentage of operational costs

The following list serves as a short summary of some of the factors which can impact the cost of cleaning. These were identified through the literature presented in this chapter and are not intended to be all-inclusive or elaborate:

- The market, for example, exposure to competition, demand for efficiency and procurement skills;
- Building design, for instance, floor coverings, windows, elevators and waste arrangements;
- Technological developments, for example, cleaning tools, cleaning machines' work rates and chemicals; and
- Management, for instance, work organisation, service and contract management, training of cleaning staff and specification of methods and frequencies.

3.3.2 Cost-efficiency in cleaning can be facilitated by a focus on technology and management

Cleaning costs have not only been linked to building longevity, but also to technology and management. Implementation of new technology, work practices, work scheduling and tools also impact cleaning costs (Aulanko, 1997, 2002; Trygstad *et al*., 2011). This is supported by early cleaning research from the 1950s and 1960s, wherein new technologies and work practices facilitated up to an 86% reduction in the time spent cleaning (**Article 1**). Since then, cleaners' work pace has increased significantly (Aulanko, 1997; Trygstad *et al*., 2011). A common estimation of the maximum efficiency rate in Norway was 250 m^2 per hour during the 1990s (Trygstad *et al*., 2011), whereas at present, it ranges from 500 m^2 to 1000 m^2 per hour. Ryan (2012, p. 259) reports similar efficiency rates in Australia, which can range from up to 1000 to 1200 m^2.

Common attempts to reduce cleaning costs, apart from outsourcing (Fitzgerald and Melvin, 2002; Ryan, 2007; Stoy and Johrendt, 2008; Huuskonen, 2014), have focussed on tactical–operational cleaning management, team cleaning, training of cleaning staff, environmentally friendly cleaning practices and a good physical work environment for cleaners (Campbell, 1990, 2005; Ryan, 2007; Nilsen *et al.*, 2008; Aaltonen *et al.*, 2013; Öhrling, 2014). Cost factors related to a changing cleaning practice were discussed a few decades ago by Aulanko (1997, 2002), who attempted to envision cleaning in the future. Some of the notable factors were competition, sustainability and education.

Education has been linked to staff retention, cost savings and operational management, and has been addressed by Campbell (1990) in FM research, who points to education as a way to reduce turnover and secure both cleaning quality and lower costs: *"[T]raining, although expensive, is much more cost-effective than ignorance. […] Poorly trained cleaning staff use incorrect techniques to do the wrong job to an inappropriate standard"* (Campbell, 1990, p. 21). One of Aulanko's (1997, 2002) core arguments is that education will help to improve cleaning practice. As consequences of efficiency demands, she called for short-term training and specialised on-the-job courses which easily fit into cleaners' work schedules and increase their willingness to attend. Aulanko (1997, 2002) argues that there is a need to establish a common understanding of cleanliness, which the introduction of cheaper foreign labour forces would diminish. Educated cleaners would have full-time day jobs with a multitasked practice encompassing several soft FM services; thus, future cleaners would require less management, as they would be self-managed and conduct both efficient and sustainable cleaning practices. More recently, sustainable cleaning practices have also been linked to cost reduction and can include green cleaning policies and programmes, usage of eco-labelled chemicals, general reduction in the use of water and cleaning chemicals and environmentally friendly tissue and sanitary paper (Aulanko, 1997, 2002; Aaltonen *et al.*, 2013). In the past, this has been facilitated by changing the practice from the use of water-filled buckets to pre-moistened mops and cloths, concentrated chemicals, microfibre textiles and machinery. Nilsen *et al.* (2008) tested such new practices and reduced cleaning costs by 27% through a focus on an environmentally friendly cleaning concept. This concept achieved reductions in the use of chemicals, plastic waste, dust loads on surfaces and sick leave amongst cleaners. The efforts were of such significance that the project received a national sustainability award (Forsvarsbygg, 2006; Renholdsnytt, 24.05.2006).

Based on Jørgensen (2011), Bråten and Nicolaisen (2013), Holley (2014a) and Öhrling (2014), intra-organisational management could be considered as an equally important approach to cost-efficiency as engagement in outsourcing and inter-organisational networks. These studies further link cleaning management to customers' satisfaction, cleaning quality and cleaners' wellbeing. One association is with the provision of alternative and less physically challenging work tasks such as dusting, watering plants or laundering equipment (mops and cloths), when this is needed (Bråten and Nicolaisen, 2013). Another is empowering cleaners. Based on Öhrling's (2014) findings, an emphasis on tactical–operational service development could possibly lead to increased productivity. Her study also links to the aforementioned research on building design.

Öhrling (2014) studied cleaners' psychosocial and physical work environment and obtained positive results in productivity through empowering cleaners. The positive results were gained by increasing cleaners' influence and responsibilities, shortening the organisation's decision-making process and emphasising the need for a good physical work environment for cleaners. The efforts led to reduced absenteeism amongst the cleaners and increases in their job satisfaction, job motivation, productivity and the delivered service quality. In addition, customers reported increased customer satisfaction. A few years earlier, Jørgensen (2011) addressed similar issues regarding physical and behavioural training among cleaners. Jørgensen found that "*physical coordination training and cognitive behavioural training are effective in improving individual capacity*" (Jørgensen, 2011, p. 64), but was unable to link this to improvements in work ability and absences due to sickness. Thus, Jørgensen (2011) calls for research with a stronger focus on this within *"the context to which they are applied"* (p. 64). This is in many ways what Öhrling (2014) did.

3.3.3 Team cleaning and kitting links to cost-efficiency in operational cleaning practice

Team cleaning has been increasingly employed since the 1990s, and according to Ryan (2012), it is linked to scientific management, neo-Taylorism, just-in-time and total quality management (TQM).

A team can consist of two or more cleaners; however, the existence of cleaning teams does not necessarily result in teamwork (Ryan, 2012). Different types of cleaning teams exist, and their labour can be divided according to tasks, space or gender (Aguiar, 2001; Ryan, 2012). The team can be self-managed, limitedly managed or strictly managed. Teams can base their work on multitasking, wherein two cleaners may work together at a small site, or monotasking, with multiple cleaners working together at large sites.

In monotasking, cleaners have specialised duties, such as a toilet specialist or vacuuming specialists. As a consequence, being part of a cleaning team can involve *"four specialists working cooperatively across 'a staggered assembly line'"* (Ryan, 2012, p. 258). This is what Aguiar (2001, p. 239) refers to as "*gang cleaning*". Prior to monotask-based gang-cleaning, traditional cleaning involved zone cleaning. Zone cleaning is a common practice at small sites (Ryan, 2012). Typically, one cleaner performs "*all the required cleaning tasks within a specific area or geographic space"* (p. 258). This cleaner may have little supervision and may be empowered to choose the timing and sequence of his or her tasks.

In Australian commercial cleaning companies, the transition from zone cleaning to specialist cleaning started during the 1970s (Ryan, 2012). In the US, team cleaning has also been used as means of ensuring cost efficiency since at least the 1990s. Campbell (2005) describes the Operation System One (OS1) that was first implemented in 1992 in Salt Lake City, UT, to replace a zone-based system. In order to reduce FM

costs, this system focussed on team cleaning, on-the-job-training, standardisation, ergonomically designed equipment, productivity, safety and service monitoring. One of the OS1 system's aims was to reduce practices such as kitting, wherein "*employees often return to a designated location to load and unload equipment, supplies and tools"* (Campbell, 2005, p. 207). The system also aimed to increase the use of backpack vacuums, portion-sized chemical packages and color-coded chemicals. In New Mexico, the implementation of OS1 resulted in a cleaning cost savings of 48%, including a decrease in absenteeism, a reduction in cleaners' full-time equivalents (FTEs) and a reduction in the number of chemicals used in cleaning from 125 to 9. In Seattle, the system led to reduced injuries amongst cleaners, reduced absences due to such injuries, a reduction in managers' span of control (operational) from 1:20 to 1:16 and a reduction in the number of cleaners from 900 to 302. The average age of the cleaning workforce is worth mentioning in the case of Seattle: Campbell (2005) describes it as a tiered and willing workforce with an average age of between 50 and 70 years.

3.4 Summarising debates on the organisation and practice of cleaning

Figure 5 has been developed as summary of this chapter's discussions on the organisation and practice of cleaning, and provides an overview of organisational models from which Norwegian local authorities can choose. The development of the figure is based on Chapter 3 and on Figure 1 in **Article 2**.

Figure 5 illustrates that individual organisations consist of formal and informal networks. The squares illustrate local authorities. Formal organisations are illustrated as larger circles. In this context, formal organisations refer to FM organisations. Each circle can be further broken down into hierarchies and networks, as described by Barley and Kunda (2001), each of which is further separated into individuals. Individuals in the figure are denoted by dots. These individuals can be grouped into teams which operate within a service area. The different teams can be arranged as self-managed teams, zone-cleaning teams or monotasking gang-teams, as described by Ryan (2012) and Aguiar (2001). Gang-teams are illustrated by a line connecting four dots. The figure illustrates that individual local authorities can retain their organisation in-house or outsource their services. The internal in-house organisation, which is described as public service supply models in the figure, can be a traditional department (etat), a municipal undertaking (KF), an inter-municipal alternatives (IKS) with other local authorities or a municipal-owned limited company (AS). An in-house organisation may also purchase services from one or more private providers. Private providers can be large or small organisations possibly forming part of a service supply network, as described by Huuskonen and Nenonen (2012) and Huuskonen (2014). In this regard, it can be mentioned that all of the companies Huuskonen (2014) researched structured their production geographically at a strategic level. In Huuskonen's study, one supplementing design to that of geography was customising service delivery by engaging smaller providers, referred to as entrepreneurs. This decentralisation strategy led to higher profitability for the parent provider as they avoided the need to manage the operational level themselves and created flexible inter-organisational networks of larger and smaller organisations. The figure also illustrates that individual cleaners have been found to subcontract their own duties, as described by Trygstad *et al*. (2011).

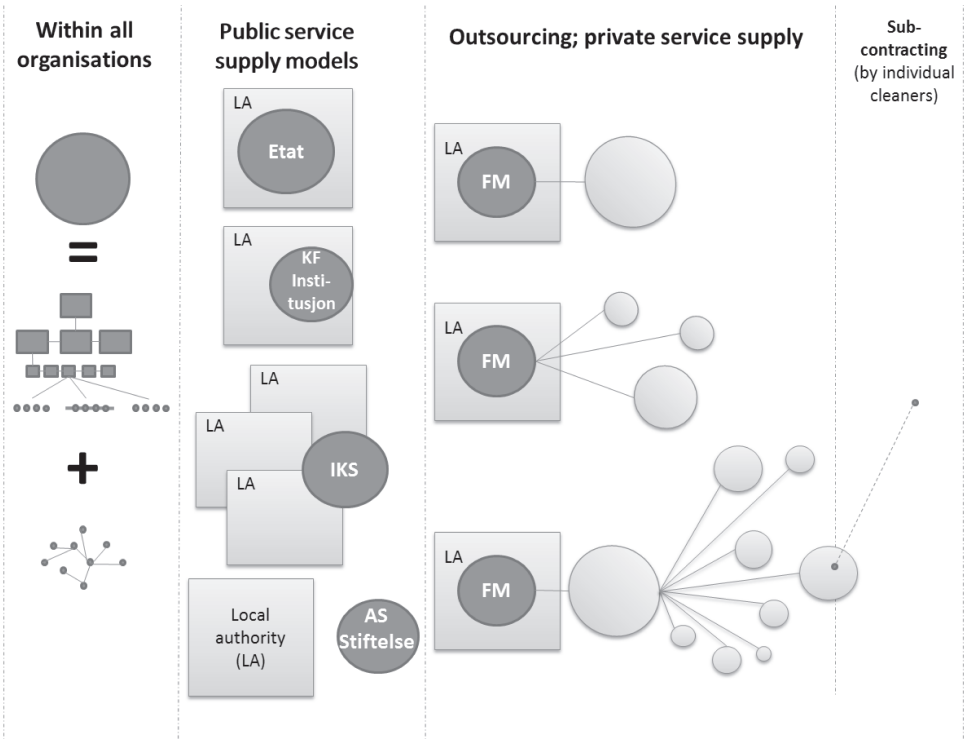

Figure 5 Summarising debates on the organisation and practice of cleaning

4 Cleaning from a historical perspective: a return to the 1800s

This chapter focusses on the organisation and practice of cleaning in local authorities, predominantly in the context of RQ 1 on what types of cleaning research exist in a Norwegian context. The history of cleaning-related research in Norway from the 1800s onwards was brought forward in **Article 1**, which provided insight into the foundation of the interest in cleaning in Norway. In this chapter, some of these findings will be brought into a wider FM and management perspective; thus, this chapter presents, elaborates on and adds to some of those findings.

The predominant conclusion of **Article 1** showed that cleaning research generally followed the development of research and society. When sociological and psychological investigation was in its early stages, Eilert Sundt, the father of Norwegian social sciences, travelled through Norway and mapped cleanliness (**Article 1**). The prevailing ideal was positivistic, value-free research – an ideal that remained influential until the mid-1900s. When positivistic research was popular, in particular during the 1950s and 1960s, Norwegian cleaning research focussed on technical issues. These technical issues involved modern cleaning methods and discussions of whether they were more efficient, as well as whether there was any risk involved with their potential implementation. Cleaning-related research in Norway started to emerge as a discipline just after the economic crisis in the 1970s. The broadening of Norwegian cleaning research approaches during the 1970s and 1980s corresponded to the ideological changes taking place in universities and the political events which occurred at the end of the 1960s. The new and broader spectrum of research approaches found in the 1980s continued in the 1990s and 2000s (**Article 1**).

Most of the identified research in **Article 1** was based on positivism–realism, particularly from the 1990s and onwards, when cleaning research started to emerge in earnest. Disciplines such as engineering, medicine and social science have predominantly researched cleaning. Figure 6 illustrates the overall distribution of the cleaning-related contributions according to approaches. Sundt's contribution from the 1800s is included in this figure. These are added as '+ 2' in the interpretivism–idealism category.

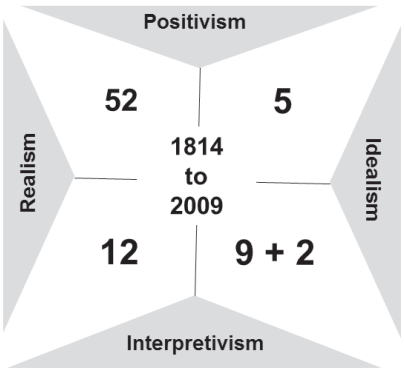

Figure 6 Norwegian cleaning research approaches since the 1800s (based on Figure 7 in Article 1)

A few of the identified studies in **Article 1** had a particular focus on public sector issues. None of these provided any overview of how cleaning services were generally organised in municipalities, nor did the

identified research provide any substantial information on the practice of cleaning in local authorities. The focus in the identified studies was on other topics instead.

4.1 Past developments in society and research

In many ways, the 1800s represented the beginning of modern times with regard to industrial, political and societal developments. The 1700s and 1800s brought about industrialisation and other major changes in society all over the world. European countries, as well as the US, formed their constitutions at this time. Many European countries settled their borders after the Napoleonic wars ended in the early 1800s. In Norway, numerous changes occurred during this century.

The system of higher education began to take shape in Norway at the beginning of the 1800s. The constitution was signed in 1814 (**Article 1**). In 1837, the municipalities were established (**Article 2**) and started to take their current form, both in size and responsibilities. Until the 1860s, municipalities were mostly self-governed and left alone by the state; however, as the responsibilities of the municipalities increased, this slowly changed, and the state became more involved. Most of the development in Norwegian municipalities occurred towards the end of the 1800s. In this period, Norway experienced an extensive development in infrastructure, and roads, systems for sewages and waste, telephone lines, electricity and gas plants were built. Welfare systems, such as education, health care, culture and (a sort of) sheltered housing, were created (NOU 1997:8, chap. 3.2.3).

To bring perspective to what everyday life was like at this time, the example of the municipality of Klepp in southwest Norway can be considered. Klepp received its first school house and its first educated teacher in 1854. This school house was also used for council meetings and other gatherings. Prior to this, teaching took place in the living room – the only heated room – of a farmer or tenant farmer's house (Lindanger *et al.*, 1987). It is in this context that the first Norwegian cleaning research emerged (**Article 1**). At this time, Norway was struggling with leprosy. In order to understand what caused this disease and how it could be dealt with, calls were made for studies on women's everyday lives; thus, the first research describing cleaning practices was developed. Women were blamed for the leprosy situation, and as a consequence, schools to educate women on domestic sciences were developed.

Determining when cleaning became a municipal responsibility may prove challenging. There are some indications that a reasonable estimate would be the late 1800s or the early 1900s. The writings by Lindanger *et al.* (1987) indicated that prior to the 1850s, cleaning was a housewife's responsibility. During the following decades, cleaning was transferred to the municipalities. This is supported by the rise of unions for cleaning ladies in Norway's larger cities. In the capital of Norway, the Oslo Cleaning Woman Association was constituted in 1901 (Unknown, 1951). In mid-Norway, the Trondheim Municipal Cleaning Woman Association was constituted in 1922 (Randen, 1997).

4.1.1 Organisational theory: pre-war, inter-war and post-war periods

The development in cleaning research can be linked to the developments of organisational theories. As with many social and political changes, organisational theories can also be divided into at least three periods (Busch and Vanebo, 2003; Christensen *et al*., 2007; Bevir, 2012; Friday, 2012). First is the *pre-war period*, which followed the industrial revolution and continued until the First World War started in 1914.

Man was viewed as a machine in this period. The contemporary theories included Taylor's scientific management theory (also known as Taylorism) and Weber's theory of bureaucracy. Once Weber put forth his thoughts on bureaucracy, the hierarchy was the dominant idea until it received increasing criticism during the mid-1900s (Bevir, 2012). In this period, only Sundt's studies have been identified as cleaning-related research (**Article 1**).

The second period is the *inter-war period*, between the First and Second World Wars (from 1918 to 1939). This is the period where no cleaning research was identified (**Article 1**); however, many contributions were made during this time in the form of commercial materials and textbooks – amongst these, textbooks for domestic science schools. In this period, Mayo's theory of human relations changed the view on man from being a machine to being a social individual. Mayo (1933) was inspired by Sir William Mather, who conducted a two-year project to the benefit of both employees and businesses in the late 1890s. Productivity gains were achieved by reducing workers' hours of duty (Mayo, 1933). This illustrates that an emphasis on the work environment can be beneficial for both employees and employers, as was indicated by Öhrling (2014) and discussed in Chapter 3.

The third period is the *post-war period* from 1945, when the Second World War ended, and onwards. Theories from the second period related to man's role as a social being were developed further, and hybrid theories such as networks arose (Busch and Vanebo, 2003; Christensen *et al*., 2007; Bevir, 2012). This is the time period in which Norwegian cleaning research re-emerged. In this period, cleaning practices began their transformation from relying purely on manual labour to implementing mechanical practices that also rely on machinery (**Article 1**). Cleaning research started to take into account that women were not only "machines"; they were social beings with health and families which needed to be taken care of. As an example, the majority of identified cleaning research contributions during the 1950s and 1960s researched technical issues. These technical issues included such modern cleaning methods as the mop as an alternative to floor cloths and machines for the removal of floor polish as opposed to the use of bare hands. The contemporary discussions included whether these new methods were more efficient and if there were any risk involved with potential implementation.

The criticism of the bureaucracy and the re-emergence of Norwegian cleaning research coincided with a new research focus. This included declining positivistic research, increasing interest in social sciences and a new ideal: value-laden research. Important and influencing events around this time were the Vietnam War, the feminist movement, the green movement, the rise of the students and later on, the worldwide economic crisis of the mid-1970s (**Article 1**). It was in this context that FM started to evolve.

4.1.2 Societal and political changes during the 1960s–1980s

A variety of changes occurred in society during the 1900s, many of which led to the development of FM. In the 1960s, technical services units were developed in Norway, and the municipalities received their own municipal engineers and municipal planners. In the same decade, the municipalities' health units and culture units advanced, and Norway saw its first day care and public school of music for children (Lindanger *et al.,* 1987). At this time, the municipal building portfolios were small and easy to follow (Bjørseth *et al.*, 1995). The municipalities owned school buildings, town halls and some accommodations for employees. The buildings, which were not very advanced, were usually managed by skilled caretakers [18]. The

municipalities, on average, were responsible for approximately 2 m^2 of built environment per inhabitant (Bjørseth *et al.*, 1995). During the following decades, the buildings became more advanced and the building portfolios increased in size and complexity. For example, by 1975, when the first day care law was enacted, Norway had day care opportunities for about 3% of children below school age (including toddlers and infants). This service was seen as important, since women had started to work outside the home (NOU 2007:6, chap. 5). Today, all Norwegian children are guaranteed a place in day care.

In this period, both market theories and FM evolved, and the focus on efficiency influenced management. This is the same timeframe in which a new value-free ideal influenced research. Both the demand for efficiency and this value-free ideal can be seen in the cleaning research which was conducted in Norway during this period. In the 1970s, cleaning research broadened and cleaning started to emerge as a discipline. The contributions mapped the complete cleaning industry and investigated cleaners' skill training, work environment, working hours and families' ability to cope with their inconvenient working hours (**Article 1**). The following decade, the 1980s, was the decade when FM started to emerge as a profession (Barnes, 2014). The research efforts of this decade related to cleaning in a Norwegian research context were focussing on gender equality, job design, working hours, disability levels, repetitive strain injuries, ergonomic initiatives and variations in cleaning costs. One of the few who studied cleaning services in local authorities at the time was Bringslid (1989).

4.2 Transformations in Norwegian public FM since the 1980s

Transformation occurring in a Norwegian context since the 1980s are of particular interest, as both FM and NPM originate from 1978–1980 (Pitt and Tucker, 2008; Christensen and Lægreid, 2013). It is also of particular interest as little research into the organisation and practice of cleaning in Norwegian local authorities was identified prior to Bringslid (1989). Bringslid's study illustrates that 1) the organisation and practice of cleaning at an operational level are influenced by a building's design, 2) cleaners at the time were managed by a caretaker and 3) a building's design can influence the implementation of technological developments in cleaning. As such, Bringslid's study is supportive of what was described in Chapter 3.

4.2.1 Transformation 1: modern cleaning methods and need-regulated cleaning

Bringslid's (1989) research shows that cleaning services in a Norwegian county were in transformation in the 1980s. This transformation relates to a change within the in-house cleaning organisation and bears a resemblance to Campbell's (2005) pre-OS1 descriptions.

In the parts, of the county which Bringslid researched, cleaning was still conducted traditionally using buckets and cloths. Other parts of the county started to use modern cleaning methods such as mops and polishing machines around 1985. These were the modern techniques which researchers focussed on during the 1950s and 1960s. One of the arguments given for the mixing of traditional and modern methods was a building's usability, as clarified in the following: *"The many stairs and specially designed rooms, with little 'cleaning friendly' design makes the building ill-suited for 'modern cleaning'. The part of the building which a cleaner is responsible for ('zone'), often includes several floors, and some are split between different buildings. In the old school they also do not use a trolley or roll to transport their cleaning equipment; it is too 'uneven' for it with that many stairs and thresholds"* (Bringslid, 1989, p. 28 [19]).

The use of chemicals was also different in these two paradigms. Traditional methods were based on well-known chemicals such as green soap, scrubbing powder and ammonia. Modern methods were based on a variety of chemicals. According to Bringslid, cleaners seemed to have no clear understanding of their usage. One of Bringslid's criticisms of modern cleaning at the time was the lack of staff training: "*The professionalisation of the cleaning profession does not seem to include training of labour. One has introduced modern methods, but the criteria for what is 'clean' are still following housewife standards for 'proper cleaning'"* (Bringslid, 1989, p. 57 [20]).

The cleaners in Bringslid's (1989) study were, on average, 51-year-old females with housewife responsibilities who worked part-time before or after school hours (on average, 3 hours and 15 minutes a day). Only about 32% of the cleaners had income in addition to their cleaning job. The only other employee cleaners commonly met was the caretaker, who was their superior. Occasionally, cleaners also interacted with the teaching staff and pupils. Although the caretakers were the cleaners' superiors, they were recruited by the municipal education directory. Notably, both one pupil and one cleaner were part of the education directory.

Bringslid's (1989) study refers to yet another emerging development in cleaning: cleaning within a larger municipality. This development includes a transition in the view of cleaners from being machines to being human beings. The machine view includes requests to perform certain tasks at a certain speed according to input-based frequencies. The human view includes working according to what is called "need-regulated cleaning". This system allowed the cleaners themselves to assess the need for cleaning. Cleaners were also allowed to work in teams during the day when end users were present.

4.2.2 Transformation 2: recognising the need for professional organisations

As cleaning used to be the responsibility of caretakers (Bringslid, 1989), it is useful to include insight on general FM. When market theories were at their height of popularity, a need for more professional FM began taking form, not only as a result of the political climate, but also as a consequence of societal development. In Norway, the responsibilities of municipalities had increased. By the mid-1990s, they were responsible for administration buildings, day care buildings, homes for the elderly, social housing and sports and cultural facilities. Consequently, the Norwegian municipalities' built environment per inhabitant rose from approximately 2 m^2 during the 1960s to approximately 5–7 m^2 during the 1990s, and up to 15% of the municipalities' employees were now working in jobs related to FM (Bjørseth *et al.*, 1995).

In 1995, the FM organisation for one of Norway's larger municipalities was evaluated by Haugen *et al.* (1996). Their report included a miserable description of FM at the time: There was no complete overview of the building portfolio nor the cost to MMO or the legal responsibilities. The operations of this larger municipality were not coordinated with maintenance. The FM department lacked resources, needed to become more visible and was in need of a clearer division between FM and user services. The report showed a municipality in transition from full to partial decentralisation. As such, this municipality illustrates that FM in Norwegian local authorities had entered a professionalisation process. In both models of decentralisation, representatives of individual institutions (e.g. the principal at a school) were responsible for the FM staff, including labour costs. What distinguished these two models was a centralised support system that predominantly included job training and maintenance planning assistance. A third

organisational model was also brought forward by Haugen *et al.* (1996) with a fully centralised department (FCD) in which the central department had the full responsibility for FM, including employment responsibilities.

As a consequence of efficiency demands requesting a minimum of 10% cost savings, parts of the FM organisation in this municipality participated in an organisational pilot test (1993–1995). Caretakers were assembled in groups of 15–18 led by a superior – an operations manager with both economic and professional responsibilities, including human resources. Common routines were developed, such as the registration of energy and water consumption, maintenance needs and staffing coverage. The caretakers were pleased with the change, as it included a social and collaborative environment. This new collaborative environment also reduced the FM department's need for external and specialised services. Overall, Haugen *et al.* (1996) recommended that the municipality continue with this new organisational model but develop it as a department with a mixed centralised and partly decentralised structure. This partly (de)centralised model included the centralisation of strategic FM (that of management, *"forvaltning"*), the division of tactical responsibilities in geographical districts and the division of operational FM into teams of 15–18 persons according to a purposes principle (educational and health care). Moreover, they advised the municipality to employ a centralised operations manager in addition to the one managing maintenance-related issues.

4.2.3 Transformation 3: daytime cleaning

The study by Bringslid (1989) shows that the transformation to daytime cleaning in the Norwegian public sector was going on during the mid-1980s. This transformation was still ongoing during the 1990s; Haugen *et al.* (1996) comment that the change to daytime cleaning had given the caretakers additional user service responsibilities. Such services included tasks like turning off lights and locking/securing the buildings. In this regard, Haugen *et al.* (1996) emphasise that these responsibilities could have easily been assigned to others, as they resulted in caretakers' wasting time waiting for after-school activities to end. Also notable in relation to cleaning were the FM department's efforts to replace textile floor covering with hard flooring.

4.2.4 Transformation 4: NPM spurs discussions on in-house and outsourcing

The influence of market and NPM on FM, including the newer view in management theories of humans being social individuals, can also be seen in the Norwegian research on cleaning. Examples during the 1990s included ways of detecting cleaning quality, chemical-free cleaning methods and the effects of cleaning on indoor environments. Research also focussed on cleaning personnel's health, consequences for cleaning personnel in relation to outsourcing, key figures in cleaning services, families' use of cleaning services and improvement possibilities within the Norwegian cleaning industry (**Article 1**). Many of these topics continued to be investigated in the research contribution from 2000 onwards, including topics such as the focus on cleaning personnel's health, cleaning quality, chemical-free cleaning and topics related to indoor environments. Cleaning research contributions also covered topics such as immigrants' appearance in the industry, the use of part-time employment, wages within the private and public sectors, cleaning personnel's occupational identity, the situation for unskilled women and possibilities related to robot and sensor technology.

The in-house outsourcing discussions in FM research were also present in Norwegian cleaning research (**Article 1**). In 1994, a consultancy firm provided rough estimates of the distortion of competition as a consequence of VAT, a situation which ended in 2004. At the time, private sector providers needed to be 22% more effective than in-house provisions to become the cheaper alternative for local authorities (ECON, 1994). Such estimations and discussions are still ongoing (NHO Service, 2013). The consequences for cleaners in relation to in-house and outsourced cleaning services were studied by Nesheim and Rokkan (1997). Their results showed that in-house cleaners, both in municipalities and companies, experienced better connections with their employers (independent of gender, age, seniority, isolation of work and hours of duty). In-house cleaners also more frequently reported an acceptable work pace and being satisfied with their work; moreover, they considered leaving their jobs less often. External cleaners, on the other hand, experienced greater acknowledgement of their work and better work training.

In the new millennium, research on public Norwegian cleaning services has focussed on issues related to whether it is best for cleaners to be employed in the public or the private sector. These studies have illustrated that exposure to competition in municipalities was most common for cleaning in the healthcare sector (Nesheim and Vathne, 2000), the pension scheme in the public sector was better than cleaners' pension scheme in the private sector (Pedersen, 2000) and that there were few differences in cleaners' levels of pay within local authorities, central authorities and the private sector, unless the cleaners were experienced (Fevang *et al.,* 2008). These examples illustrate how Norwegian research was influenced by the general discussion going on at the time, in particular regarding whether it is better to use in-house or outsourced services. Some of these discussions continue today, and the pension scheme debate seems to be one of the reasons behind the reluctance to outsource public cleaning services (Renholdsnytt, 2015). Other discussions worth mentioning regarding Norwegian public cleaning services have addressed the use of part-time employment (**Article 1**). Moland and Andersen (2007, p. 26 [21]) linked these discussions to NPM and municipality size, as the larger the municipality, the more common it was to implement NPM-inspired ideas.

4.2.5 Transformation 5: a pursuit of full-time positions

Norwegian municipalities' management of part-time labour was studied by Moland and Andersen (2007). They argue that this issue had been neglected by employers since the 1970s, when women started to enter the workplace. To these authors, position sizes are linked to service quality and efficiency. Here, the term *position sizes* refers to the percentage of a full-time position; for example, a 13% position would be regarded as small and an 80% position could be regarded as large. Allowing part-time positions was often part of the municipalities' policies for senior staff. Moland and Andersen (2007 [22]) point out that *"smaller positions and part-time are not necessarily a problem. From an employee perspective, part-time and small positions primarily constitute a problem if an employee would like a larger position"* (p. 20). Their study indicates that the larger the municipality, the more common it is to address the issue of part-time work. Norwegian municipal CEOs favour smaller positions, as it makes it easier to schedule shifts and easier to distribute unfortunate/uncomfortable shifts such that temporary staff could assist when needed (Moland and Andersen, 2007). A common argument against such positions is that their vast numbers lead to difficulties in recruiting competent staff, which hurts the municipalities' reputation as employers. Other negative concerns involve the municipalities' working environment; the inconvenience to users who must

repeatedly relate to new personnel; temporary staff's lack of knowledge of their users (resulting in reduced service quality); employees leaving their jobs when municipalities fail to provide an increased position; and reduced efficiency.

4.2.6 Transformations 6 and 7: cross-service positions and engaged building users

One of the cases studied by Moland and Andersen (2007) concerned cleaning services at a primary school that also had an after-school program. When the school was built in 1994, the principal had decided to encourage increased collaboration between teachers, after-school employees and cleaners. Previous experience within the local authority had identified a tendency towards conflicts between teachers and other employees. One of the after-school arrangements at this primary school was a midday hour at 1100–1230. In 1997, two actions were taken, as follows: 1) cleaners were allowed cross-services positions, and 2) to reduce the cleaners' physical workload, environmental cleaning (*"miljørenhold"*) was introduced.

The cross-services positions allowed cleaners to clean between 0600 and 1100 o'clock and to work as after-school employees from 1100 to 1230. As a consequence, the principal found it easier to hire competent staff (as compared to hiring for the traditional cleaner position). Another benefit included a greater variation in tasks, as well as larger and more interesting positions, which led to reductions in health-related issues. Cleaners in cross-services positions received job training and developed professionally. Two even changed jobs, to become an after-school manager and a teacher.

The *concept of environmental cleaning*, as described by Moland and Andersen (2007), engaged the building users in dirt-preventive actions. Pupils began wearing indoor shoes and tidying the wardrobes. In addition, a group of 7th-grade pupils formed an environmental patrol, which was responsible for emptying the paper and food waste and tidying and sweeping the playground. This environmental patrol was led by the environmental employee (also a cross-services position) responsible for the physical indoor and outdoor environment, including dealing with caretaking tasks, waste sorting and so forth. As a result, the primary schools experienced increased service quality and efficiency, as well as an improved work environment, which led to better recruitment.

4.2.7 Transformations 8, 9 and 10: official education, standardisation and competition

Three other transformations in cleaning can be highlighted. One was indicated above: First, the distortion-free competition which provides local authorities compensation for the VAT added to private providers' services, thereby enabling competition between private and public bodies' on more or less equal grounds. Second, an official education system for cleaners has emerged: a certificate of apprenticeship. In the early 1990s, an educational reform – Reform 94 – was taking place in the Norwegian high school system. This reform ensured that all pupils had the right to a high school education and introduced cleaning as one of the possible subjects, thereby allowing cleaners to obtain a certificate of apprenticeships (Skilbrei, 2003). The third transformation is the development of standards. In today's Norwegian FM setting, cleaning is regarded as a frontrunner when it comes to standards. Cleaning is used as an example and inspiration for the development of standards for other FM services, and is referred to by Standards Norway (2015) as *"a complete set of Norwegian standards which contributes to simplifying tendering processes"* (p. 2 [23]).

NS-INSTA 800 [24], a cleaning quality assessment standard, was launched in 2000. It quantifies cleaning in terms of soiling and is based on some of the research identified in **Article 1**. The standard also assesses

items such as a surface's degree of friction, resistance, gloss, static electricity and hygiene (microorganism count). In 2005, the NS 8431 contract standard was launched; this provides a general contract for the supply of regular cleaning. In 2011, the standard NS-INSTA 810 was launched, addressing the requirements and recommendations for the procurement of cleaning services. Together with NS 3940, which provides a guide for how to measure a building's area, these cleaning standards offer a framework for procurement, contract, performance, SLA and KPI, as shown in Figure 7.

Figure 7 Norwegian cleaning standards: a front-running three-part series (based on Standards Norway, 2015)

5 Findings from the national survey: cleaning organisation

Previous chapters in this thesis have employed a theoretical lens focussing on developments since the 1800s. In this chapter, the focus shifts to the situation as of 2010. The information presented here is one part of this thesis' original research and is based on **Article 2**.

5.1 National overview of the organisation of municipal cleaning services

The national survey explored how municipal FM services and cleaning services in Norway were organised throughout the country in 2010. Literature studies prior to the survey considered what organisational models municipalities could apply and how the municipalities had applied these models. For more information on this, see the attached **Article 2**. The survey mapped what model the municipalities had applied, whether the applied organisational models within each municipality were the same for cleaning services organisations and FM organisations and what changes were planned in the organisational models. The survey also explored whether building categories or municipal size had any influence on the use of organisational models.

The predominant conclusion from the national survey was that as of 2010, Norwegian municipalities have preferred to keep both their FM services and their cleaning services in-house. Most commonly, they favour the use of centralised departments. The results showed that FM and cleaning organisations are commonly *structured similarly*. The results also showed that some municipalities have applied a different organisational model for their cleaning services than for their FM services. With regard to *the use of organisational models*, a few were particularly notable, as follows: inter-municipal alternatives (IKS), municipal-owned limited companies (AS) and voluntary providers. These were rarely used or not used at all. None of the responding municipalities reported using any form of inter-municipal alternatives (IKS) for FM or cleaning organisations. Municipal-owned limited companies (AS) were little used as an organisational model, and when they were, they were only employed for FM organisations. Voluntary providers were barely used. The only reported use was for the cleaning of one building category ("other") by one medium municipality. *Municipality size* seems to be important for some of the applied organisational alternatives. Small municipalities apply decentralised alternatives more frequently than medium-sized and larger municipalities. Fully decentralised departments (FDDs) are notable in this regard. Medium-sized and large municipalities use municipal undertakings (KF) more often than small municipalities do. *Building categories* also seem to be of importance, in particular for municipal-owned limited companies (AS) and municipal undertakings (KF). Municipal-owned limited companies (AS) are mostly used for administrative buildings, while municipal undertakings (KF) are mostly used for entire building portfolios. Healthcare buildings have been using decentralised alternatives for cleaning more often than other building categories.

5.2 Norwegian municipalities have preferred fully centralised departments as of 2010

The national web survey of 2010 confirmed the indication of Norwegian municipalities' preferences identified in literature reviews. Both FM and cleaning are most commonly retained in-house as fully centralised departments (FCDs).

Notable in the survey was that FCDs are about 10–28% more common for FM organisations than for the main cleaning organisations (Figures 9–12 in **Article 2**). In relation to cleaning, healthcare buildings and "other buildings" stood out, with a notable low preference for FCDs compared to the other building categories (about 6–17% lower). Rarely, FCDs were applied as an additional alternative for cleaning.

With regard to the *less-preferred organisational models*, the preference of Norwegian municipalities depends on whether their response concerned FM organisations or cleaning organisations. FM organisations prefer municipal undertakings (KF) and "other" organisational models to decentralised models. Decentralised alternatives are of little preference for FM organisations. There are two alternatives for decentralised departments (see Table 1 in Chapter 2): fully decentralised (FDD) and partly decentralised (PDD). Cleaning organisations prefer decentralised models to municipal undertakings (KF), particularly for healthcare buildings.

5.3 Private providers supply FM services more often than they do cleaning

The survey results from 2010 indicate that private providers are more commonly used for FM organisations than for cleaning organisations. The findings of the national survey showed that municipalities in general, irrespective of size, use private and voluntary providers to a limited extent as supplements to their in-house services and even less as a replacement for in-house services. Notable is small and medium-sized municipalities' use of the alternatives of *voluntary* or *private providers,* both for cleaning and for FM, as shown in Figure 16 in **Article 2**. In this figure, FM organisations' potential use of *voluntary* or *private providers* is recorded as an "other" model. No use of "other" organisational models was reported for cleaning organisations. This indicates that the additional response alternatives given to cleaning organisations in Table 1 were sufficient to cover the alternatives used.

Norwegian municipalities rarely completely outsource cleaning. Irrespective of the type of cleaning organisation, whether it is the main organisation or one of the two additional organisational alternatives, only 0.7–1.9% reported relying *entirely* on private providers in 2010 (see Figures 10–12 in **Article 2**). This illustrates a minor reliance on full outsourcing of cleaning in Norwegian municipalities.

Norwegian municipalities rely on private providers as a supplement to their in-house provision. The *most common additional alternative* for municipalities' cleaning organisations was *partly* private providers. The municipalities' use of private providers decreased from additional daily cleaning services (5.8–7.8%) to occasionally used cleaning service (1.9–5.8%).

5.4 Municipalities' planned changes in organisational models as of 2010

The municipalities' 2010 responses related to planned changes in use of models indicates that changes at times relate more to tactical or operational interfaces than to strategic choices concerning which models to use. For cleaning, future plans were at times associated with changes within the in-house management (for more detail, see Figure 15 in **Article 2**). This may also be the case for FM organisations. With regard to cleaning, planned strategic–tactical changes included such as transforming the centralised department (FCD) into a municipal undertaking (KF), making cleaning service a part of the centralised FM organisation, making cleaning its own unit beneath FM or employing a cleaning manager. The reported management-

related changes, which can be described as having relevance to tactical–operational interactions, included dividing the service into cleaning areas, creating cleaning teams, giving individual cleaners responsibility for particular buildings and developing the collaboration between individual cleaners.

An indication that planned changes in FM organisations also relate to tactical and operational management can be seen in the reports of changes to and from the very same alternative, an FCD (see Figure 14 in **Article 2**). This could indicate that the planned changes are taking place within the particular organisational model, and thus are not related to strategic decisions. Apart from this, planned changes in the FM organisations as of 2010 indicate that future strategic changes could involve an increased use of decoupled, market-inspired models. Signs of this are the municipalities' planned 1) decreased use of traditional department models (etat models such as FDD, PDD and FCD) and 2) increased use of municipal undertakings (KF) and inter-municipal alternatives (IKS), as well as the indication that 3) municipalities had started to test whether municipal-owned limited companies (AS) could be an option. Based on the municipalities' reports of planned changes in the 2010 survey, the future in FM organisations could include an increased use of municipal undertaking (KF), inter-municipal alternatives (IKS), limited companies (AS) and "other" unknown models. "Other" and unknown models may include 1) intra-organisational changes at a tactical-operational level or 2) the use of voluntary or private providers. There are indications that municipalities are moving away from decentralised alternatives more or less entirely. As of 2010, out of 139 municipalities, only four to eight municipalities (the number depends on building category) used decentralised alternatives simultaneously for both cleaning organisations and FM organisations (see Figure 17 in **Article 2**).

Based on the findings of the national survey of 2010, Norwegian municipalities have started their next transition. This is supported by the findings from NOU 2004:22, as described in **Article 2**. This next transition is in its early inception. As of 2010, FM organisations were ahead of cleaning organisations in such developments. This finding is supported by cleaning organisations' preference for decentralised alternatives and the reported plans to change. Figure 8 illustrates the recent developments in the FM organisations which cleaning organisation may follow. The figure gives a summary of the findings from NOU 2004:22 and this survey, as shown in Figures 18 and 19 in **Article 2**.

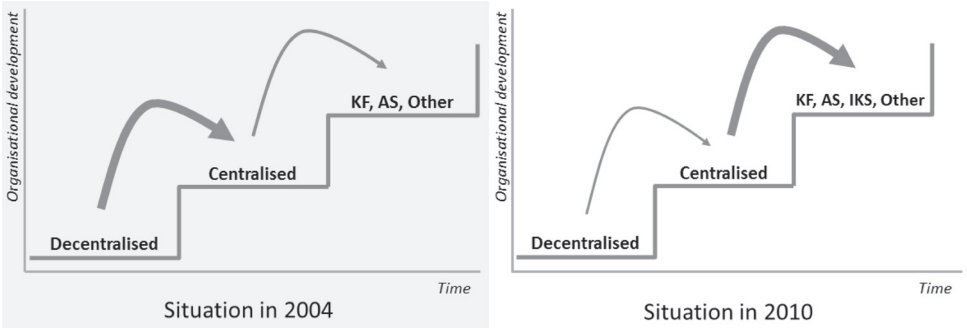

Figure 8 Developments in municipal FM organisations in Norway

6 Findings from the case studies: examples from cleaning practice

The previously presented national survey showed that changes in organisational models are not only related to a strategic choice concerning what model to use. Rather, changes can also relate to intra-organisational changes within the very same organisational model, and thus, they can be related to the practice of cleaning. This raises the following question: How can FM and cleaning be organised and performed within local authorities?

This chapter presents the findings of the two descriptive case studies in this thesis and includes descriptions of one case from Norway and one from the UK. The cases describe the common way to supplying cleaning services in local authorities: in-house cleaning. The internal environment of these service organisations is described. The descriptions are divided into two main sections. First, the organisations are presented from a management perspective (section 6.1). Second, they are presented from a practical mop-floor perspective providing insight to the organisations' cleaning practice as experienced by on-the-job cleaners (section 6.2). These mop-floor perspectives also touch upon the underlying view in this thesis of organisations, buildings and technologies as support services for operational staff. Separating the operational cleaning practice from these contexts is challenging. The presented findings are based upon those presented in the attached **Article 3**, **Paper 1** and **Paper 2**; hence, limited references to these publications are made below.

Both Norwegian local authorities and UK local authorities embrace in-house provision. Of all the available organisational alternatives considered in the survey, Norwegian municipalities preferred those models which can be described as in-house, that is, the different internal supply models. The literature review in **Article 2** indicated that UK local authorities also prefer in-house cleaning services. As described in **Article 2**, for UK local authorities, Clark and Rees (2000) indicate that FM is commonly either a traditional separate support services or an integrated service. In **Article 2**, Alexander's (2003b) findings are used to support the indication that FM in the UK is predominantly in-house; only 35.5% of the municipalities were found to outsource their FM services. This preference for in-house services seemed to be particularly notable for cleaning services. The Association of Public Service Excellence surveys for 2008/2009 and 2009/2010 referred to in **Article 2** showed that cleaning in UK local authorities is seldom contracted out to external providers. The high occurrence of in-house cleaning services in UK local authorities (89-87%) was an unexpected theoretical finding, as the expectations involved less in-house provision in the UK. This expectation was due to the UK being known for its private sector orientation and as an NPM reformer. Based on Rhodes (1994) and Greenwood and Wilson (1994), Chapter 3 showed that public cleaning services in the UK have been outsourced since 1968 and exposed to competitive tendering since the late 1980s.

The predominant conclusions from the case studies illustrate that cleaning can be structured and managed differently in different local authorities and countries. One contextual factor influencing the cases' differences relates to the two countries varied market influence. The two case studies have different national contexts. In terms of contextual environments, both cases operate within larger local authorities which have won awards for some of their FM services. In terms of their building portfolios, the two cases comprise a similar portion of school buildings. A difference related to ownership is that the UK case owns all of its buildings, whereas the Norwegian one also rents space on the private market.

The two case organisations are rather flat, with three levels of management which link to their councils in different ways. The cases divide their labour and organisational functions differently. In terms of the workforce, cleaning represents a dominant element in both the studied cases. Their workforce flexibility and customer relations are also administered in different ways. What is more, they manage, supervise and educate their operational staff in different ways. Table 4 presents a brief summary of the two studied organisations regarding budget and staff.

Budget and staff	**UK case**	**Norwegian case**
Budget, FM department*	More than £10M	£64M (operations) £106M (investment)
Employees, FM department	1200 employees	550 employees
Employee: operations budget ratio (approx.)	1 employee: £8334	1 employee: £116 054
Number of cleaners, approx.	450	300
Cleaning workforce as a percentage of total workforce	37.5%	54.5%

*In this thesis, 9.4 NOK = £1

Table 4 The cases' workforce and budgets

6.1 Examples from cleaning practice: a management perspective

Major strategic distinctions relate to the cases' exposure to competition, their split in service supply, their specific organisational model and the model's financial dependency (see Table 5). The Norwegian case, a traditional and centralised department (FCD), receives funds from its local authority. The soft FM department in the UK is an arms-length department with financially independent services which must generate their own income to cover costs.

Other major differences between the two cases relate to their levels of integration, the chain of command, the division of functions and the manager's span of control.

6.1.1 Chain of command, levels of integration and grouping of functions

The two cases links differently to their local authority councils (see Table 6). The cases also illustrate different levels of integration of FM services. The Norwegian case can be described as a fully integrated FM organisation, as it groups both hard and soft services together. The UK case can be described as a partly integrated FM organisation, as soft services are organisationally separated from hard FM services. It was the soft FM organisation in the UK which was studied in this thesis research. This soft FM organisation in the UK coordinated its practice with the local authority's hard FM department on a monthly basis. In Norway, cleaning was a sub-unit under the FM organisation responsible for everything to do with buildings.

Organisational model, market competition and financial model	UK case	Norwegian case
Exposure to competition	Yes, the case is continuously exposed	No, the case is not exposed
Service split *During research*	There is a split in services provision in the case. The in-house organisation cleans 75% of the local authority buildings. A private provider cleans the remaining 25%	No split of services in the case. All cleaning services are provided in-house
Organisational model	Arms-length department referring to itself as a trading arm	Traditional and centralised unit; fully centralised department
Financial dependency	Independent. Must generate its own income. Any surplus is given to the local authority	Dependent. Receives funding from the council
Change in organisation *After research*	2011 – A tendering process significantly reduced the in-house cleaning organisation	2011 – No change in the cleaning organisation. The FM organisation was simplified

Table 5 Service split, organisational model and financial dependency

Grouping of functions and levels of integration	UK case	Norwegian case
Linking to the responsible directorate (denotes chain of command)	Soft link	Hard link
Directorate responsible	People directorate; children, adults and families	Urban development
Level of integration	Partly integrated FM services; hard and soft services are separated into two different organisations	Fully integrated FM services; hard and soft services are grouped together in the same organisation
Grouping of functions	According to process	According to process and clientele
Functions within the FM organisations (denotes the supplied services)	Business and finance School crossing patrol Cleaning Catering	Accounting and administration Project and development Caretaking Cleaning MMO housing MMO schools MMO health
Grouping of cleaning	*On a strategic level:* grouped together with soft FM services *On a tactical level:* grouped together with catering and divided into 3 geographical cleaning service areas	*On a strategic level:* grouped together with hard FM services *On a tactical level:* grouped as a single service and divided into 11 geographical cleaning service areas

Table 6 Grouping of cleaning amongst the FM services

At a strategic level, the two cases supply different services to their customers (see Table 6). In the Norwegian case, each service is led by one manager; as a consequence, this case has one manager who is solely responsible for cleaning. In the UK case, one of the managers divides his attention between cleaning and catering. Included in the UK cleaning service is also a caretaking cover service.

Yet another difference between the cases relates to how the strategic level of management prefers to supervise the FM organisation. The Norwegian cleaning service has more responsibility for financial and administrative tasks on a tactical level than the UK case. In both cases, the FM organisations have their own unit administering economics at a strategic level. In addition, the Norwegian case has such a unit at the tactical level.

There seem to be few similarities in the two cases' cleaning service management, apart from cleaning being grouped at a tactical level and divided into geographical cleaning service areas (see Tables 6 and 7). Each cleaning service supervisor has his or her own geographical area to supervise. On a tactical–operational level, the similarities between the two cases more or less end here. The only other similarity can be found in some of the tasks performed by the individual cleaning service supervisors, as addressed below.

6.1.2 Division of labour, span of control and education

From a management perspective, the Norwegian case has more management capacity on the tactical–operational levels than does the UK case. Strategically, the two strategic managers had a different span of functions to follow up on; thus, the two cases exhibit quite different spans of control (see Tables 6 and 7). The difference increases on a tactical and operational level. In both cases, one strategic manager leads the tactical managers, but the number of managers on the tactical and operational levels differs.

In terms of span of control, the Norwegian case has the highest span of control on both the strategic and tactical levels, whereas the UK case has the highest span of control on the operational level. In the UK case, the cleaning service supervisors are supported by operational support staff. Even if these operational support staff are included into the span of control at a tactical level, the Norwegian span of control at a tactical level would be at least twice as high as that in the UK. The greatest difference in the span of control, however, is found at the operational level, as the Norwegian cleaning service supervisors are responsible for considerably fewer cleaners (5–6 times fewer than in the UK case). In the Norwegian case, each cleaning service supervisor is responsible for 25–30 cleaners split into teams of 5–8 cleaners. In the UK case, each cleaning service supervisor is responsible for 150 cleaners. These cleaners can be split into teams of two or more, as described in **Paper 1**.

With regards to the cleaners, major distinctions can be highlighted in the way the cases emphasise education and described the cleaners' hierarchy. The soft FM department in the UK case described the hierarchy among the operational staff as based on levels of responsibility – whether cleaners had management responsibilities (lead cleaners), key responsibilities (custodians) or no responsibilities other than cleaning (cleaner). This contrasts with the Norwegian case, where the hierarchy amongst cleaning staff is based on education – whether cleaners held a certificate of apprenticeship. In the UK case, education included induction and job training (given by operational support staff), as well as a national

vocational qualification (NVQ 2). In the Norwegian case, newly employed cleaners take part in an orientation day, as they do in the UK. In addition, Norwegian cleaners are given the following:

- Monthly updates (meeting with their cleaning services supervisors);
- Annual and targeted education (theme day where all cleaners meet for a day to focus on a single cleaning topic);
- Opportunities to pursue an official education qualification, such as a certificate of apprenticeship; and
- Language classes for non-natives, including cleaning-dedicated sections.

Division of labour and spans of control	UK case	Norwegian case
Division of labour	All tactical managers are led by a strategic manager Three tactical managers lead the four functions. One tactical manager is responsible for two services: cleaning and catering One service supervisor for each service area	All tactical managers are led by a strategic manager All functions are led by one tactical manager One service supervisor for each service area
Strategic span of control	1:3	1:7
Tactical span of control	1:3	1:11
Operational support staff (OSS)	3	n/a
Alternative span of control at tactical level (if OSS is to be included)	1:6	n/a
Number of cleaners	450	300
Operational span of control	1:150	1:25–30
Alternative span of control if OSS is to be included	1:75	n/a

Table 7 Division of labour and span of control

6.1.3 Service monitoring: benchmarking and internal measurements

The UK case measures and benchmarks its services to a greater extent than the Norwegian case does (see Table 8). The Norwegian case participates in a national group developing common KPIs for FM in the public sector, whereas the UK case is part of a well-established benchmarking group. In addition, the UK case

steers according to a performance plan linked to the local authority's strategic priorities, key performance targets and delivery plans for all services (see Table 1 in **Article 3**). No such clear strategies were expressed and no such documents were provided in the Norwegian case. Yet another difference relates to the cases' way of communicating with staff: The UK case emphasised business gatherings, whereas the Norwegian arranged thematic gatherings.

Quantification and monitoring of cleaning	**UK case**	**Norwegian case**
Benchmarking	The case is benchmarking its services in a national and public benchmarking group	The case is taking part in a group of larger local authorities developing common KPIs to facilitate future benchmarking
Internal measures	Number of employees Full-time equivalents (FTEs) Absence due to illness National vocational qualifications (NVQs) Cleaning quality Accidents Turnover Customer satisfaction Financial measures	Number of employees % of full-time positions Absence due to illness Certificate of apprenticeships Cleaning quality
Information flow to the entire workforce	Gatherings occurring twice annually for the entire workforce focussing on the organisation's business, finances and performance. All services and staff are represented at these gatherings	No reported business gatherings for the entire workforce. For cleaning, an annual "thematic day" is arranged for the entire cleaning unit

Table 8 Quantification and monitoring of services

6.1.4 Customer relations: billing, contract and communication

The two cases have different ways of handling their customer relations, billing process and communication with customers (see Table 9). Each UK customer is charged for the provided services, whereas Norwegian customers are not charged. In terms of customer relations, it is not only the cases' billing practices which differ. There are also variations in the cases' management of customer contracts and communication with customers.

Customer relationships in the Norwegian case are regulated by a general contract which is developed according to building type; apart from this the Norwegian case did not indicate how it communicated with its customers.

Customer relationships in the UK case were regulated in three different ways: no formalities, SLAs and contracts. SLAs were used in the case of educational customers, as the school boards could choose the preferred provider. In addition, the UK case communicated with the customers when meeting with the hard FM department and when assessing the cleaning services' quality.

Customer relations	UK case	Norwegian case
Billing and payment	Customers are charged for supplied services	Customers are *not* charged for supplied services
Contract management	Contracts for customers outside the LA SLAs for educational customers No formalities for non-educational customers	Contracts according to building type
Communication	Customer satisfaction is measured Cleaning quality is assessed by both a client representative and a tactical manager Regular meetings with hard FM to jointly address changes in the use of buildings	Not described No indication that customer satisfaction is measured No indication of regular meetings with customers

Table 9 Management of customer relations in the two case studies

6.1.5 Information flow connecting strategic, tactical and operational levels

At a strategic level, information flow in the two cases was quite different: the Norwegian case emphasised educational information, whereas the UK case emphasised business-related information (see Table 10). At a strategic level, the UK cleaners were given regular opportunities to meet with their strategic manager and tactical manager twice as often as in the Norwegian case. Here, it should be noted that there were few scheduled gatherings wherein the Norwegian cleaners could meet with strategic and tactical managers, other than the annual theme day gathering.

At a tactical–operational level, information flow is linked to the frequency of interactions between managers and cleaners. Common to both cases are 1) the frequency of scheduled meetings between the tactical cleaning manager and all cleaning service supervisors (once a week) and 2) the predominant responsibilities of the cleaning service supervisors. In both contexts, cleaning service supervisors were responsible for the day-to-day contact with customers and cleaners, management of sick leave coverage and monitoring service quality. In terms of contact with front-line staff, the approaches were different.

The aim of the cleaning service supervisors in the UK was to meet the cleaners every third month. In the UK, cleaning service supervisors seldom interacted with the cleaners unless the end user indicated such a need. During the shadowing in the UK, the interviewed service supervisor met with one of the shadowed cleaners. This meeting showed that the UK span of control was too large to facilitate good information flow at a tactical–operational level, as the cleaning service supervisor was unaware of the full responsibilities of the cleaner. This cleaner had key responsibilities of which the service supervisor was unaware, and as such, the cleaner should have been defined as a custodian.

In the Norwegian case, the cleaning service supervisors met with their cleaners once a month for a two-hour meeting. During these meetings, cleaners were given access to up-to-date information. Cleaners were given information to put in their team folders and had the opportunity to ask questions. The individual cleaning service supervisors could invite superior management to their monthly team meetings. Apart from

the annual thematic day, it is unknown how frequently cleaners in the Norwegian case actually meet with strategic–tactical management.

Information flow	UK case	Norwegian case
Strategic/tactical	Twice annual business and finance day for the entire soft FM workforce	Annual thematic day for the entire cleaning unit
Tactical/operational	Once a week	Once a week
Operational	Every third month – as individuals The cleaning service supervisor attempts to meet every cleaner once every third month	Monthly – as a group Cleaning service supervisors gather all cleaners in the service area every month

Table 10 Strategic, tactical and operational information flow

6.1.6 Service supply: cleaning service deliveries and quality monitoring

The cleaning services supplied to the customers are different in the two cases (Table 11). Both cases deliver daily and periodic cleaning services. What differentiates them is their view on deep cleaning. The Norwegian case views deep cleaning as an admission of failure, and includes tasks designed to avoid the need for it as part of the daily cleaning services. The periodical cleaning tasks in the Norwegian case include window cleaning, curtain steaming, high-speed polishing and application of varnish. The UK views deep cleaning as one of the periodical cleaning tasks, in addition to window cleaning, barrier matting cleaning, jet washing and graffiti removal. Additional services offered by the UK service include litter pickup and specialist cleaning (e.g. cleaning keyboards and computer screens). Additional services are not provided in the Norwegian case.

Cleaning service deliveries	UK case	Norwegian case
Quality control system (for cleaning)	Lead cleaner checklist Building user checklist	Indoor environmental standard
Scheduling of cleaning	Input-based, according to frequency.	Output-based and input-based, according to frequency and % of dust level
Cleaning services	Daily cleaning up to handheld height and deep cleaning during school holidays	Daily cleaning, including periodical cleaning; this should eliminate the need for deep cleaning
Additional services offered	Litter removal Specialist cleaning, such as PC screens and keyboards	No specific services mentioned
Cleaners' working hours	Tailored to family life, e.g. before and after school business hours	Tailored to family life, but limited to 0600–1800

Table 11 Cleaning service delivery and cleaning quality

In the UK, cleaning tasks are scheduled according to frequency (input-based), for example, vacuuming every other day. The quality is assessed every sixth week by both a cleaning service supervisor and the customer through separate checklists.

The Norwegian case uses input-based specifications in addition to output-based ones. As an example, the shadowed Norwegian cleaner explained that her routine at the "Pebble" building was to clean the residents' toilets twice a week and the common hall three times a week. The Norwegian case quality control system illustrates that its cleaning quality requirements are (at least partly) put forward in an output-based manner. An indication of this is the dust level, which should never exceed 5% dust build-up. The interviews, however, did not highlight how their quality system was actually managed, except for the cleaners' monthly tests of surfaces' dust loads. The Norwegian case quantified their cleaning quality according to a philosophy called an "environmental standard". This quality control philosophy engages building users in ways which reduces the need for cleaning. For example, disposable shoe covers are placed at entrances and building users are responsible for tidying up.

In terms of service delivery, both cases expressed concern for the environment. The Norwegian case has implemented the use of shoe covers to prevent dirt from entering the building, thereby reducing the general need for cleaning. To reduce the need for chemicals, the Norwegian case also uses steaming and microfibre cloths and mops. With regards to cleaning textiles, the UK case bases its practice on string mops, flannel and viscose cloths. The UK case expressed concern about its carbon footprint. The organisation aims to reduce chemical bottle waste by implementing the use of concentrated chemicals, as most of the water is removed from these smaller containers. In the shadowing, it was observed that cleaners attach these containers to a water outlet for automatic and accurate mixing of the chemicals with water. In the interviews, the UK case also mentioned the use of ionators, which produce "activated water". The idea is that "charged" water can substitute for chemicals.

6.1.7 Workforce flexibility: staffing contract, working hours and self-management

In the two cases, the management of the operational staffing contracts was in part affected by the strategic objectives of workforce flexibility and full-time positions. Ensuring the cleaners' full-time positions was seen as important in the Norwegian case. Ensuring the FM organisation's greater workforce flexibility was seen as important in the UK case. As a consequence, the management of staffing contracts and cleaners' division of labour are handled differently in the two cases. Although both cases attempt to provide their cleaners with full-time positions, many of their cleaners work part-time.

A particular observation for both cases is that they view their specific practices as tailored to family life. The Norwegian case emphasised daytime cleaning, while the UK case attempted to avoid daytime cleaning. In the Norwegian case, cleaners are expected to work an uninterrupted full shift comprising 8 hours of work. The Norwegian cleaners can choose when to work, with the limitation that their work must predominantly be conducted during business hours. In the UK case, cleaning needs to be predominantly performed outside business hours. One of the shadowed cleaners in the UK had her workday split into three shifts, as follows: cleaning at 0510–0840, catering at 1100–1315 and then cleaning again at 1510–1900. The other cleaner, who worked part-time, was given the opportunity to determine his own working hours; thus, he only worked 3 hours per day, from 0600 to 0900.

In the UK, the issue of workforce flexibility was linked to being able to move operational staff according to the needs of the business. This affected how the UK case dealt with the cleaners' contracts. The UK case did not link staff contracts to any location and employed staff using several contracts to enable full-time positions; thus, UK cleaners could be assigned to several services. For example, an employee could be assigned both cleaning and catering duties, as in the case of the female UK cleaner.

Staffing contract	UK case	Norwegian case
Division of labour	A cleaner may not only clean, but can also be assigned to other services	A cleaner only cleans
Cleaners' contract	Multiple contracts to ensure FTE (e.g. one contract for cleaning and another for catering)	One contract with multiple sites to ensure FTE (e.g. cleaning at a school, a kindergarten and a nursing home)
Cleaners' pay	Based on job evaluation	Based on education and experience

Table 12 Staffing contracts

The Norwegian case also emphasised workforce flexibility, but solved the issue in a different manner. The case enabled full-time positions by assigning employees to several locations, as its cleaners only cleaned. The Norwegian cleaners did, however, clean as part of self-managed teams with flexible working hours within the timeframe of 0600–1800. The teams would clean a variety of facilities, preferably located close together, and could be responsible for locations such as an administrative building, a healthcare centre, a school building and a day care centre.

6.2 Examples from cleaning practice: the mop-floor perspective

The previous section in this chapter emphasised management perspectives. The present section provides brief insights to the cases' actual cleaning practices, as observed through shadowing. As buildings and technologies are part of the cleaners' contexts, these form part of what is described here.

6.2.1 Shadowing context: building design and age

The Norwegian cleaner was named "Summer", and the accounts presented in this thesis represent a small section of her workday. Summer's full workday also included cleaning at other sites. This section presents her work at a healthcare building called "Pebble", a residence for the elderly.

The UK cleaners were called "Annie" and "Frank". They were shadowed for one morning and one evening. This covered these cleaners' full shift at the administrative building called "Brick". This shadowing included Frank's entire workday and a predominant part of Annie's workday. Annie's full workday also included catering services; her catering job was not observed. The two case studies revealed differences in the buildings' design and age. The Norwegian cleaner could use an elevator to transport equipment, whereas the UK cleaners worked in a building without an elevator. As a consequence, the UK cleaners' needed to store equipment at several locations to avoid unnecessary strain carrying equipment up and down stairs. A notable difference between Brick and Pebble was their floor covers. Brick exhibited extensive use of textile flooring, while no textile flooring was observed in Pebble. In particular, in **Paper 1**, several building-related factors of importance to cleaning practice were observed. These included swinging doors, interior partition

walls with a gap between the wall and the floor, the need for appropriate space around a toilet, power outlets at waist height, dedicated equipment rooms and an elevator.

6.2.2 Enabling cleaning practice: the equipment room, storage system and washing machine

The most evident difference in the two cases' physical contexts was the cleaners' equipment rooms (see Figures 9 and 10). In the Norwegian case, the room was well-equipped with regard to storage systems and had a washing machine for the cleaning of mops and cloths; the UK cleaners had neither of these facilities. The shadowing of the UK cleaning team did not reveal any procedures for cleaning equipment; what actually happened to cloths and mops is uncertain.

Pebble had one large equipment room, while Brick had several storage areas spread throughout the building. At Brick, there was a storage room dedicated to the building users by Frank's base, a large rest room which was Annie's base, the men's room, a kitchen sink in the ladies' room, a corner by a staircase and a corner in a meeting room. Only one of these rooms in the UK case had any sort of organised storage system. Although the cleaners used this room to store some equipment and paper supplies, it was predominantly utilised by the building users to store envelopes and other office supplies.

6.2.3 Teamwork and cleaning routine: the influence of management and the building's design

The equipment room arrangements seem to have generated part of the difference in starting routines, cleaning routines and the use of trolleys. Two main cleaning routines were found, as follows:

- *A one-task-in-all-spaces* routine, which was preferred when *no* building users were present; and
- An *all-tasks-in-one-space-at-a-time* routine, which was preferred when building users were present or when there was a need to move up or down stairs.

The Norwegian case equipment room, including the inventory and the available technology within it, enabled an all-tasks-in-one-space-at-a-time routine. In this case, the cleaner Summer started her work at Pebble by unloading clean textiles from the washing machine and reloading it with dirty ones (see Figure 9). While doing this, she arranged her trolley to make sure that it contained all the necessary equipment for her job, with the exception of a vacuum cleaner. Only when these starting routines were completed did she begin her actual cleaning work. This preparation of her trolley enabled Summer to carry out an all-tasks-in-one-space-at-a-time routine.

In the UK case, Annie started her morning routine by opening the building and turning on the light. As Annie's main equipment room did not have appropriate storage, she would systematically spread the necessary equipment around the premises the night before. This practice partly prevented those entering the building using the staff entrance to pass by her "storage system". Annie made sure, however, that her arrangement did not hinder anyone from passing through. Users could go through the two other passages by the plant island, while Annie used the third passage to store her things (see Annie's base in Figure 10 in this thesis and Figure 1 in **Paper 1**). This third passage provided access between her "office wing", referring to her zone, and the public entrance. Annie and Frank shared the responsibility for the building, as they divided the work at Brick between them into geographical cleaning zones.

The UK case showed that cleaners assisted each other in their work – for example, Annie checked whether any ladies were present before Frank entered the ladies' room. Apart from this, their teamwork seemed to involve individual work.

Figure 9 Equipment room in the Norwegian case (source: Paper 2)

Figure 10 Equipment rooms in the UK case (based on Image 2 in Paper 1)

Annie predominantly carried out a one-task-in-all-spaces routine and worked predominantly when buildings users were absent. Although Annie had a trolley, she did not use it for cleaning work. Aside from a WC and a porcelain sink, this trolley was the only actual storage system in her main equipment room. As a consequence, she ended up having to run back and forth on a number of occasions to find appropriate equipment, instead of being able to transport necessary equipment to the work site. Building users were present when Annie cleaned the mail room and the public entrance. In these spaces, Annie had an all-tasks-in-one-space-at-a-time routine, as in the Norwegian case.

The building's usability also seemed to influence Annie's choice of routine. When Annie had to walk up the stairs to the first floor, she also took on an all-tasks-in-one-space-at-a-time routine. This practice was facilitated by the storage of dedicated equipment on the first floor. The lack of an elevator created the need for extra equipment and storage space.

Frank also carried out a one-task-in-all-spaces routine. Frank, who only worked 3 hours per day, preferred to work in the morning when no building users were present. He also attempted to do as much as he could before their arrival. Frank's starting routine, after signing into the building, was emptying rubbish. When all the rubbish bins were emptied, he cleaned the toilets, then vacuumed the floor, refilled paper utilities in the toilet, scrubbed the urinal and finally discarded the refuse bags he had initially collected. With this, his workday was over. On alternate days, the task of vacuuming of the floors was changed to wiping the office desks. One of the more notable observations in Frank's routine was his change of speed as building users arrived. Prior to their arrival, Frank was more or less running, whereas afterwards, his pace slowed.

6.2.4 Cleaning practice and technology: tools, chemicals and colour codes

The shadowed cleaners' equipment also illustrates that the cases have different cleaning practices. Summer used microfibre cloths and a Velcro frame for microfibre mops. She used clean, damp cloths and mops, and was therefore not in need of water-filled buckets. Her trolleys carried small bottles with ready-to-use mixtures in addition to some chemicals. On the trolley, Summer had an open, ready-to-fill refuse bag, and thus had no need to run back and forth. In contrast, the UK cleaners rushed around with refuse bags in their hands and pockets when emptying office workers' waste. For the cleaning of floors, the UK cleaners used string mops and wheeled buckets.

The shadowing of the UK cleaning team and the Norwegian cleaner indicated that colour coding was important not only in terms of chemicals, but also textiles and equipment such as buckets. Both cases showed that colour codes, labelling and easily available, practical instructions are important in cleaning work. Summer had washing machine instructions hanging on the wall in her equipment room and stacked cleaning cloths according to colour (see Figure 9). She also had marked containers in this room. Annie labelled her buckets. Frank reported that the soft FM department had a saying which informed cleaners of suitable tasks for different colour-coded cloths: *"The rhyme is: Pink for sinks. Blue for loos"* (**Paper 1**, p. 718); yellow was used for everything else.

6.2.5 Daytime cleaning: cleaners' routines and interactions with others

The interaction with people and the presence of building users was quite different in the two cases. UK cleaners' interactions with users were much rarer than in the Norwegian case. The limited snapshot of

Summer's workday presented in **Paper 2** showed that Summer met three building users. This snapshot indicates a generally higher interaction with others in contrast with what was observed in the UK case in **Paper 1**.

Summer did not hurry at all. She took time to greet users and explain her routine. She also took the time to greet and show care for the residents at Pebble (see **Paper 2** and Figure 9 in this thesis). It should be noted that Summer's relaxed work rate could very well be a result of the researcher's presence and Summer's perceived obligation to explain her work situation. (Although the researcher had not requested them, Summer's explanations were appreciated.) Hence, the recorded pace in the Norwegian case may not reflect the cleaners' actual everyday pace.

The UK cleaning team also encountered building users; however, Frank strove to perform most tasks before the building users arrived. After the building users arrived, Frank reduced his pace and changed to more detail-oriented work such as cleaning glass panels, which requires focus to ensure service quality.

Annie and Frank interacted with each other on a daily basis. Annie also interacted with the security guard at the site on a daily basis. At the time of shadowing, Annie interacted with her cleaning service supervisor. This most likely occurred because the cleaning service supervisor was introducing the author of this thesis to Annie. However, since there was a water leak which needed attention, Annie and this cleaning service supervisor also collaborated to resolve the issue. This collaboration showed that Annie was more knowledgeable when it came to using the necessary equipment than her cleaning service supervisor was. This demonstrates the significance of the operational support staff in the UK case. In the Norwegian case, knowledge of chemicals and equipment was passed on to the cleaners by their service supervisors. In the UK case, operational support staff were responsible for their training. The water leak incident also showed that UK building users interact with – and assist – cleaners when needed. Apart for these observed interactions, UK cleaners may interact with personnel such as head teachers, caretakers/site managers or other staff from the soft FM department.

Building users' presence influenced Annie's and Frank's work. As already mentioned, Annie changed her routine and Frank changed both his pace and tasks. One likely reason for this relates to the cleaners' convenience. Another is the convenience of the building users: Annie preferred not to interrupt building users who were working. Yet another factor relates to the building users' customers. Annie had to leave her tasks when a member of the public entered the public entrance. The reason given for this was the person's need for confidentiality when seeking advice at the counter. Therefore, Annie altered her routine to give this visitor more privacy. The shadowing of Annie indicated that building users were not always considerate of the cleaner. When Annie was cleaning the mail room, the users turned off the light when they left, even though Annie was still doing her job. This disturbed Annie, who had to stop performing her task to turn on the light.

7 Concluding discussion

The aim of this thesis was to describe and explore cleaning in order to provide new knowledge that may contribute to development and improvement of FM in local authorities. This thesis adopted a historical and contemporary perspective and sought to produce knowledge by bringing past wisdom forth and describing cleaning practices as of 2010–2011. Predominantly, the thesis took a Norwegian perspective through a literature review, a national web survey and a case study. This Norwegian perspective was supplemented by a case study from the UK; in addition, theoretical knowledge was added in this thesis, so that the knowledge base covered the period of 1814–2014.

The thesis addressed one objective of studying organisation and practice of cleaning in local authorities. This objective was divided into three research questions (RQs). RQ 1 addressed the term *cleaning* broadly through researching what types of cleaning research exist in a Norwegian context. This research question allowed a description of cleaning all the way back to the 1800s. RQ 2 continued the broad national approach, but limited the scope of research to how cleaning is organised in Norwegian local authorities. Finally, RQ 3 narrowed the scope of research further and addressed the most common way to organise cleaning in local authorities in Norway and the UK by describing how cleaning is organised and practiced in two local authorities. In this way, the thesis studied the organisation and practice of cleaning from a rather general to a rather specific level in local authorities.

7.1 Answers to RQ 1: what types of cleaning research exist in a Norwegian context?

The aim of RQ 1's historical approach was to gain an overview of Norway's cleaning-related research topics, approaches and disciplines all the way back to the 1800s. In this thesis' theoretical chapters, RQ 1 was linked to issues of organisational theories, costs and FM. The research on cleaning, the developments of cleaning knowledge and the development of cleaning as one of FM's services relate to the developments in society, politics and management theories. Separating these developments was not found to be reasonable. As a consequence, this thesis' answer to RQ 1 includes such perspectives.

Cleaning research approaches in a Norwegian context seem to follow the development in general research. Social science started to evolve in general research and in cleaning research during the 1800s. Cleaning research was positivistic when positivism was dominant in general research. It started to explore the different approaches when a value-free view emerged. Since then, cleaning research has been dominated by positivism, like research in general. The disciplines researching cleaning in Norway are most commonly engineering, medicine and social science. Norwegian cleaning research has included a variety of topics, several of which are relevant to the thesis objective, as they focus on issues relevant to strategic, tactical and operational management of cleaning services, including operational cleaning practice.

Cleaning research has followed the developments in organisational theories to some extent. It was influenced by the developments of FM, which coincided with the discussions in management, particularly NPM. Cleaning research, however, demonstrates a delay in its development. In the pre-war period, cleaning research was in its early stages and based on social science, while organisational theories saw humans as machines. It is likely that cleaning became a responsibility of municipalities in this period. In the following inter-war period, no cleaning research was found, while organisational theories started to see

humans as social individuals. Cleaning caught up with this social view during the post-war period, when organisational theories started to explore humans as social beings and organisations as networks. This is the period in which most of the changes in cleaning and FM occurred. After technical units were established, FM slowly became a recognised profession. Early in this post-war period, cleaning was not regarded as part of FM. It seems that cleaning was just one of the necessary services. In this period, cleaning research focussed on technical issues and included human and social aspects. Some of the topics covered included testing of new cleaning methods, risks of potential new cleaning methods, challenges in implementing new methods and cleaners' health and wellbeing. Later, when market theories came to influence FM discussions, the studied topics also included differences between public and private employer organisations, the use of part-time work in cleaning and local authorities' expertise in procuring private services. In the post-war period, municipal FM organisations started to consider their services as having strategic, tactical and operational importance. This is the period when cleaning seems to have become a part of municipalities' FM organisation.

These developments in cleaning indicate that cleaning became a profession during the 1900s. From a historical perspective, the mapping of Norwegian cleaning research and insight into the development of the Norwegian public sector demonstrate how cleaning services have developed over the past 200 years. For a long time, cleaning seemed to be just one of the tasks within a municipality. Caretakers were typically responsible for cleaners, and cleaners commonly worked alone before or after common business hours. Despite research on new cleaning methods during the 1950s and 1960s, it took quite some time for these new methods to influence cleaning practice in local authorities. During the 1980s and 1990s, cleaning services were still transforming their work practices from using methods such as floor cloths and old-fashioned chemicals to more modern methods involving mops and new chemicals. Yet another change was taking place during the 1980s and 1990s: the shift to daytime labour and need-regulated cleaning, wherein cleaners assessed the need for cleaning as opposed to following an input-based frequency system. Since the 1990s, cleaning services have continued to develop: Official education and standards have been introduced. At present, cleaning services are commonly part of the FM organisation and the services can include modern cleaning technologies such as iPads and microfibre textiles.

The research for this thesis suggests that the developments in cleaning seem to have followed the developments of local authorities building portfolios, including the management of these portfolios. During the early 1800s, cleaning was rarely regarded as a service at all, nor was it part of municipalities' services. In the mid-1800s, however, a change took place. Municipalities started to construct buildings dedicated to particular public responsibilities, such as education. The need for services such as caretaking and cleaning increased as the public sector's responsibilities and building portfolio grew. On average, the Norwegian municipalities' building portfolio grew from 2 m^2 per inhabitant in the 1960s to 5–7 m^2 during the 1990s and 5–9.5 m^2 in the 2000s. During the 1960s, FM departments were developed in Norwegian municipalities. These were referred to as technical units, and it is likely that cleaning was not a part of these units, as the cleaners in Bringslid's (1989) study were the responsibility of caretakers and employed by the municipal educational directory. This illustrates that cleaning during the 1980s was organised as fully decentralised department (FDD), wherein each core business such as schools had full responsibility for operational staff. The study by Haugen *et al.* (1996) indicates that the same was true of caretaking.

Illustrating that FM services in local authorities, with the exception of maintenance, mostly had one organisational department model until the mid-1990s: the fully decentralised department (FDD).

The 1990s seem to have marked a change in the public sector. Before this decade, both society and politics experienced significant changes. These changes intertwined with the criticism of bureaucracies. In this regard, bureaucracies can be seen as a representation of in-house services; thus, a criticism of bureaucracies can be seen as a criticism of in-house service supply. This corresponds to an increasing emphasis on cleaning as a service to outsource. These changes coincided with developing neoliberalist thoughts, which are frequently linked to market theories and NPM. From the late 1980s, NPM components entered the Norwegian public sector, and were officially introduced in 1992. Since then, municipalities have had greater freedom in terms of how to organise their services, and municipalities' FM and cleaning organisations had gradually transitioned to partly decentralised and later to centralised department models. As of 2010, this model was the most common for both FM and cleaning.

It seems evident that FM has emerged as a result of societal and political developments. The public sector grew. The hierarchy was criticised. The market was seen as the solution, and NPM introduced new ideas of management such as standardisation, quantification and exposure to competition. While the public sector and FM were being professionalised by NPM, cleaning in Norway was also beginning its move toward professionalisation – from night cleaning to daytime cleaning, from traditional cleaning methods to modern ones, from being supervised by caretakers to being supervised by cleaning managers, from being organisationally decentralised to centralised and from being completely in-house to being supplemented by external service supply. A total of 10 transformations were found to have taken place since the 1980s. These are not direct consequences of NPM, but seem to relate to this model, as they are consequences of a professionalisation process wherein cleaning transformed from a not-to-be-seen service to a service that should be seen, managed, educated and monitored. The identified transformations include the following: 1) a transformation to "modern" cleaning methods and need-regulated cleaning, 2) the recognition of a need for professional FM organisations, 3) a transfer to daytime cleaning, 4) discussions on whether the traditional in-house model was the most suitable, 5) a pursuit of full-time positions for cleaners, 6) the creation of cross-service positions to enable full-time positions, staff retention and staff recruiting, 7) environmentally friendly approaches, including the engagement of building users in dirt-preventive actions, 8) official education for cleaners, 9) standardisation of cleaning and 10) the exposure of public cleaning services to competition. Prior to these transformations, yet one further shift occurred – the uptake of cleaning as a public responsibility during the late 1800s or early 1900s.

7.2 Answers to RQ2: how is cleaning organised in Norwegian LAs at a national level?

The aim of RQ2 was to study Norwegian municipalities' organisation of cleaning services, that is, what models the municipalities could use, have used and were using as of 2010. It also aimed to determine whether the same model was used for both FM and cleaning within each municipality. Furthermore, it sought to explore whether the size of the municipality or building categories had any influence. Based on this, the introduction indicated that the concluding chapter would also address how cleaning *might possibly* be organised in the future. The following paragraphs provide these answers, first, by addressing how it has

been and can be; second, by addressing how it was organised as of 2010; and third, by indicating how it might be organised in the future.

Cleaning became a responsibility of Norwegian municipalities during the late 1800s or early 1900s. Since the beginning, cleaning has predominantly been organised in-house. This situation was still evident in 2010. At this time, common organisational models which Norwegian municipalities could use for the cleaning of premises included decentralised or centralised traditional departments, inter-municipal arrangements, public limited companies and outsourcing to either private providers or voluntary organisations.

Until the mid-1990s, cleaning was predominantly organised as an fully decentralised department. It may be said that the 1990s not only marked a change in the public sector, but also a change *within* the public sector, in particular within municipalities' traditional department models. Two new traditional department models seemed to have been added for FM services in the 1990s: the partly centralised department (PDD) and the fully centralised department (FCD). As a consequence, the traditional department could since then be organised in three different ways, as an FDD, PDD or FCD. Haugen *et al.*'s (1996) study illustrates this change. The position of operation manager was created, as the management and coordination of operational services became part of the centralised technical units in addition to that of maintenance. Technical units could now talk of strategic, tactical and operational management. In this regard, it can be argued that a transfer from decentralised to centralised services reduced municipalities' purchases from the private sector, as this change decreased the need to purchase specialist services in Haugen *et al.*'s (1996) studied municipality. This is also illustrative of municipalities' occasional engagement in private supply networks before the 1990s. The research of this thesis has indicated that since this time, municipalities have continued to develop. Most municipalities seem to have taken on centralised department models and several seem to be in transition to further market-inspired models.

Until 2004, little was known of other ways to organise cleaning in Norwegian municipalities than the fully decentralised department, except for some indications of engagement in private supply networks. Since 2004, municipalities have increased their use of private providers. Since 2004, this also seems to have included an increasing engagement in private supply networks. Private supply of cleaning services did not really start to arise before 2004, when municipalities were compensated for VAT on private supply. As of 2010, private suppliers of cleaning have been a supplement to in-house provision, but have not replaced in-house cleaning.

The 2010 survey results indicated that private supply of cleaning is a little-used but a common additional alternative to an in-house organisation. These results showed that fully centralised departments are the most common way to organise in-house cleaning services in Norway. The survey also found private providers to be the most common additional alternative to the main cleaning organisation. Private providers are the second most common organisational alternative for FM organisations if their use of "other" organisational models can be interpreted as the use of private providers. This may signify the purchase of services from specialists such as electricians, plumbers and so forth. Consequently, it seems that Norwegian municipalities purchase FM services from the private market more often than they do cleaning services.

Cleaning is often organised similarly to municipalities' FM organisations. However, some differences remain. Changes in municipalities' strategic views on cleaning are ongoing. Cleaning organisations seem to be behind FM organisations in terms of development. Some municipalities seem to view cleaning services as just one task of FM, while others view cleaning as an independent service, requiring dedicated cleaning managers. Decentralised alternatives are more commonly used for cleaning, particularly for healthcare buildings, illustrating that FM is ahead of cleaning in centralising its services. Market-inspired and decoupled models are infrequently used, or not used at all, in Norwegian municipalities' cleaning organisations. The only market-inspired model employed for cleaning, apart from a minor use of municipal undertakings (KF), is the municipalities' use of private providers. The Norwegian municipalities' minor engagement in private supply networks was believed to be unique to Norway but was found to be similar to UK local authorities. Local authorities in the UK also prefer in-house provision of cleaning services.

The 2010 survey targeted strategic changes in the use of organisational models. The 2010 reports on future changes seem to relate to tactical–operational decisions as well. As a consequence, one might anticipate that future and planned changes in FM and cleaning organisations will not necessarily involve a change of organisational models, but rather management changes within their present model. However, some strategic changes were also found. Norwegian municipalities seem to have completed their first transition from decentralised to centralised departments, and they seem to have started their next transition from centralised departments to decoupled, public and market-inspired organisational models. Norwegian municipalities' FM and cleaning organisations may gradually transform into larger and more business-like organisations, such as municipal undertakings (KF), inter-municipal alternatives (IKS), municipal-owned limited companies (AS) and other organisational alternatives (such as external service provision).

The future of cleaning services in Norwegian municipalities may include a professionalisation of the in-house cleaning organisation. This professionalisation process relates to all three levels of interactions – strategic, tactical and operational – in FM. Since the 1990s, both FM and cleaning services have gained strategic and tactical importance in Norwegian municipalities as FM has taken on the responsibility for these services. Since then, these services have become more frequently centralised. Such centralisation tendencies are expected to continue into decoupled public and market-inspired models.

The expected use of market-inspired models could include potential increased engagement in private supply networks. If the future is to involve increased engaging with private supply networks, then this should also include becoming smarter procurers, valuing quality more than cost. This relates to management actions at the strategic, tactical and operational levels within the in-house organisation.

The predominant conclusions of RQ 2 are summarised in Table 13.

	Main finding	Detailed remarks
Structure	FM and cleaning organisations are commonly structured similarly	Cleaning organisations can at times have a different organisational model from FM organisations
Use of models	In-house models are most commonly used for both FM and cleaning organisations, and FCD is the most preferred model IKS, AS and voluntary organisations are rarely used or not used at all Private supply is used relatively little by municipalities	PDDs and FDDs were the least used in-house models for FM organisations in 2010, though such decentralised alternatives were more commonly used for cleaning FM organisations prefer "other" models and KF more than cleaning organisations do FCDs are least used in healthcare buildings and other buildings KF is the least used in-house model for cleaning organisations IKS was not used by any municipalities in the 2010 survey. The use of IKS has been reported by other surveys In 2010, AS was only used by FM organisations Voluntary organisations were only used for the cleaning of one building category in one medium municipality Private supply seems to be more commonly used by FM organisations Cleaning organisations mostly use private supply as an additional alternative Cleaning organisations also use decentralised models as additional alternatives
Municipal size	Has some importance regarding the use of organisational models	Small municipalities more frequently use decentralised models, particularly FDD Medium and large municipalities more frequently use KF
Building category	Has some importance regarding the use of organisational models	Decentralised alternatives (FDD and PDD) are used more often for the cleaning of *healthcare buildings* and of *"other" buildings*. Both of these building categories use FCD less often than other building categories AS is mostly used for *administrative buildings* KF is mostly used for *entire building portfolios*
Planned changes	Reported planned changes in organisational structure can relate to strategic, tactical and operational interactions	The survey targeted strategic changes in the use of organisational models. The results illustrate that several organisations report changes which seem to relate more to tactical–operational decisions

Table 13 Predominant conclusions of RQ 2

7.3 Answers to RQ 3: how can cleaning be organised and practiced at a local level?

RQ 3 aimed to provide examples of what cleaning services can be like in local authorities and to describe the situation as is. The research of this thesis showed that in-house cleaning services were the most common way to organise cleaning in the two studied national contexts. The research also showed that this service, in the two case examples, is *structured* according to the common structure in FM theories – the three levels of strategic (S), tactical (T) and operational (O) management. In both of the studied cases, in-house cleaning was grouped at the tactical level within an in-house FM organisation. The *management* of the cleaning services seemed to be dependent on strategic guidelines set by the governments and local authorities wherein the FM organisations operated. The presence and absence of compulsory competitive tendering pressures did not seem to influence local authorities' general preference for in-house service provision, but it seems clear that such private sector ideas affected the management within the in-house

organisations of the two studied cases. This illustrates that strategic management of in-house cleaning services in local authorities is bound by the context, and that strategic managers hold the responsibility within this context. The two cases' contexts seemed to influence the management of the in-house cleaning services at all three levels of management. The organisations' *operational* cleaning services also seemed to be influence by the cases' contexts to a certain degree. The practice of cleaning, as of 2010–2011, was predominantly manual in both contexts. On the other hand, the understanding of what constitutes good family life, and the perception of cleaning as a service to be seen or not seen, appeared to be context-dependent. These differences in understanding influenced cleaners' hours of duty, the use of split shifts and cleaners' contractual relationship with the employer. Irrespective of context, colour coding and sustainability-related issues were important for the cases' operational cleaning services. Although neither of the cases specifically mentioned the term "sustainability", both expressed approaches related to sustainability, using terms such as "environmentally friendly" or "ecological" to discuss efforts to reduce chemical usage, for example.

Strategically, the two case studies showed that in-house cleaning services in local authorities can have differences in structures, organisational models and operational models. Tactically, in-house cleaning services can have many similarities relating to how they are managed, despite differences in how their services are grouped and their labour is divided. Finally, in an operational sense, in-house cleaning services can also share many similarities concurrently, as they are managed and operated differently.

The local authority which was bound by compulsory competitive tendering pressure had a mixed cleaning service supply, wherein some of the services were supplied by private providers. This market influence seems to be the cause of this case's emphasis on business monitoring, and makes the case resemble a corporation emphasising business, performance and financial targets. This case organisation was a financially independent, arm's-length department which was steered according to a performance plan linked to the local authority's strategic priorities. This illustrates a local authority with clear strategies and a case organisation with a stronger strategic focus. The case organisation benchmarked its cleaning services in a national and public benchmarking group and held annual business gatherings for the entire staff. This case's constant competition with the market ensured their local authority third-party evaluations. One consequence of this case's exposure to compulsory competitive tendering was a significant reduction of their in-house cleaning services after the case study was completed.

The local authority which was not bound by compulsory competitive tendering pressure kept all of their cleaning services in-house. This local authority had strategies, but these were far from being as clear as they were in the other case. As a result, this case appeared to have no clear guidelines apart from delivering necessary services to the local authority and ensuring their operational staff's full-time positions. The case organisation was a financially dependent and fully centralised traditional department, which was also influenced by market ideas. It exhibited a split in its building portfolio, as some of the buildings were rented from the market. This case organisation had also started to think about benchmarking and was part of establishing public benchmarking efforts for larger local authorities. In terms of cleaning services, this case had a stronger focus on operational management, as they encouraged building users to reduce the need for cleaning, placed a stronger emphasis on education and met with their operational staff more

frequently. Although the case organisation changed its structure after the case study was completed, the studied cleaning organisation remained unchanged.

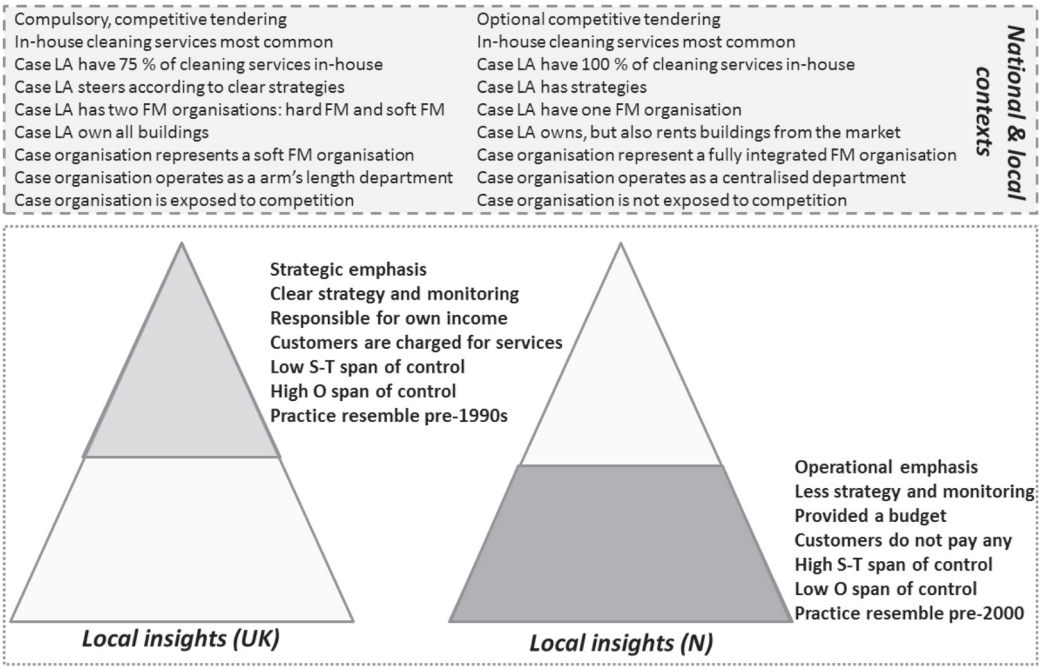

Figure 11 Examples of how the case organisations were influenced by the contexts in which they operate

One of the two studied organisations seemed to emphasise strategic perspectives, while the other emphasised operational perspectives; as such, they may be referred to as "top heavy" and "bottom heavy". In Figure 11, this is denoted by darkening the respective part of the triangle representing the case organisations. A few cultural or context-dependent differences seemed to be revealed between the two case studies, apart from that of compulsory competitive tendering. The top-heavy organisation represented a soft FM organisation which was linked to its local authority through a soft, human link. This organisation provided only soft FM services. The bottom-heavy organisation represented an integrated FM organisation which was linked to its local authority through a hard, technical link. This organisation provided both hard and soft FM services.

Figure 12 has been developed as a condensed summary of the two descriptive case studies. This figure illustrates a number of differences and similarities between the two studied cases. Both cases supplied multiple services and exhibited the same primary approach to the grouping of functions and the division of labour at the strategic, tactical and operational levels. In both cases, a process principle was used at the strategic level and a geography principle was used at both the tactical and operational levels. This contrasts with Huuskonen's (2014) study, where private supply networks used a geographical principle at the strategic level. This may be a consequence of the case studies being local authorities, and thus naturally bound by a geographic principle. Common at the tactical level in both cases were the information flows,

which included weekly meetings for tactical and operational managers. Other similarities related to the operational cleaning practice, which was divided into daily and periodical services. Their services were mainly based on manual labour and on input-based scheduling according to frequency. Common in both cases was also an emphasis on environmentally friendly practices and multitasking team cleaning. In relation to operational cleaning services, both cases used one of the two identified operational cleaning routines – the all-tasks-in-one-space-at-a-time routine. This routine was preferred in daytime cleaning when building users were present.

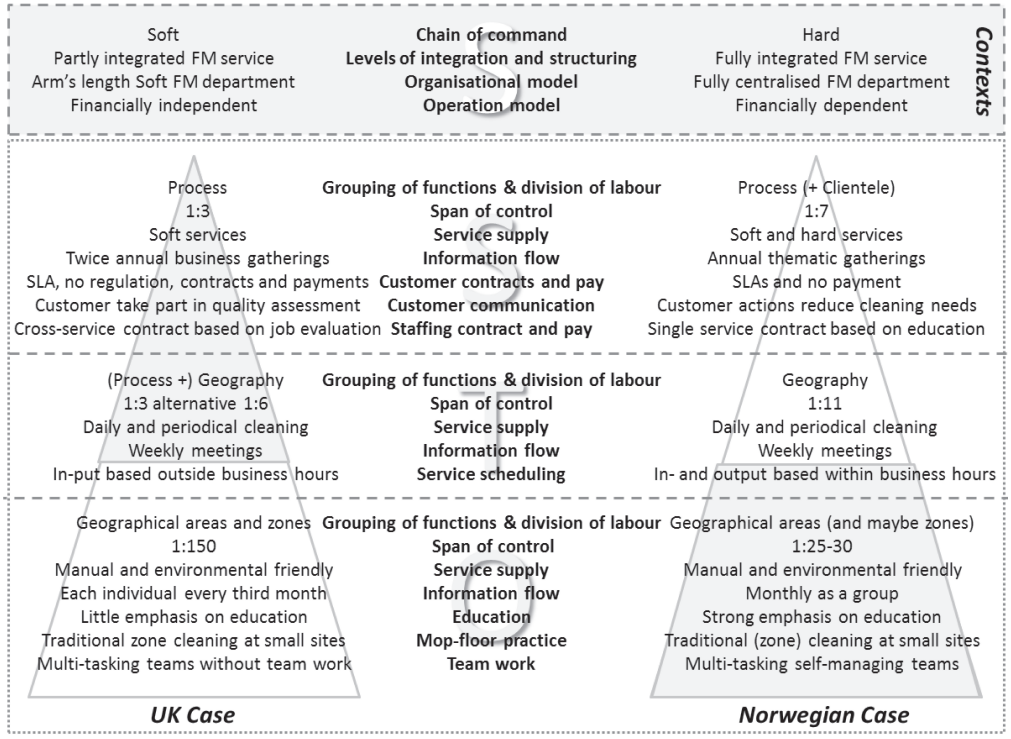

Figure 12 Examples of how in-house cleaning services in local authorities are organised and practiced

The differences between the two cases can be condensed into differences in span of control, wherein one case had greater capacity at the strategic–tactical level, while the other emphasised operational management. Here, greater capacity refers to a low span of control. This resulted in quite different information flows, educational efforts and spans of control at the operational level. Some of the differences at the strategic–tactical level seemed in part to be a consequence of the cases' services on offer. As an example, the Norwegian case continued to group one of their services (MMO) according to a clientele principle at the strategic level. In both cases, the in-house cleaning services were grouped at the tactical level. In the UK case, the geographic principle at the tactical level followed a process principle; as a result, the in-house cleaning service shared the attention of the tactical manager with another service. This seemed to be the cause of one of the aforementioned context-dependent differences. In this case,

workforce flexibility was ensured through cross-service positions; this may relate to differences in strategic structuring rather than context. This is supported by the literature review, which indicated that such cross-service positions are also used in a Norwegian context. The main difference between the two cases at the strategic–tactical level was related to information flows, customer relations and contract management. One case emphasised business and billed all their customers. In this case, customers took part in cleaning quality assessments and cleaners' contracts and pay were based on job evaluation. The other case emphasised technical efforts (education and thematic gatherings), and did not charge any of the customers. In this case, customers took part in preventive cleaning actions and cleaners' contract and pay was based on education.

Other identified differences between the cases seem to be their view on tailoring to family life and workforce flexibility. The top-heavy soft FM organisation emphasised cleaning work outside business hours and cross-service positions. This cleaning work was managed at an operational level to a limited extent, and can be defined as traditional, multitasking zone cleaning with teams which do not necessarily engage in any teamwork. The bottom-heavy integrated FM organisation emphasised work within business hours and single-service positions across a number of buildings. This case organisation's cleaning work was more managed at an operational level, and its cleaning services can be defined as multitasking cleaning with teams which self-manage. This case illustrates that self-management does not necessarily lead to reduced operational management.

The case studies illustrate that the structure and management of public in-house cleaning services influence how the services are operated, including everything from arrangement of working hours and family life to facilitation of an efficient cleaning practice by avoiding kitting and time wastage incurred in waiting for building users to leave. The Norwegian case encouraged and enabled daytime work and engaged the building users in dirt-preventive actions. They also emphasised cleaners' education more extensively and gave the cleaners greater freedom in their work in terms of self-management. Based on this thesis' literature review, the Norwegian case seems to resemble the pre-2000s in Norway, whereas the UK case seems to resemble operational cleaning practice as it was conducted in Norway before the 1990s.

The case studies demonstrated that both cases can learn from each other. One can strengthen its strategic management, while the other can strengthen its operational management. The Norwegian case illustrated that self-management does not necessarily lead to less management, but rather strengthened educational efforts and more up-to-date management practices. Of the two case studies, the Norwegian case was the most managed at the operational level. In contrast, the UK case seemed to have clearer strategic management, which involved steering and operation according to well-defined priorities set by the local authority.

The two case studies also supported the indications from the literature review that building design can influence operational cleaning practice. Operationally, the building design in the UK seemed to influence or result in part of the cleaning practice, as this – together with the operational management – enabled a kitting practice. Such variations do not necessarily relate only to the particular local authorities or the studied organisations. Rather, the cases illustrate that the cleaners' physical environments and their ability to perform well can change from site to site. Challenging physical environments will generally drive costs,

as cleaners will need added time to overcome the disadvantages of the physical surroundings. The management of cleaning practice can reduce some of these disadvantages, but cannot eliminate them.

7.4 Studying organisations and practices of cleaning in local authorities

The aim of this thesis was to describe and explore public cleaning services in order to provide new knowledge which may contribute to developing and improving FM in local authorities. The objective was to study the organisation and practice of cleaning in local authorities. The conducted literature review, national web survey and case studies are illustrative of this. Altogether, the thesis illustrated historical developments in how cleaning services have been, are and possibly may become *organised*, and to a certain extent, how they have been and are *practiced* in local authorities.

7.4.1 The organisation of cleaning in local authorities

Cleaning services have traditionally been *organised* in-house and are still predominantly organised in this way in local authorities in Norway and the UK, irrespective of governmental strategies such as compulsory competitive tendering. This was confirmed by the literature reviews and the national web survey, which showed that cleaning services in Norwegian municipalities seem to follow the development of organisational models used in FM organisation. The future development of cleaning and FM services in Norwegian municipalities appear to include an increasing use of market-inspired and public organisational models.

Cleaning services in local authorities can be *organised* in a number of ways. Common ways of organising cleaning services are as in-house services, outsourced services or as a mixed service supply. In both Norway and the UK, in-house cleaning services are the most common. This internal provision of cleaning services can be organised in a number of ways in Norway, as follows: as partly or fully decentralised or centralised departments; as municipal undertakings (KF); as municipal-owned limited companies (AS); or as inter-municipal alternatives (IKS). The Norwegian local authorities can also engage in private supply networks. Their cleaning services can as such be organised as a split service, wherein the cleaning is organised as a combination of in-house and outsourced services. In Norwegian municipalities, outsourced cleaning services are most commonly an additional alternative to in-house service provision. Few Norwegian municipalities outsource their cleaning services fully. The literature reviews indicated that this is the same for local authorities in the UK.

7.4.2 The practice of cleaning in local authorities

Cleaning services have traditionally been performed manually and are still performed in this way in local authorities. This was confirmed by both the literature reviews and the conducted case studies. The literature reviews showed that cleaning services are highly dependent on labour. The case studies illustrated that cleaning service is not only significant in terms of labour costs, but also in relation to the share of the workforce. The cleaning workforces represented significant parts of the case studies' total workforces. In relation to the conducted case studies, the results illustrated that both case organisations can learn from each other, as they emphasise different levels of management. One case can develop its strategic management, while the other can develop its operational management.

Cleaning in local authorities is performed with environmental consciousness in relation to the consumption of chemicals, water and waste. Operational cleaning practice is dependent on strategic, tactical and operational management. Cleaning management can support operational practice through engaging building users in dirt-preventive actions. The choices which management makes to enhance operational cleaning practice can depend on how buildings enable the implementation of new cleaning methods and technology, as well as how the services are viewed in terms of whether they should be visible to building users. The operational mop-floor findings are understood as having more relevance to cleaning practice than to factors such as building type, building age or the two cases' national contexts. This contrasts to some of the findings related to RQ 2, which indicated that strategic choices of organisational models can be influenced by building category; thus, it could be concluded that building category has a greater importance for strategic management decisions than operational ones.

7.4.3 Concluding remarks

In brief, the following statement can be made regarding this thesis objective of studying the organisation and practice of cleaning in local authorities:

Cleaning services in local authorities are predominantly organised in-house, both in Norway and in the UK. Cleaning is a labour-intensive service which constitutes a significant part of a building's total lifecycle costs and an FM organisation's total workforce, as the work is predominantly performed manually. Further case studies are desired to get a solid understanding of the objective. Two cases are not sufficient to reach robust reliability and validity. Further quantitative studies could well be conducted to target yet further details related to the organisation and practice of cleaning in local authorities. The literature review, the survey and the two cases, however, have facilitated a deeper understanding of the organisation and practice of cleaning in local authorities. These understandings can facilitate implications for development and improvement in public FM, following the aim of this thesis. The literature reviews and the case studies showcased strength and weaknesses of actual practice. The survey showed that choices concerning the organisation of cleaning are not only a matter of strategic choices, but also tactical and operational decisions. This was also confirmed by the theoretical findings.

The assemblage of historical knowledge and description of recent practices provides deeper knowledge of the past, thereby establishing an enhanced understanding of the historical development of FM and cleaning in the Norwegian context. Such a foundation provides a new dimension to the field of FM and may serve as a foundation for a new and specific research field in FM. Just as the topics energy and maintenance previously experienced, cleaning can become a dedicated research field of its own. This thesis showed that cleaning is a significant service. Yet also that cleaning is a service which has been limited research. In research terms, cleaning services may not yet be fully understood. Most previous studies targeted the in-house outsourcing debate. This debate may need to advance in order for research to detect how cleaning can add value to core business, which represents the new research paradigm in FM.

8 Further research

This thesis addressed and answered a few questions. In Chapter 3, the issue of cost was addressed. The lessons learned opened one thought-provoking question: Could it be that good in-house cleaning services and secure outsourced cleaning services are equally costly? In-house provision is expensive, and at the same time can be profitable. In contrast, while outsourced services are considered cheap, secure outsourcing is not cheap. So, what is actually the better option if service quality, customer satisfaction and cleaners' wellbeing all are to be upheld?

Until recently, little cleaning-related research existed within the FM research community. However, in Norway, several contributions have recently been made, including this thesis. Collectively, these contributions provide an overview of the current situation in both the public and private sectors. Similar overviews may exist internationally, or may be under development. If not, this area would be a candidate for future research.

Recent changes in fields such as robotics, nanomaterials and IT technology, may well influence how cleaning services are organised and practiced in the near future. In the past, scholars have focussed on how buildings can be arranged for more efficient and effective cleaning service; however, it seems that much of this research is becoming rather old. New studies are therefore needed. Buildings change, technology changes and both buildings and technology seem to be of importance to cleaning practice. The increasing use of iPads, mobile phones and robots are indicators of this. Building materials have also continued to develop. Such advancements call for new studies on both cleaning practices and building suitability in use, as the changes they bring have significance for cleaning practices and the cost of cleaning. As a result, research into new and possibly emerging cleaning practices may be of interest. For example, how do new computer-aided facility management (CAFM) tools contribute to operational practice and what impact do these tools have on management practices? If Aulanko (1997, 2002) and Linn's (1995, 2007, 2002) studies are correct, then architects and building and workplace designers can be considered as facilitators of cost-effective, environmentally friendly and sustainable cleaning practices. If this is the case, how can architecture arrange for efficient, environmentally friendly cleaning practice, enhancement of cleaners' health and reduction of cleaning costs? In general, studies addressing estimation of cleaning cost may be desirable, as many of the identified studies in this thesis are rather old and seem to lack detail.

Further research on the organisation and practice of public cleaning services is also desirable. Both larger quantitative studies and qualitative in-depth studies in various settings would be preferable. Research questions might include the following: How are cleaning services measured through KPIs? How common are various cleaning practices, both managerially and practically? Considering the Norwegian territorial reform which may be forthcoming, research on larger municipalities would be of particular interest. Such further work could indicate how common the practices illustrated in this thesis are and the extent to which the detected issues are relevant for other organisations. Further research would also be desirable concerning the potential increase in municipal size and potential influences on organisational models in FM and cleaning.

Yet one more concept could well be explored further; the links between the developments of cleaning, FM and NPM. Could it be that FM in reality is new public facility management (NPFM), and that the identified developments in cleaning could be described as new public cleaning management (NPCM)?

References

Aaltonen, A., Määttänen, E., Kyrö, R., and Sarasoja, A.L. (2013), "Facilities management driving green building certification: a case from Finland", *Facilities*, Vol. 31 Iss. 7/8, pp. 328-342.

Aguiar, L.L.M. (2001), "Doing cleaning work 'scientifically': the reorganization of work in the contract building cleaning industry", *Economic and Industrial Democracy,* Vol. 22 Iss. 2, pp. 239-269.

Aguiar, L.L.F. and Herod, A. (2006), *The Dirty Work of Neoliberalism: Cleaners in the Global Economy,* Blackwell Publishing Ltd., Malden, MA.

Alexander, K. (2003a), "A strategy for facilities management", *Facilities,* Vol. 21 No. 11/12, pp. 269-274.

Alexander, K. (2003b), "The United Kingdom: local authority FM in the UK", *Nordic Journal of Surveying and Real Estate*, Vol. 1, Special series: Property and facilities services in local government – contracting out or managing in-house, pp. 71-88.

Alexander, K. and Brown, M. (2006), "Community-based facilities management", *Facilities*, Vol. 24 Iss. 7/8, pp. 250-268.

Alexander, K. and Marshall, S. (1987), "Analysis: managing life cycle cost by design", *Facilities*, Vol. 5 No. 4, pp. 6-12.

Alnæs, L.I. (1995), *Kvalitet og bestandighet av naturstein. Påvirkningsfaktorer og prøvemetoder,* PhD 1995:5, Institutt for geologi og bergteknikk, Trondheim, NTH – Universitet i Trondheim. Norges Tekniske Høgskole.

Alsos, K., Berge, Ø.M. and Ødegård, A.M. (2012), *Kampen om vikarene*, Arbeidskraftstrategier i kommunesektoren, Fafo-rapport 2012:06, available at: http://www.fafo.no/media/com_netsukii/20233.pdf (accessed 01 July 2015).

Alsos, K., Berge, Ø.M. and Steen, J.R. (2013), *Norske kommunepolitikeres holdninger til konkurranseutsetting,* Fafo-rapport 2013:30, available at: http://www.fafo.no/images/pub/2013/20320.pdf (accessed 01 July 2015).

Amaratunga, D., Sarshar, M. and Baldry, D. (2002), "Process improvement in facilities management: the SPICE approach", *Business Process Management Journal*, Vol. 8 Iss. 4, pp. 318-337.

Atkin, B. and Brooks, A. (2009), *Total Facilities Management,* 3rd ed., Wiley-Blackwell, Chichester, UK.

Aulanko, M. (1997), "Future trends in professional cleaning", *Journal of Consumer Studies and Home Economics*, Vol. 21 Iss. 4, pp. 371-385.

Aulanko, M. (2002), "Professional cleaning in 2010 – cleaning professionals' thoughts of their field and its future", *Hauswirtschaft und wissenshcaft*, Vol. 50, Nr. 2, pp. 77-82.

Barley, S.R. and Kunda G. (2001), "Bringing work back in", *Organization Science,* Vol. 12 No. 1, pp. 76-95.

Barnes, R.L. (2014), "Competencies, credentials, education and training", in Roper, K.O. and Borello, L.J. (2014), *International Facility Management*, Wiley Blackwell, Oxford, United Kingdom, pp. 5-38.

Baruch, Y. (1999), "Response rate in academic studies: a comparative analysis", *Human Relations*, Vol. 52 No. 4, pp. 421-438.

Baruch, Y. and Holtom, B.C. (2008), "Survey response rate levels and trends in organizational research", *Human Relations*, Vol. 61 Iss. 8, pp. 1139-1160.

Behre, B. (1986), *Städbarhet hos golv. Enkät till berörda inom lokalvården. Rapport R25:1986,* Statens råd för byggnadsforskning, Stockholm, Sweden.

Berge, Ø.M. and Sønsterudbråten, S. (2011), *Anbud og arbeidstakerrettigheter. En studie av bransjene renhold, vakt og anlegg,* Fafo-rapport 2011:14, available at: http://www.fafo.no/media/com_netsukii/20205.pdf (accessed 01 July 2015).

Bevir, M. (2012), *Governance: A Very Short Introduction*, Oxford University Press, Oxford.

Bjørseth, C.B., Herse, B. and Horjen, F. (1995), *Temahefte nr. 1. Hvordan forvalter kommunen sine eiendommer?*, NKF – Norsk Kommunalteknisk forening, Forum for offentlige bygg og eiendommer, Oslo, Norway.

Bjørberg, S. (2009), "Public buildings – from decay to model of excellence", paper presented at the MM conference: Maintenance and Facility Management, Italian Committee for Maintenance (CNIM), Sapienza Università di Roma, Italy.

Bjørberg, S., Larsen, A. and Øiseth, H. (2005), *Livssykluskostnader for bygninger. Innføring og prinsipper*, 2. utgave Januar 2005, RIF – Organisasjonen for rådgivere, Norges Bygg- og Eiendomsforening.

Blåka, S., Tjerbo, T. and Zeiner, H.H. (2012), "Kommunal organisering 2012, Redegjørelse for Kommunal- og regionaldepartementets organisasjonsdatabase", *NIBR-rapport 2012:21,* Norwegian Institute for Urban and Regional Research (NIBR), available at: http://www.nibr.no/filer/2012-21.pdf (accessed 01 July 2015).

Blossey, R. (2003), "Self-cleaning surfaces: virtual realities", *Nature Materials*, Vol. 2, pp. 301-306.

Boge, K. (2012), "Rational reluctance? A conceptual discussion about transition from FM 1.0 (cost reductions) to FM 2.0 (value creation)", in Junghans, A. and Jensen, P.A. (Eds.), *Proceedings of the 11th EUROFM research symposium, in Copenhagen, Denmark, 24–25th May 2012,* Polyteknisk forlag, Lyngby, Denmark, pp. 31-38.

Boston, J. (2013), "Basic NPM ideas and their development", in Christensen, T. and Lægreid, P. (Eds.), *The Ashgate Research Companion to New Public Management*, Ashgate Publishing Limited, Farnham, UK, pp. 17-32.

Bråten, M. and Nicolaisen, H. (2013), *Tilrettelegging i buss, renhold og vakthold. Hvorfor så vanskelig?* Fafo-rapport 2013:32, available at: http://www.fafo.no/images/pub/2013/20322.pdf (accessed 01 July 2015).

Bringslid, M.B. (1989), "*Eg synes ikkje eg kunne gå fra det sånn…" Ein rapport om reinhaldsarbeidarar sitt arbeidsmiljø,* Arbeidsliv- Historie-Samfunn, Gruppe for Flerfaglig arbeidslivsforskning, Universitetet i Bergen, AHS Serie B.

Bröchner, J. (2010), "Innovation and ancient Roman facilities management", *Journal of Facilities Management*, Vol. 8 Iss. 4, pp. 246-255.

Buckley, S. (1989), "Deep cleaning: for washrooms, kitchens and ventilation", *Facilities*, Vol. 7 No. 2, pp. 11-14.

Busch, T. and Vanebo, J.O. (2003), *Organisasjon og ledelse. Et integrert perspektiv*, 5. Utgave, Universitetsforlaget, Oslo, Norway.

Butler, J. (1989), "Internal cleaning: an industry view", *Facilities*, Vol. 7 No. 2, pp. 8-10.

Butler, J. (1991), "Setting up and controlling cleaning programmes for complex sites", *Property Management,* Vol. 9 Iss. 1, pp. 18-23.

Byggeriets utviklingsråd (1983), *Drift og vedlikehold av boligbyggeri,* Byggeriets utviklingsråd, Copenhagen, Denmark.

Byggeriets utviklingsråd (1985), *Planlegging av diftvennligt byggeri – en anvisning,* Byggeriets utviklingsråd, Copenhagen, Denmark.

Bywater, L. (1990a), "Costs and methods to improve expenditure in cleaning", *Facilities*, Vol. 8 No. 1, pp. 8-11.

Bywater, L. (1990b), "Cleaning costs: a case study exercise", *Facilities*, Vol. 8 No. 6, pp. 16-18.

Campbell, F. (1990), "Cleaning and maintenance workers", *Facilities*, Vol. 8 No. 3, pp. 20-23.

Campbell, J.L. (2005), "Significantly reducing facility maintenance costs through innovative custodial safety", *Journal of Facilities Management*, Vol. 3 No. 3, pp. 203-214.

Cheng, Y.T., Rodak, D.E., Wong, C.A. and Hayden, C.A. (2006), "Effects of micro- and nano-structures on the self-cleaning behaviour of lotus leaves", *Nanotechnology,* Vol. 17 No. 5, pp. 1359-1362.

Christensen, T. and Lægreid, P. (Eds.) (2013a), *The Ashgate Research Companion to New Public Management*, Ashgate Publishing Limited, Farnham, UK.

Christensen, T. and Lægreid, P. (2013b), "Beyond NPM? Some development features", in Christensen, T. and Lægreid, P. (Eds.), *The Ashgate Research Companion to New Public Management*, Ashgate Publishing Limited, Farnham, UK, pp. 391-403.

Christensen, T., Lægreid, P., Roness, P.G. and Røvik, K.A. (2007), *Organization Theory and the Public Sector: Instrument, Culture and Myth*, Routledge, London.

Christensen, T., Lægreid, P., Roness, P.G. and Røvik, K.A. (2009), *Organisasjonsteori for offentlig sektor*, Universitetsforlaget, Oslo, Norway.

Clark, L. and Rees, D. (2000), "Professional facilities management in public organisations", *Facilities*, Vol. 18 No. 10/11/12, pp. 435-443.

Coenen, C., Alexander, K. and Kok, H. (2013), "Facility management value dimensions from a demand perspective", *Journal of Facilities Management*, Vol. 11 No. 4, pp. 339-353.

Creswell, J.W. (2009), *Research Design. Qualitative, Quantitative and Mixed Methods Approaches*, 3rd ed., SAGE Publications, Inc., Los Angeles, California.

Dalen, M. (2008), *Intervju som forskningsmetode – en kvalitativ tilnærming*, Universitetsforlaget, Oslo, Norway.

De Toni, A., Ferri, A. and Montagner, M. (2009), *Open Facility Management: A Successful Implementation in Public Administration*, International Facility Management Association, Milan, Italy, available at: http://www.scuolanazionaleservizi.it/eng/pubblicazioni.asp (accessed 01 July 2015).

Diez, K. and Lennerts, K. (2009), "A process-oriented analysis of facility management services in hospitals as a basis for strategic planning", *Journal of Facilities Management*, Vol. 7 No. 1, pp. 52-60.

ECON (1994), *Produksjon i egenregi i kommunene innenfor renhold og vaskeri- og renserivirksomhet*, ECON rap 107/1994.

Eisenhardt, K.M. (1989), "Agency theory: an assessment and review", *Academy of Management Review*, Vol. 14 No. 1, pp. 57-74.

Eley, J. (1989a), "Cleaning: maintaining the corporate image", *Facilities*, Vol. 7 No. 3, pp. 7-13.

Eley, J. (1989b), "Lloyd's Corporation", *Facilities*, Vol. 7 No. 3, pp. 13-15.

EN 15221-1 (2006), "Facility management. Part 1: terms and definitions", CEN – European Committee for Standardization, Brussels, Belgium.

EN 15221-4 (2011), "Facility management. Part 4: taxonomy, classification and structures in Facility Management", CEN – European Committee for Standardization, Brussels, Belgium.

Engelstoft, S. and Larsen, H.G. (2013), *Territorium, stat og nation, Aspekter af Europas politiske geografi,* Samfundslitteratur, Frederiksberg, Denmark.

Evers, F., van der Schaaf, P. and Dewulf, G. (2002), *Public Real Estate. Successful Management Strategies*, DUP Science, Delft, The Netherlands.

Facilities (1983), "A monthly digest for office services and building managers", Vol. 1 No. 1., pp. 1-7.

Facilities (1984a), "Analysis: floor maintenance and cleaning", Vol. 2 No. 3, pp. 10-14.

Facilities (1984b), "Economic review: cleaning: achieving substantial cost reductions", Vol. 2 No. 8, pp. 4-6.

Fan, W. and Yan, Z. (2010), "Factors affecting response rates of the web survey: a systematic review", *Computers in Human Behaviour,* Vol. 26 Iss. 2, pp. 132-139.

Fellows, R. and Liu, A. (2008) *Research, Methods for Construction*, 3rd ed., Wiley-Blackwell, Oxford, United Kingdom.

Fevang, E., Strøm, S., and Sæther, E.M. (2008), *Er kommunesektoren og/eller Staten lønnsledende? En sammenlikning av lønnsnivå for arbeidstakere I kommunal, statlig og privat sektor*, Rapport 1/2008, Stiftelsen Frischsenteret for samfunnsøkonomisk forskning og Pricewater Coopers, available at: http://www.frisch.uio.no/publikasjoner/pdf/rapp08_01.pdf (accessed 01 July 2015).

Fitzgerald, E. and Melvin, D. (2002), "The UK private finance initiative and Glasgow schools", *Facilities*, Vol. 20 No. 3/4, pp. 119-126.

Flyvbjerg, B. (2006), "Five misunderstandings about case-study research", *Qualitative Inquiry,* Vol. 12 No. 12, pp. 219-245.

FOR-2012-05-08-408, *Forskrift om offentlig godkjenning av renholdsvirksomheter og om kjøp av renholdstjenester* [Regulations on public approval of cleaning operations and the purchase of cleaning services], Ministry of Labour and Social Affairs, Oslo, Norway.

Forsvarsbygg (2006), "Forsvarsbygg vant miljøprisen Glassbjørnen", available at: http://www.forsvarsbygg.no/Arkiv/2006/112/ (accessed 01 July 2015).

Fowler, F.J., Jr. (2009), *Survey Research Methods*, 4th ed., Applied Social Research Methods Series, Vol. 1, Sage Publications, Inc., Thousand Oaks, California.

Friday, S. (2012), *Tracing the DNA of FM Organisations. Organization Development for Facility Managers,* Dog Ear Publishing, Indianapolis, IN.

Granath, J.Å. (1982), *Service- och underhallsarbetens beroende av byggnadsutforming. En problem- og kunskapsinventering. IACTH 1982:1,* Industriplannering – Arkitektur – Chalmers Tekniska Högskola, Arkitekthusets Reprocentral, CTH, Göteborg, Sweden.

Gravdahl, H.P. and Hagen, T.P. (1997), "Ny kommunelov, ny organisering? Organisasjon og arbeidsformer I kommuner og fylkeskommuner i 1996", *NIBR-notat 1997:105,* Norwegian Institute for Urban and Regional Research (NIBR), Oslo, Norwegian.

Greenwood, J. and Wilson, D. (1994), "Towards the contract state: CCT in local government", *Parliamentary Affairs*, Vol. 47 Iss. 3, pp. 405-419.

Gregory, R. (2013), "Normativity and NPM: a need for some theoretical coherence", in Christensen, T. and Lægreid, P. (Eds.), *The Ashgate Research Companion to New Public Management,* Ashgate Publishing Limited, Farnham, UK, pp. 375-388.

Hagesæther, E.L. and Danielsen, K.B. (1996), *Reinhald. Metodar, utstyr, maskinar,* Yrkeslitteratur AS, Oslo, Norway.

Halligan, J. (2013), "NPM in Anglo-Saxon countries", in Christensen, T. and Lægreid, P. (Eds.), *The Ashgate Research Companion to New Public Management*, Ashgate Publishing Limited, Farnham, UK, pp. 83-96.

Halvorsen, K. (2009), *Å forske på samfunnet. En innføring i samfunnsvitenskaplig metode*, 5, Utgave, 2, opplag, Cappelen akademisk forlag, Oslo, Norway.

Hansen, G. (2012), "Overview and status of FM research for practice in Norway", in Jensen, P.A. and Balslev Nielsen, S. (Eds.), *Facilities Management Research in the Nordic Countries: Past, Present and Future*, Polyteknisk Forlag, Lyngby, Denmark, pp. 32-49.

Hansen H.F. (2013), "NPM in Scandinavia", in Christensen, T. and Lægreid, P. (Eds.), *The Ashgate Research Companion to New Public Management*, Ashgate Publishing Limited, Farnham, UK, pp. 113-129.

Harvey, D. (2007), *A Brief History of Neoliberalism*, Oxford University Press, Oxford.

Haugen, T. (1990), *Bygningsforvaltning. Økonomisk drift og vedlikehold - organisasjon, informasjon og system*, PhD 1990:8, NTH – Universitet i Trondheim. Norges Tekniske Høgskole, Trondheim, Norway.

Haugen, T. (2003), "Norway: contracting out property and facility services in Norwegian municipalities", *Nordic Journal of Surveying and Real Estate*, Vol. 1, Special series: Property and facilities services in local government -- contracting out or managing in-house, pp. 52-70.

Haugen, T., Klev, R., Blakstad, S.H., and Farestveit, O. (1996), *Samordning av bygningsforvaltning i Trondheim kommune. Forslag til framtidig organisering og gjennomføring av FDV*, Sintef Arkitektur og byggteknikk, STF22 A96552.

Holley, S. (2014a), *Contracting-out and Regulation Labour Standards: NSW Government School Cleaners*, PhD, University of Sydney, Australia.

Holley, S. (2014b), "The monitoring and enforcement of labour standards when services are contracted out", *Journal of Industrial relations*, Vol. 56 (5), pp. 672-690.

Holley, S. (2015), "Government procurement contracts and minimum labour standards enforcement: rhetoric, duplication and distraction?", *The Economic and Labour Relations Review,* Vol. 26 (1), pp.43-59.

Hovik, S. and Stigen, I.M. (2004), "Kommunal organisering 2004, Redegjøresle for kommunal- og regionaldepartementets organisasjonsdatabase", *NIBR-Notat 2004:124,* Norwegian Institute for Urban and Regional Research (NIBR), Oslo, Norway.

Hovik, S. and Stigen, I.M. (2008), "Kommunal organisasjon Redegjørelse for Kommunal- og regionanaldepartementets organisasjonsdatabase", *NIBR-rapport 2008:20*, Norwegian Institute for Urban and Regional Research (NIBR), available at: http://nibr.no/filer/2008-20.pdf (accessed 01 July 2015).

Huuskonen, A. and Nenonen, S. (2012), "Network management practices of large service providers in the residential-FM sector", in Junghans, A. and Jensen, P.A. (2012), *Proceedings of the 11th EuroFM research symposium in Copenhagen, Denmark, 24–25 May 2012,* Lyngby, Polyteknisk forlag, pp. 64-76.

Huuskonen, A.P.J. (2014), "Supply network design in the residential-FM sector: a service provider perspective", *Facilities,* Vol. 32, Iss. 11/12, pp. 723-738.

Jensen, P.A. (2008), "The origin and constitution of facilities management as an integrated corporate function", *Facilities*, Vol. 36 No. 13/14, pp. 490-500.

Jensen, P.A. and Balslev Nielsen, S. (Ed.) (2012a), *Facilities Management Research in the Nordic Countries. Past, Present and Future*, Polyteknisk Forlag, Lyngby, Denmark.

Jensen, P.A., Nielsen, K. and Balslev Nielsen, S. (2008), *Facilities Management Best Practice in The Nordic Countries: 36 Cases*, Centre for Facilities Management – Realdania Research, DTU Management Engineering, Technical University of Denmark, Lyngby, Denmark.

Jensen, P.A., van der Voordt, T., Coenen, C., von Felten, D., Lindholm, A.L., Nielsen, S.B., Riatanaphong, C. and Pfenninger, M. (2012b), "In search for the added value of FM: what we know and what we need to learn", *Facilities,* Vol. 30, No. 5/6, pp. 199-217.

Johannessen, A., Tufte, P.A. and Christoffersen, L. (2010), *Introduksjon til samfunnsvitenskapelig metode*, 4, Utgave, Abstract Forlag, Oslo, Norway.

Jørgensen, M.B. (2011), *Physical and Behavioural Training among Cleaners. Effects of a Randomised Controlled Workplace Intervention Trial,* PhD, Department of exercise and sport sciences, University of Copenhagen, Denmark.

Jung, D., Cheng, G. and Zelinsky, A. (1998), "Robot cleaning: an application of distributed planning and real-time vision": In: Zelinsky, A. (Ed.) *Fields and service robotics,* Springer-Verlag London Limited 1998, pp. 187-194, available at: http://link.springer.com/chapter/10.1007/978-1-4471-1273-0_30 (accessed 01 July 2015).

Kemp, C. (1984), "Cleaning services: how to make the most of a bargain", *Property Management*, Vol. 2, Iss. 3, pp. 193-197.

KMD (2012), *Local Government in Norway,* Norwegian Ministry of Local Government and Modernisation. Oslo, available at: https://www.regjeringen.no/globalassets/upload/kmd/komm/veiledninger_og_brosjyrer/local_government_in_norway_h-2313e.pdf?id=2236535 (accessed 01 July 2015).

KRD (2008), *Kleppa støttar forskingsprogram om kommunal eigedomsforvaltning*, Pressemelding 20/2008, 22.02.2008, available at: https://www.regjeringen.no/no/aktuelt/kleppa-stottar-forskingsprogram-om-kommu/id501537/ (accessed 01 July 2015).

KS (2008), *Vedlikehold I kommunesektoren. Fra forfall til forbilde,* The Norwegian Association of Local and Regional Authorities (KS), Multiconsult and PricewaterhouseCoopers, available at: http://www.dibk.no/no/Tema/Eksisterende-bygg/Eksisterende-bygg-publikasjoner/Vedlikehold-i-kommunesektoren---Fra-forfall-til-forbilde/ (accessed 01 July 2015).

Kumar, R. (2006), *Ergonomic Evaluation and Design of Tools in Cleaning Occupation*, PhD, 2006:16, Luleå University of Technology, Sweden.

Lægreid, P., Roness, P.G. and Rubecksen, K. (2007), "Modern management tools in state agencies: the case of Norway", *International Public Management Journal*, Vol. 10 No. 4, pp. 387-413.

Lee, J.H., Choi, J.S., Lee, B.H. and Lee, K.W. (2009), "Complete coverage path planning for cleaning task using multiple robots", in *IEEE international conference on Systems, Man and Cybernetics (SMC), 11–14 October 2009*, San Antonio, TX, pp. 3618-3622, available at: http://ieeexplore.ieee.org/xpls/abs_all.jsp?arnumber=5346856&tag=1 (accessed 01 July 2015).

Lindanger, B., Langhelle, S.I., and Nordås, H. (1987), *Kommunen gjennom 150 år 1837-1987*, Hå Kommune ved kulturetaten 1987, Printer Print AS, Stavanger.

Linn, G. (1985a), *Svåstädade detaljer i bostäder. Arbetshandlingling Bygninadsfunskjonslära KTH A6:1985*, A-setkionens tryckeri, KTH, Stockholm, Sweden.

Linn, G. (1985b), *Fastighetsreparatörers syn på hygienrumsutformingen. Arbetshandlingling Bygninadsfunskjonslära KTH A7:1985*, A-setkionens tryckeri, KTH, Stockholm, Sweden.

Linn, G. (1985c), *Städproblem i hygienrum. Arbetshandlingling Bygninadsfunskjonslära KTH A8:1985*, A-setkionens tryckeri, KTH, Stockholm, Sweden.

Linn, G. (1985d), *Badrum och standing. Hur skall badrum byggas för att underlätta städningen?* Rapport R103:1985, Statens råd för bygnadsforskning, Liber Trykk AB, Stockholm, Sweden.

Linn, G. (1995), "Building design from the cleaning perspective," in Kujala, T. (Ed.), *Proceedings of cleaning in tomorrow's world: the first international congress on professional cleaning*, *in Tampere, Finland*, *3–4 October, 1995,* pp. 94-97.

Linn, G. (1997a), *Fastigheten som arbetsmiljö. Bygg rätt från början,* AB Svensk Byggtjänst, Stockholm, Sweden.

Linn, G. (1997b), *Prosjektet 'Byggnaden som arbetsmiljö för drift- och servicepersonal' – bakgrund, begrepp, metod m m. En beskriving av hur håndboken 'Fastigheten som arbetsmiljø – bygg rätt från början' tagits fram,* Chalmers tekniska högskola, Institutionen för byggnadskonst, IACTH 1997:1, Chalmers tekniska högskola, Gøteborg, Sweden.

Linn, G. (1999), *Bygg rätt för städning och fönsterputs,* AB Svensk Byggtjänst, Stockholm, Sweden.

Linn, G. (2002), "The building design process: when to consider cleaning requirements", *Proceedings of cleaning in tomorrow's world: the third international congress on professional cleaning*, *in Helsinki, Finland*, *30 September–1 October, 2002,* pp. 148-153.

Linn, G. (2007), "Lär byggherrarna bestålla städvänliga hus!", *Arkitekten*, May, pp. 51-53.

Linn, G., Andrèn, E. and Paulsson, J. (1990), *Hygienrum – litteratur. Prosjektet 'Hygienrum – mått, utforming och inredning', Rapport 1,* Chalmers tekniska högskola, Sectionen för Arkitektur, Bostadsplanering – Industriplanering and Göteborgs Universitet, Institutionen för Handikappforskning, Chalmers tekniska högskola, Bibliotekets Reproservice, Gøteborg, Sweden.

Linn, G., Andrèn, E. and Paulsson, J. (1991), *Funktionsmått i hygienrum – med frågetecken. Prosjektet 'Hygienrum – mått, utforming och inredning', Rapport 3,* Chalmers tekniska högskola, Sectionen för Arkitektur, Bostadsplanering – Industriplanering and Göteborgs Universitet, Institutionen för Handikappforskning. Chalmers tekniska högskola, Bibliotekets Reproservice, Gøteborg, Sweden.

Liu, K. and Jiang, L. (2012), "Bio-inspired self-cleaning surfaces", *Annual Review of Materials Research*, Vol. 42, pp. 231-263.

Liyangage, C. and Egbu, C. (2006), "The integration of key players in the control of healthcare associated infections in different types of domestic services", *Journal of Facilities Management*, Vol. 4 No. 4, pp. 245-261.

Local Government Association (2011), *The LGA Quick Guide to Local Government*, available at: http://www.local.gov.uk/c/document_library/get_file?uuid=a5b2c920-8f40-4eae-9852-8b983724f5bc&groupId=10180 (accessed 01 July 2015).

Loosemore, M. and Hsin, Y.Y. (2001), "Customer-focused benchmarking for facilities management", *Facilities*, Vol. 19 No. 13/14, pp. 464-475.

Lönn, R. and Lööf, R. (1982), *Utforming av offentliga lokaler med hänsyn till standing,* Statens råd för byggnadsforskning, Stockholm, Sweden.

MacSporran, C. and Tucker, S.N. (1996), "Target budget levels for building operating costs", *Construction Management and Economics*, Vol. 14 Iss. 2, pp. 103-119.

Madritsch, T. (2009), "Best practice benchmarking in order to analyze operating costs in the health care sector", *Journal of Facilities Management*, Vol. 7 No. 1, pp. 61-73.

Madritsch, T., Steixner, D., Ostermann, H. and Staudinger, R. (2008), "Operation cost analysis of long-term care facilities", *Journal of Facilities Management*, Vol. 6 No. 2, pp. 152-170.

Maliene, V., Alexander, K. and Lepokova, N. (2008), "Facilities management development in Europe", *International Journal of Environment and Pollution,* Vol.

May, D. and Pitt, M. (2012), "Environmental cleaning in UK healthcare since the NHS Plan: a policy and evidence based context", *Facilities*, Vol. 30 Iss. 1/2, pp. 6-22.

May, D. and Smith, L. (2003), "Evaluation of the new ward housekeeper role in UK NHS trusts", *Facilities*, Vol. 21 Iss. 7/8, pp. 168-174.

May, D. and Suckley, L. (2005), "Ward housekeepers in mental health environments", *Facilities*, Vol. 23 Iss. 13/14, pp. 608-620.

Mayo, E. (1933), *The Human Problems of an Industrialized Civilization*, Harvard University , Boston, MA.

Moland, L. E. and Andersen, R. K. (2007). *Hva gjør norske kommuner med deltid?*, FAFO 2007:25, available at: http://www.fafo.no/media/com_netsukii/20025.pdf (accessed 01 July 2015).

Mueller, D.C. (2008), "Public choice: an introduction", in Rowley, C.K and Schneider, F. (Eds.), *Readings in Public Choice and Constitutional Political Economy*, Springer, Fairfax, US, pp. 31-46.

Nelson, M.A. (1990), "Decentralization of the subnational public sector: an empirical analysis of the determinants of local government structure in metropolitan areas", *U.S. Southern Economic Journal,* Vol. 57 No. 2, pp. 443-457.

Nesheim, T. and Rokkan, A. (1997), *Renhold i egen regi eller kjøp av rengjøringstjenester. Konsekvenser for arbeidstakerne*, Stiftelsen for samfunns- og næringslivsforskning, Bergen, Norway.

Nesheim, T. and Vathne, K. (2000), *Konkurranseutsetting av bestiller-utfører organisering i norske kommuner,* Stiftelsen for samfunns- og næringslivsforskning, Bergen, Norway.

Neuman, W.L. (2006), *Social Research Methods: Qualitative and Quantitative Approaches*, 6th ed., Pearson International Edition, Boston, MA.

NHO Service (2009), *Profesjonelt renhold. Suksessfaktorer for etablering og drift*, Oppdatert okt 2009, National Federation of Service Industries, Oslo, Norway, available at:

http://www.nhoservice.no/getfile.php/Filer/Publikasjoner/Renholdsbrosjyre2009b.pdf (accessed 01 July 2015).

NHO Service (2013), *Sammen for velferd.* [A collection of reports for individual municipalities published on 14.11.13], available at: http://www.nhoservice.no/politikk/kommuneanalyser/ (accessed 01 July 2015).

Nielsen, K., Hansen, P., Perdersen, D.O., Olsen, S. and Kjær, B. (1982), *Planlegging af diftsvenligt byggeri,* Post og Telegrafvæsenets bygningstjeneste og undervisningsministeriets byggedirektorat, Denmark.

Nilsen, S. K., Dahl, I.E, Kristiansen, T.H., Brønstad, B.O. and Høstmark, A.G. (2008), "Best practice cleaning – reducing cost, waste and use of chemicals by introducing a modern cleaning concept, Sustainable Buildings 2008, 21-25th September 2008 in Melbourne", pp. 110-117.

Norwegian Ministry of Finance (2004), "Finansdepartementets fortolkningsuttalelse av 2. mars 2004 om merverdiavgiftskompensasjon til kommuner, fylkeskommuner mv" [The ministry's interpretation on VAT compensation], available at: https://www.regjeringen.no/nb/dokumenter/finansdepartementets-fortolkningsuttalel/id102876/ (accessed 01 July 2015).

NOU 1993:10, *Om renhold* [Norwegian public report on cleaning], Norges offentlige utredninger, Kommunal- og arbeidsdepartementet, Statens forvaltningstjeneste, Seksjon statens trykning, Oslo 1993.

NOU 1997:8, *Om finansiering av kommunesektoren* [Norwegian public report on the financing of local government], available at: https://www.regjeringen.no/contentassets/dbe6ddabb4d04825b96e9d73241d1627/no/pdfa/nou199719970008000dddpdfa.pdf (accessed 01 July 2015).

NOU 2004:22, *Vedlikeholdte bygninger gir mer til alle. Om eiendomsforvaltningen i kommunesektoren* [Norwegian public report on public FM], Norges offentlige utredninger, available at: https://www.regjeringen.no/contentassets/41c7554ef22740b1bfcf582e4d4ae772/no/pdfs/nou200420040022000dddpdfs.pdf (accessed 01 July 2015).

NOU 2007:6, *Formål for framtida* [Norwegian public report on day care], available at: https://www.regjeringen.no/contentassets/8d208e2fb15c4b01ab344eb29c8c1be3/no/pdfs/nou200720070006000dddpdfs.pdf (accessed 16 March 2015).

NS 3940:2012, "Calculation of areas and volumes of buildings", Norwegian Standard (NS), Standards Norway, Oslo, Norway.

NS 8431:2005, "General conditions of contract concerning fixed cleaning", Norwegian Standard (NS), Standards Norway, Oslo, Norway.

NS-INSTA 800:2010, "Cleaning quality: measuring system for assessment and rating of cleaning quality", Norwegian Standard (NS), Standards Norway, Oslo, Norway.

NS-INSTA 810:2011, "Requirements and recommendations for the provision of cleaning services", Norwegian Standard (NS), Standards Norway, Oslo, Norway.

Oh, Y.J. and Watanabe, Y. (2002), "Development of small robot for home floor cleaning", in *SICE 2002, proceedings of the 41st SICE annual conference,* Vol. 5, pp. 3222-3223.

Öhrling, T. (2014), *Städares arbete och hälsa. Utmaningar ock möjligheter I städbranschen,* PhD, Luleå tekniska universitet, Sweden.

O'Neill, M., White, P. and Simpson, C. (Eds.) (2006), *Chambers Giant Paperback Dictionary*, Chambers, Harrap Publishers, Edinburgh, UK.

Palacín, J., Palleja, T., Valgañón, I., Pernia, R. and Roca, J. (2005), "Measuring coverage performances of a floor cleaning mobile robot using a vision system", in *Proceedings of the 2005 IEEE, International conference on robotics and automation, in Barcelona, Spain, April 2005,* pp. 4236-4241.

Pedersen, A.W. (2000), *Konkurranseutsetting og pensjon – en kvalitativ undersøkelse av pensjonsforholdene blant private bedrifter i tre bransjer*, FAFO, available at: http://www.fafo.no/images/pub/2000/338.pdf (accessed 01 July 2015).

Pickles, J. (2000), "Update on NHS Trust benchmarking", *Facilities*, Vol. 18 Iss. 5/6, p.-.

Pierre, J. and Rothstein, B. (2013), "Reinventing Weber: the role of institutions in creating social trust", in Christensen, T. and Lægreid, P. (Eds.), *The Ashgate Research Companion to New Public Management,* Ashgate Publishing Limited, Farnham, UK, pp. 405-416.

Pitt, M. and Tucker, M. (2008), "Performance measurement in facilities management: driving innovation?", *Property Management,* Vol. 26 No. 4, pp. 241-254.

Price, I. (2002), "Can FM evolve? If not, what future?", *Journal of Facilities Management*, Vol. 1 No. 1, pp. 56-69.

Price, I. and McCarroll, P. (2015), "The snakes and ladders of FM service excellence. Service excellence. Putting FM at the game board", Project Report (Unpublished), Sheffield Business School, Sheffield, UK, available at, http://shura.shu.ac.uk/9839/ (accessed 01 July 2015).

Randen, P.E. (1997), "Trondheims kommunale rengjøringskvinners forening, Avd. 89, 75 år", Fagforeningen, Trondheim, Norway.

Redlein, A. and Zobl M. (2014), "Outsourcing: a cost-saving approach in FM?", in Jensen, P.A. (Ed.), *Proceedings of CIB facilities management conference using facilities in an open world crating value for all stakeholders, joint CIB W070, W011 & W118 conference at Technical University of Denmark, Copenhagen, 21–23 May 2014,*Polyteknisk forlag, Lygby Danmark pp. 468-479.

Renholdsnytt, 24.05.2006, "Miljøpris for Beste Praksis Renhold", available at: http://renholdsnytt.no/Nyheter/Siste-nytt/Arkiv/2006/Miljoepris-for-Beste-Praksis-Renhold/(language)/nor-NO (accessed 01 July 2015).

Renholdsnytt (2007), "Portrettet. En klippe taker for seg", *Renholdsnytt,* No. 3, pp. 14-15.

Renholdsnytt, 12.08.2013, "Effektivt med alt på ett brett", available at: http://renholdsnytt.no/Nyheter/Siste-nytt/Arkiv/2013/August-2013/Effektivt-med-alt-paa-ett-brett/(language)/nor-NO (accessed 01 July 2015).

Renholdsnytt, 19.03.2014, "Næringslivets Hus får nettbrett", available at: http://renholdsnytt.no/Nyheter/Siste-nytt/Arkiv/2014/Mars-2014/Naeringslivets-Hus-faar-nettbrett/(language)/nor-NO (accessed 01 July 2015).

Renholdsnytt, 10.06.2014, "Leviys programvare styrer renholdet", available at: http://renholdsnytt.no/Nyttig/Produkter/Leviys-programvare-styrer-renholdet/(language)/nor-NO (accessed 01 July 2015).

Renholdsnytt, 04.11.2014, "Ny app holder renholderen under oppsikt", available at: http://renholdsnytt.no/Nyheter/Siste-nytt/Arkiv/2014/November-2014/Ny-app-holder-renholderen-under-oppsikt/(language)/nor-NO (accessed 01 July 2015).

Renholdsnytt (2015), "Vil tape altfor mye i pensjon", *Renholdsnytt*, No. 1, p. 26.

Research Council of Norway (2009), *Arkitektur og kvalitet i omgivelser. Kunnskapsstatus og forskningsbehov,* Norges Forskningsråd, Divisjon for vitenskap, Oslo, Norway.

Rhodes, R.A.W. (1994), "The hollowing out of the state: the changing nature of the public service in Britain", *Political Quarterly*, Vol. 65 Iss. 2, pp. 138-151.

Roper, K.O. (2014), "Globalization of facility management", in Roper, K.O. and Borello, L.J., *International Facility Management*, Wiley Blackwell, Oxford, United Kingdom, pp. 53-65.

Roper, K.O. and Borello, L.J. (2014), "Facility management: changing global viewpoints and maturity", in Roper, K.O. and Borello, L.J. (2014), *International Facility Management*, Wiley Blackwell, Oxford, United Kingdom, pp. 1-4.

Ryan, S. (2007), "*Dirty Deeds Done Dirt Cheap?" Employment Relations and the Organization of Work in the NSW Commercial Cleaning Industry,* PhD, University of Sydney, Australia.

Ryan, S. (2009), "'On the mop-floor': researching employment relations in the hidden world of commercial cleaning", in Townsend, K. and Burgess, J. (Eds.), *Method in the Madness: Research Stories You Won't Read in Textbooks,* Chandos Publishing, Oxford, UK pp. 27-38.

Ryan, S. (2012), "When is a team a team? 'Teamworking' and the reorganisation of work in commercial cleaning", *Employee Relations*, Vol. 43 No. 3, pp. 255-270.

Ryan, S. and Herod, A. (2006), "Restructuring the architecture of state regulation in the Australian and Aotearoa/New Zealand cleaning industries and the growth of precarious employment", in Aguiar, L.L.F. and Herod, A. (Eds.), *The Dirty Work of Neoliberalism: Cleaners in the Global Economy,* Blackwell Publishing, Malden, MA. First published in *Antipode: A Radical Journal of Geography,* Vol. 38 Iss. 3.

Schaug, N. (2010), *Leder i kommunen. I samspill med administrasjon, politikere og innbyggere*, Kommuneforlaget, Oslo, Norway.

Shohet, I.M. and Lavy, S. (2004), "Healthcare facilities management: state of the art review", *Facilities,* Vol. 22 No. 7/8, pp. 210-220.

Skilbrei, M.L. (2003), "Dette er jo bare en husmorjobb. Ufaglærte kvinner i arbeidslivet", Dr.polit.-avhandling 2003, Insitutt for sosiologi og samfunsgeografi, Universitetet i Oslo, Norsk insitutt for forskning om oppvekst, velferd og aldring. NOVA Rapport 17/2003, Oslo, Norway.

Standards Norway (2015), "Eiendomsforvaltning – Avtaler om fasilitetstjenester", available at: http://www.nbef.no/fileadmin/Kursprogrammer/2015/1550105_Byggdrift_Omfang-ytelser-kontrakt/N_250_Eiendomsforvaltning-Avtaler-om-fasilitetstjenester_Faktaark_Januar_2015.pdf (accessed 01 July 2015).

Statistics Norway (2010), *Statistical Yearbook of Norway 2010,* Statistics Norway, Oslo, Norway, available at: http://www.ssb.no/a/en/histstat/aarbok/2010_en.pdf (accessed 01 July 2015).

Steane, P.D. and Walker, D.H.T. (2000), "Competitive tendering and contracting public sector services in Australia: a facilities management issue", *Facilities*, Vol. 18 No. 5/6, pp. 245-255.

Steger, M.B. and Roy, R.K. (2010), *Neoliberalism: A Very Short Introduction*, Oxford University Press, Oxford.

Stoy, C. and Johrendt, R. (2008), "Cleaning management of owner-operated real estate", *Facilities*, Vol. 26 Iss. 3/4, pp. 131-143.

Strand, J.A. (2000), *Nøkkeltall for kommunale bygninger,* Norwegian Association of Municipal engineers (NKF), Forum for public buildings and properties (FOBE), En samlerapport om areal- og kostnadstall for i alt 114 norske kommuner, Nøkkeltall 1996–1998.

Tay, L. and Ooi, J.T.L. (2001), "Facilities management: a 'jack of all trades'?", *Facilities*, Vol. 19 No. 10, pp. 357-362.

Taylor, F.W. (1911/2011). *The Principles of Scientific Management. The Fundamentals.* Prism Key Press, Amazon Distribution GmbH, Leipzig, Germany.

Tolman, A., Matinmikko, T., Möttönen, V., Tulla, K. and Vähä, P. (2009), "The benefits and obstacles of mobile technology in FM service procurement", *Facilities*, Vol. 27 Iss. 11/12, pp. 445-456.

Trygstad, S.C., Bråten, M., Nergaard, K., and Ødegård, A.M. (2012), *Vil tiltakene virke? Status i renholdsbransjen 2012,* Fafo-rapport 2012:59, available at: http://www.fafo.no/media/com_netsukii/20286.pdf (accessed 01 July 2015).

Trygstad, S.C., Nergaard, K. Alsos, K., Berge, Ø.M., Bråten, M. and Ødegård, A.M. (2011), *Til renholdets pris,* Fafo-rapport 2011:18, available at: http://www.fafo.no/media/com_netsukii/20209.pdf (accessed 01 July 2015).

Tulla, K., Vähä, P., Matinmikko, T., Tolman, A. and Möttönen, V. (2009), "RFID technology changes FM services deliveries", *Facilities*, Vol. 27 Iss. 11/12, pp. 457-468.

Unknown (1951), "Oslo vask- og rengjøringskvinners forening 50 år, 29. april 1901 - 29. april 1951", Oslo vask- og rengjøringskvinners forening, Arbeidernes Arktietrykkeri, Oslo, Norway.

Vabo, S.I. and Stigen, I.M. (2000), "Kommunal organisering 2000. Redegjørelse for Kommunal- og regionaldepartementets organisasjonsdatabase", *NIBR-notat 2000:128,* Norwegian Institute for Urban and Regional Research (NIBR), Oslo, Norway.

Valen M.S., Haugen, T.I., Arge, K., Blakstad, S.H. and Bjørberg, S. (2007), *Utvikling og forvaltning av offentlige bygninger i et livsløpsperspektiv.* Forsknings- og utviklingsprogram. Kommunal eiendomsforvaltning 2008, NTNU, Trondheim, available at: http://www.ntnu.no/documents/20658136/21235906/Forslag-FoU-program-Off-Eiendom_Valen_etal_2007.pdf/ade906eb-6874-4c8d-a0e1-afec922acdf7 (accessed 01 July 2015).

van Vlijmen, J. and van den Hoogen, T. (2013), "Reconstructing the image of the cleaner", in Aleksander, K. (Ed.) *Proceedings of the 12th EuroFM Research Symposium,FM for a sustainable future, 22-24 May 2013, Prague, Czech Republic,* European Facilities Management Network (EuroFM), pp. 66-73.

Ventovuori, T., Lethonen T., Salonen A. and Nenonen S. (2007), "A review and classification of academic research in facilities management", *Facilities*, Vol. 25 No. 5/6, pp. 227-237.

Whitehead, H., May, D. and Agahi, H. (2007), "An exploratory study into the factors that influence patients' perceptions of cleanliness in an acute NHS trust hospital", *Journal of Facilities Management*, Vol. 5 No. 4, pp. 275-289.

Wilde, E. (1994), "Dust, sweep and clean: a case history", *Facilities*, Vol. 12 Iss. 10, pp. 22-26.

Williams, B. (1996), "Cost-effective facilities management: a practical approach", *Facilities*, Vol. 14 No. 5/6, pp. 26-38.

Wilson, S. (1989), "Specifying cleaning services", *Facilities*, Vol. 7 No. 2, pp. 5-7.

Wilson, D., and Game, C. (2011), *Local Government in the United Kingdom*, 5th ed., Palgrave Macmillan, Basingstoke, UK.

Yin, R.K. (2014), *Case Study Research: Design and Method*, 5th ed., Sage Publications, Inc., Thousand Oaks, California.

Endnotes

[1] Original quotation by Hagesæther and Danielsen (1996): *"Reinhaldshistoria finn vi ikkje nedskriven i noka historiebok eller i noko oppslagsverk"* (p. 9).

[2] In 2014, the Norwegian Ministry of Local Government and Regional Development (KRD) changed its name to the Norwegian Ministry of Local Government and Modernisation (KMD).

[3] Original quotation by the Research Council of Norway (2009): *"Det er stort behov for kunnskap om hvordan bygninger bør utformes, drives og forvaltes på måter som samsvarer med høye idealer for arkitektonisk praksis og kvalitet i våre bygde omgivelser"* (p. 49).

[4] Original quotation by Renholdsnytt (2007): *"Om 20 år vil renholdere være skolert til andre oppgaver innen bransjen, og jobbe på en annen måte. Da vil arkitektene måtte bli flinkere enn de er i dag til å tenke på renhold når de tegner bygninger"* (p. 14).

[5] The terms *cleaner, custodian, housekeeper, janitor and caretaker* are defined here, as these terms seem to have some interchangeable meanings. In some contexts, cleaners' work can be described as "custodial services"

(Campbell, 2005), while others refer to cleaners as "housekeepers" (Dumingan *et al.*, 2010). Savage (2006) and Aguiar and Ryan (2009) refer to a "janitor" as a cleaner. O'Neill *et al.* (2006) define *janitor* as a term which refers to either a "caretaker" or a "doorkeeper". Both *caretaker* and *janitor* translate to the Norwegian term *"vaktmester"*. A vaktmester in Norway is commonly understood as a handyman who does not clean. This handyman is at times educated and may be a certified carpenter, electrician or plumber. This handyman can also be a non-educated man or woman with practical skills. Consequently, the term *cleaner* is used in this thesis when someone's occupation is to clean, while a *caretaker* is interpreted as a handyman that does not clean. The abovementioned references that are not referred to in this thesis' list of references are as follows:

- Aguiar, L.L.M. and Ryan, S. (2009), "The geographies of the justice for janitors", *Geoforum*, Vol. 40 Iss. 6, pp. 949-958.
- Dumingan, D.G., Boyce, J.M., Havill, N.L., Golebiewski, M., Balogun, O. and Rizani, R. (2010), "Who is really caring for your environment of care? Developing standardized cleaning procedures and effective monitoring techniques", *American Journal of Infection Control*, Vol. 38 Iss. 5, pp. 387-392.
- Savage, L. (2006), "Justice for janitors: scales of organizing and representing workers", *Antipode*, Vol. 38 Iss. 3, pp. 645-666.

[6] *Outsourcing* refers to whether a service is supplied by a client organisation or external to it (EN 15221-1:2006), and the term *out-tasking* can be used if only one service is supplied by a provider external to an organisation (Haugen, 2003). For simplicity, the term *outsourced* is frequently used in this thesis irrespective of the range of supplied services.

[7] The UK case referred to itself as a soft FM organisation. Many of the publications reviewed through this PhD project also describe cleaning as a soft FM service.

[8] *Core business* refers to the client, customer and end users of FM. These are the ones signing the FM agreement, specifying the agreement and consuming the agreed-upon services. In FM, it is common to distinguish between support services, which comprise FM, and the receivers of FM services, which represent the demand side of FM. The receivers are frequently referred to as the core business of an organisation. Core business can be within the same organisation as the FM services. In this case, the FM services are commonly referred to as *in-house service supply*. FM services can also be supplied by an organisation external to the core business. Here, the FM services are often referred to as being *outsourced*. As with FM, a core business can be separated into the strategic, tactical and operational levels. For core businesses, these three levels are referred to as client, customer and end users (EN 15221-1:2006). End users, who represent the operational level, are the persons who receive the services, such as when each individual employee in an organisation receives cleaning service in his or her office or catering services for meetings. The customers, who represent the tactical level of core businesses, are those who specify and order service delivery within the framework of an FM agreement. The clients, which represent the strategic level, bring the FM agreement further, as they are the ones procuring the needed services.

[9] During the course of this research, some knowledge on cleaning costs was collected. Such knowledge is brought forward in this thesis. The undertaken research did not target cleaning costs in particular; thus, no dedicated literature review was conducted. As such, the phrase "some of the available knowledge" is used here.

[10] Four approaches were used to categorise research along two axes in the framework in **Article 1**: positivism–interpretivism and realism–idealism. Positivism was "*used in relation to quantitative research approached and 'the method of logic analysis'"* (**Article 1**, p. 4) and included research based on observation and measurements. Interpretivism referred to *"research that acknowledges there can be several 'truths', depending on who the observer is and in what context the research is made"* (p. 5), and included qualitative research and multi-method studies combining quantitative analysis and interviews. The realism–idealism axis referred to "*the extent to which research has been value-based"* (p.5), that is, whether the research aimed at being value-neutral, real-world oriented and problem-centred (realism) and whether it aimed to have an underlying consciousness and was oriented towards political-, change- or empowerment-related issues (idealism).

[11] As of 2014, the European Norm series of EN 15221 consists of seven standards, commonly referred to as "the magnificent seven":

- EN 15221-1:2006 Facility management. Part 1: Terms and definitions;
- EN 15221-2:2006 Facility management. Part 2: Guidance on how to prepare facility management agreements;
- EN 15221-3:2011 Facility management. Part 3: Guidance on quality in facility management;
- EN 15221-4:2011 Facility management. Part 4: Taxonomy, classification and structures in facility management;
- EN 15221-5:2011 Facility management. Part 5: Guidance on facility management processes;
- EN 15221-6:2011 Facility management. Part 6: Area and space measurement in facility management; and
- EN 15221-7:2012 Facility management. Part 7: Guidelines for performance benchmarking.

Recently, EN 15221-1 and EN 15221-2 started the transformation process of becoming international standards (ISO) and will therefore soon be substituted by ISO 18480-1 and ISO 18480-2 (most likely in 2015 or 2016).

[12] During the procurement process, this local authority was marked by well-defined and clear quality demands. The local authority insisted on having control routines and (its own strategic–tactical) staff familiar with the industry tendering processes. The service contracts allowed for regulations of contract sums according to changes in the standard wage. The lowest tenderer was awarded the final contract, lasting four years – until the next procurement process began. The experience of the contractors was that the lowest bid always won. Delivered services needed to be cheaper than in previous years. Irrespective of whether the formerly delivered service quality was good or bad, a previous contractor would win the new contract if its tender price was the lowest.

[13] Original quotation by Bråten and Nicolaisen (2013): *"[R]enholderne som jobber på fritiden for å levere god nok kvalitet innenfor tidsrammer som ikke justeres opp selv om antallet kvadratmeter som skal rengjøres, blir høyere. Andre strategier er 'å kutte hjørner' eller å hjelpe hverandre slik at man blir ferdig innenfor den avsatte tiden"* (p. 104).

[14] Original quotation by Trygstad *et al.* (2011): *"Likevel mener politiet at det kan være en indikasjon på at renholdsbedriftene har noe å skjule dersom de foretrekker å utføre renholdet mellom klokka 21.00 og 06.00, eller på tidspunker når det ikke er andre ansatte på jobb"* (p. 142).

[15] Strand (2000) analysed 114 municipalities' annual MMO costs (excluding administrative costs and measured in NOK per m^2 gross total area) for the years 1996–1998, finding that cleaning, depending on building type,

commonly represented 35–49% of MMO costs. More specifically, cleaning (C) and energy (E) represented the following percentages of annual MMO costs: in administrative buildings, 37% C and 29% E; in healthcare buildings, 33% C and 32% E; in culture and sports facilities, 28% C and 30% E; in school buildings, 43% C and 24% E; and in day care buildings, 49% C and 21% E. Based on the available information, Haugen *et al.*(1996) collected the total cost of MMO for the entire building portfolio, including administrative costs for 1994, which were estimated to be 336 NOK/m^2, of which 135 NOK was related to cleaning (40.2%) and 73 NOK to energy (21.7%).

[16] Stoy and Johrendt (2008) examined the relevant causal relationships of cleaning costs for 113 owner-operated buildings in Switzerland for the full year of 2001, but no estimation of cleaning costs as a percentage of operating costs was conducted.

[17] On the cost of cleaning, Shohet and Lavy (2004) refer to the following reference: Nesje, A. (2002), "Management, operation and maintenance cost of hospital buildings", in *Proceedings of the international federation of hospital engineering*, Bergen, pp. 290-296.

[18] The term Bjørseth *et al.* (1995) use for skilled caretakers is *"fagkyndige vaktmestere"* (p. 4).

[19] Original quotation by Bringslid (1989): *"Dei mange trappene, spesialromma med lite 'vaskevennleg' utforming gjer bygningen lite eigna for 'moderne renhold'. Den delen av bygningen som ein reinhaldar har ansvaret for ('posten'), går ofte over fleire etasjar, og nokre er også spredd til ulike bygningar. På gamleskulen brukar ein heller ikkje vogn eller trille til å frakte med seg vaskesakerne; det er for 'ulendt' til det med så mange trapper"* (p. 28).

[20] Original quotation by Bringslid (1989): *"Profesjonaliseringa av vaskeyrket ser ikkje ut til å omfatte opplæring av arbeidskrafta. Ein har innført moderne vaskemetodar, men kriteria for kva som er 'reint' følger husmornormene for 'skikkelig reingjering'"* (p. 57).

[21] Original quotation by Moland and Andersen (2007): *"…de store kommunene i større enn de små grad har tatt opp i seg den NPM-inspirerte tenkingen om sammenhengen mellom brukerorientering, effektivitet, god ledelse og involverte medarbeidere"* (p. 26).

[22] Original quotation by Moland and Andersen (2007): *"Små stillinger og deltid trenger ikke nødvendigvis å være et problem. Fra et arbeidstakerståsted er deltid og små stillinger først og fremst et problem dersom arbeidstakeren ønsker en større stilling"* (p. 20).

[23] Original quotation by Standards Norway (2015): *"På renhold finnes det et komplett sett av norske standarder som bidrar til enklere tilbudsprosesser"* (p. 2).

[24] The cleaning quality standard NS-INSTA 800 has been a joint development by researchers, purchasers, contractors, confederations of enterprises and trade unions in both the public and the private sectors across the Scandinavian countries of Norway, Sweden, Finland and Denmark. In these four countries, as well as in Iceland, this standard is identical.

Publications

Klungseth NJ and Olsson NOE (2013)
Norwegian Cleaning research: an overview and categorization.
Facilities, Vol. 31, No. 7/8, pp. 290-313.

Emerald Awards for Excellence 2014: Highly commended

Article 1

Klungseth NJ (2014)
Organising Cleaning in Norwegian Public FM.
Journal of Facilities Management, Vol 12, Iss. 4, pp. 382-410

Article 2

Klungseth NJ and Blakstad SH (to be published)
Organising In-house Cleaning Services in Public FM.

Article 3

Klungseth NJ and Blakstad SH (2012)
The silent Army: A story from practice.
In Michell, K., Bowen, P. and Cattell, K. (Eds.), *Proceedings of the Joint CIB W070, W092 & TG72 International conference on facilities management, procurement systems and public private partnership: delivering value to the community, Cape Town, South Africa, 23-25 January 2012,* Department of Construction Economics and Management, Faculty of Engineering & the Built Environment, University of Cape Town, Cape Town, South Africa, pp. 711-720.

Paper 1

Klungseth NJ (2012)
Shadowing – a valuable approach to Facility Management research.
In Junghans, A. and Jensen, P.A. (2012), *Proceedings of the 11th EuroFM research symposium in Copenhagen, Denmark, 24–25 May 2012,* Polyteknisk forlag, Lyngby, Denmark, pp. *52-63*.

Paper 2

Klungseth NJ and Olsson NOE (2013)
Norwegian Cleaning research: an overview and categorization.
Facilities, Vol. 31, No. 7/8, pp. 290-313.

Emerald Awards for Excellence 2014: Highly commended

Article 1

Article 2

Article 3

Paper 1

Paper 2

Article 1

Article 2

Article 3

Paper 1

Paper 2

Post-print version

Norwegian cleaning research: An overview and categorization

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Abstract

Purpose: This article summarizes Norwegian cleaning-related research to give an overview of the knowledge we hold today and to categorize the approaches used.

Design/methodology/approach: The research is based on an extensive literature search. Research contributions from 1814 until 2009 were studied, even though the main findings are from 1950. The different disciplines contributing to research are mapped and the contributions are categorized based on different research approaches, namely positivism, interpretivism, realism and idealism.

Findings: Norwegian cleaning-related research experienced a burst in publications from the 1990s**.** The majority of Norwegian cleaning-related research has been positivistic, mostly based on realism. The least common approach used was interpretivism-idealism and interviews were most frequently used method in interpretivisitc contribution. The article indicates a need for further broadening in research methods.

Research limitations/implications: Through categorizing existing knowledge the article will help when searching for information and thus stimulate more research as limited research exist within the field.

Practical implications: The paper represents a summary of the knowledge status in cleaning, in a Norwegian perspective. We believe that the general picture also has international relevance.

Social implications: Few researchers have investigated cleaning work from the perspective of cleaning personnel. We also note that there has been little focus on the usability of buildings for cleaning personnel.

Originality/value: This article may be the first historical overview of Norwegian cleaning-related research.

1. Introduction and research questions

Cleaning represents a major part of facilities management expenditure. According to Bjørberg *et al.* (2007), cleaning represents approximately 33% of the cost of managing and maintaining Norway's public building stock. Despite this, cleaning has attracted little attention by researchers, in contrast to energy consumption, for example. Within the field of cleaning there has been little research to date. A clean environment is a very important characteristic of pleasant surroundings (Cold *et al.*, 1998). Clean environments serve as an assurance of healthy surroundings. Cleanness may therefore serve as an important security check when it comes to eliminating health risks. If people have the impression that something is unclean they will tend to avoid it (Nasar, 2000).

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Even though cleaning has attracted comparably little attention in the research community, a certain amount of research has been carried out. The purpose of this article is to summarize Norwegian research and knowledge development related to cleaning. Accordingly, it may thus constitute the first historical overview of Norwegian cleaning research.

Facilities management is a relatively new scientific field. In a facilities management perspective, cleaning is an important support service to any type of core business. To be able to support such organizations, it is important to be aware of what kind of support cleaning services themselves need. Structuring existing knowledge regarding cleaning should therefore be of value to the facilities management community. There is a general need to develop theoretical frameworks and to categorize existing knowledge. One need is to gain more insight to the different services that are managed. This would help practitioners and researchers when searching for information. It could also stimulate to more research. Cleaning has to a very limited extent been a research field in itself, it is therefore valuable to map research in different academic disciplines. The term discipline is related to tools, methods, procedures, concepts, and theories which coherently account for the objects or subjects studied (Krishnan, 2009; Holland, 2008). A wide array of research disciplines have touched upon cleaning research. This has created a need for not only mapping research, but also for categorization of the research.

The aim is to provide an overview of available Norwegian research related to building cleaning services. Providing an overview of available research will indicate what knowledge exist regarding cleaning and were further research is required. More specifically, the research questions are as follows:

- What type of research has been carried out during different time periods since 1814, with special focus on research after 1950?
- What research disciplines have been involved in cleaning research?
- What research approaches have been present in cleaning research?
- How has research approaches changed over the years?

2. Defining research and cleaning-related research

The chronological history of Norwegian cleaning research is presented before the Norwegian cleaning research contributions are categorized according to their approaches.
The Frascati Manual (2002) provides the following definition of research: *Research and experimental development (R&D) comprise creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of man, culture and society, and the use of this stock of knowledge to devise new applications*.

In this article **research** has been defined as publications that provide new knowledge through data sampling and data analysis. Research contributions are often presented in the form of research reports or peer-reviewed articles.

Norwegian cleaning research covers a wide range of academic disciplines. Contributors include researchers within, for example, civil engineering, chemical engineering, medicine, social science, and statistics. In particular, the following disciplines and research traditions represented are based on OECD (2007):

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- *Engineering*—especially within civil and chemical engineering, on cleaning methods' effect, quality, frequency, cost, and the environmental dangers of detergents.

- *Medicine*—on cleaning personnel's general health and work-related injuries.

- *Qualitative social science*—on cleaning personnel's family and working situation. The topic excludes studies of quantitative character.

- *Quantitative social science*—on numbers of cleaning companies and families using private cleaning assistance. The topic includes only those of purely quantitative character.

Cleaning-related research can be perceived as relatively wide ranging in scope. In this article **cleaning-related research** refers to topics related to janitorial cleaning within buildings. Issues mainly dealing with sanitation, outdoor cleaning, and Sick Building Syndrome (SBS) fall outside the scope of this article. Accordingly, research articles such as "Emissions from different types of used ventilation bag filters and their impact on perceived air quality" by Mysen *et al.* (2006) have been defined as mainly related to indoor air and hence not defined as cleaning-related research, even though in the cited case one of the authors is a known researcher on cleaning in Norway. In contrast, the article titled "Attachment of Bacillis cerus spores without appendages to stainless steel surfaces" by Klavenes *et al.* (2002) has been defined as cleaning-related research because it focuses on providing new information in order to "obtain effective cleaning procedures".

3. Data collection and limitations

This article covers cleaning-related research since Norway was declared an independent nation in the Constitution of Norway, signed in 1814. The researchers aimed to access known and available research contributions produced until 2009.

Several approaches were used to identify Norwegian cleaning-related research. The starting point was a list of references cited in specialized Norwegian cleaning literature. Second, searches in the Norwegian library database (Bibsys) were conducted, covering both books and academic journals. Searches on words and terms relating to cleaning were made, as well as on the names of known researchers of cleaning. In addition, references cited by the aforementioned researchers were examined. The same approach was also adopted in several search engines on the Internet, such as Emerald, Science Direct, Wiley Online Library, and Google Scholar. During the database searches, both titles and keywords were examined. The collected material was subsequently examined in more detail.

In total, over 300 publications were investigated. In each case, the title, abstract, and content were examined in order to determine whether or not the publication could be defined as cleaning-related research. In total, 80 publications fell into this category. These publications were checked several times in order to identify their research approach and the appropriate category.

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4. Framework and model for analysis

A framework inspired by Alexander (2010) has been applied to categorize the research approaches in the sample cleaning literature, see Figure 1. Alexander's model categorizes facilities management research along two axes: positivism–interpretivism and realism–idealism. He concluded that most of FM research has been conducted in the positivism–realism setting. Norwegian cleaning research was identified within all four categories, but it is clear that the majority of cleaning research also has been conducted in relation to positivism–realism.

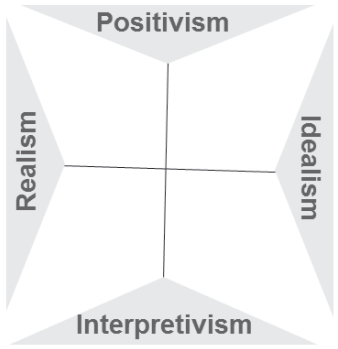

Figure 1 General model

There are different ways of characterizing research. For example, Creswell (2009) and Neuman (2006) use a slightly different framework to Alexander (2010). Creswell categorizes research according to four philosophical worldviews: postpositivism, constructivism, pragmatism, and advocacy/participatory. In contrast, Neuman describes five types of social science: positivistic, interpretive, critical, feminist, and postmodern.

Neuman's (2006) distinction between positivism and interpretivism correspond with Creswell's (2009) descriptions of postpositivism and constructivism. Both describe positivism as a "scientific" method. Cresswell (2009) claims that the method develops quantitative knowledge through "careful observation and measurement of the objective reality that exists 'out there' in the world". Neuman and Creswell describe a viewpoint that should be value-free. Positivism is based on the belief that true knowledge is based purely on empirical observation and positive verification. Its general aim is to develop laws and models that can be used to understand and make predictions relating to studied phenomena.

Creswell states that social constructivism often is combined with interpretivism, while Neuman characterizes constructivism as part of interpretivism. According to Neuman (2006), there are several types of interpretivism: "hermeneutics, constructionism, ethnomethodology, cognitive, idealist, phenomenological, subjectivist and qualitative sociology". Creswell (2009) sees constructivism as qualitative approaches that "rely as much as possible on the participants' view of the situation being studied". Interpretive social science differs from positivism concerning choice of method, but is related to positivism concerning value, and hence interpretative social sciences have a relativistic understanding with "no single point of view or value position" (Neuman, 2006). In the present article, **positivism** is used in relation to quantitative research approaches and "the method of logical analysis" (Neurath, 1973).

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This includes research approaches based on observation and measurements, while research that acknowledges there can be several "truths", depending on who the observer is and in what context the research is made (Fellows and Liu, 2008) is regarded as **interpretivism**. The latter type of research includes qualitative methods as well as multi-method studies, typically a combination of quantitative analyses and interviews.

Creswell's descriptions of advocacy/participatory worldviews and Neuman's critical and feminist social sciences also have similarities. These perspectives hold value-laden views. Creswell discusses the advocacy/participatory view as "intertwined with politics and political agenda" (Creswell, 2009). According to him issues such as "empowerment, inequality, oppression, domination, suppression, and alienation" are all important in an advocacy/participatory viewpoint. This corresponds with Neuman, who states that critical social science studies of social reality "necessarily contain a moral-political dimension, and moral-political positions are unequal in advancing human freedom and empowerment" (2006). Similarly, Neuman's feminism corresponds with his critical social science and Creswell's advocacy/participatory worldview when it comes to value. According to Neuman (2006), feminist research is "action-oriented research that seeks to facilitate personal and societal change". There are several approaches to the terms idealism and realism. As shown above, positivism and interpretivism seek to be value-free, while advocacy/participatory, feminist, and critical social sciences sees a value-laden research approach as a necessity. Idealism can be summarized as comprising two approaches: 1) an understanding that our reality is shaped by our thoughts and ideas, and 2) the practice of envisioning things in an ideal form. Pratt (1933) describes an idealist as one who denies what the realist believes in:

> [T]he physical world did not depend for its existence on consciousness in any form; a physical thing was not a centre for consciousness, nor did it have to be the object of any mind, whether finite or infinite, in order to be real.

Realism is interpreted as problem-centered, and aims to be value-neutral and real-world oriented without any underlying consciousness. Hence, the term realism has been used as an approach in cases where reality has an absolute existence, independent of our thoughts and ideas. In this article **idealism** is interpreted as political, change-oriented, and empowerment issue-oriented, with an underlying consciousness that colours the research. As an example, idealistic research may focus on the integration of immigrants. In this article, research in which the author(s) state a political or value-based justification of their research has been categorized as idealism. It should be noted that it is the studied researchers' reasons for doing the research that have been judged as idealism-based, not the performed research. In this article the axis realism–idealism signifies the extent to which research has been value-based.

5. History of science, university traditions, and social development

The histories of science and universities are closely linked. In Norway, the history of universities started with their establishment in the period 1811–1813. According to Collet (1997) the development can be divided into three phases: the civil servants university (1813–1870), the research university (1870–1960), and the mass-education university (1960 onwards). Prior to the early 1800s, only philosophers and religious scholars engaged in "armchair speculation" had studied or written about human behavior (Neuman, 2006). The establishment of a realistic tradition in the universities in the mid-1800s marked the beginning of the positivistic era and adapted an ambition of value free empirical research (Collet, 1997). It was seen as a matter of honour to not be bound by religion or politics. The positivistic era

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held its ground until the 1950s and 1960s when the social democratic school reforms were introduced. This argument is supported by Creswell (2009) who states that postpositivism originated in the 19th century writers. The research traditions of the technical, medical, and social sciences all date back to this period in time, when they focused on positivistic research.

The French philosopher Auguste Comte founded sociology and many of his positivistic social science principles from the 1830s are still used today. In Norway, Eilert Sundt is regarded as the father of the social sciences (Seip, 1986). Interpretivism dates back to Dilthey in the 1880s and its approach is associated with the Chicago school of sociology in the 1920s and 1930s (Neuman, 2006). This is supported by Neurath (1973), who states that sociological and psychological investigation around the 1900s was "still in its early stages". According to Neuman (2006), positivistic social science dominated in sociology journals published in the USA, Canada, UK, and Scandinavia during the 1960s and 1970s. A sharp decline in European journals was seen in this type of publications during the 1980s and 1990s (Neuman, 2006). This corresponds with the history of university traditions in general, and with what Nilsson (1984) and Creswell (2009) have written about this period.

The value-laden advocacy/participatory worldview rose, according to Creswell (2009), during the 1980s and 1990s. Nilsson (1984) has written about the ideological change in universities and political events that occurred at the end of the 1960s. He claims that some of the factors behind the strong criticism directed towards positivism, established science, and the demand for control over the application of it, included the green movement, the feminist movement, the Vietnam War, and the rise of the students. Prior to the mid-1970s the school reforms had led to confusion in the universities' self-understanding and also students' understanding of their situation and future. The universities had been losing their elite, research and professional status as the numbers of students increased. The worldwide economic crisis in 1973–1974 resulted in increased interest in the universities as sources of new knowledge that could renew society (Collet, 1997).

The development in sciences can roughly be described as follows when it is based on Creswell (2009), Neuman (2006), Nilsson (1984), Neurath (1973) and Collet (1997). The 1800s were dominated by positivistic value-free research, and natural science was the first acknowledged field of research. Social science research emerged in the 1830s. A broadening within the field of research occurred in the time around World War II. True value-laden research first emerged during the 1960s and 1970s, when there was also a decline in positivistic research. In contrast, there was an increase in research activities after the economic crisis in the mid-1970s.

6. History of knowledge related to cleaning

Cleaning as a process has developed in the past 200 years, from the time when floors were cleaned with sand up to the introduction of chemicals and different cleaning machines and back again towards more natural and green cleaning.

The first publication that occur in the Norwegian library database (Bibsys) related to cleaning is a Danish publication from 1661 which relates to a tax on emptying toilets. This can be explained by the fact that the Norwegian word for cleaning sometimes carries the same meaning as the Norwegian word for sanitation. The second publication, which is also the most interesting, is a publication by Eilert Sundt in 1869 regarding cleanliness in Norway. Several

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searches were conducted to detect whether any Norwegian cleaning-related research was published earlier than Sundt's work, but none were found. This may indicate that Sundt was the first to publish research on cleaning in Norway.

Sundt's publication *On Cleanliness in Norway* dating from 1869 was a response to an essay competition announced in 1864. The task required responses to a number of factors concerning women, including girls' education, women's work, catering, cleaning, laundry, child care, and nursing (Sundt, 1873). The events leading up to the competition started in 1833 when King Oscar I visited patients with leprosy in Bergen. The king initiated a discussion on the issue and asked for a written record of leprosy in Norway. In 1837 a royal commission was established to investigate the leprosy issue and its findings were published in 1847 (Danielssen and Boeck, 1847). The records of physician and scientist D.C. Danielssen published in 1854 blamed women and their poor knowledge and lack of ability. According to Sundt (1869), Danielssen's records were the reason why Norwegian health commissions were established.

Sundt was eager to prove that Norwegian life had something to be proud of (Christophersen *et al.*, 1975). His publications have consequently been categorized as interpretivism-idealism. He found, amongst other, that it was common for floors to be cleaned once or twice a week and also that it was common for the whole house to be cleaned at least twice a year. Sundt did not win the essay competition, because the committee claimed he had not answered the task of providing remedy and method to correct women's care for cleanliness (Christophersen *et al.*, 1975). As a result of the criticism Sundt (1873) examined the topic further in the publication *On Domestic Life in Norway*.

The number of domestic science schools increased significantly at the end of 1800s (Høst, 2007). In 1876 the national assembly awarded the first grants for education in domestic science (Nossum, 1999). The first public domestic science school started in Nordre Bergenhus amt, which today is the county of Sogn og Fjordane (Tøsse, 2004).

In 1908 the state took over responsibility for all schools teaching domestic science. Members of the national assembly unanimously decided to start the State Women Teachers College in Domestic Science (Nossum, 1999). Many different organizations emerged around the school, including the State Information Bureau in Domestic Science and the State Experimental Activities in Domestic Science in late 1930s.

Sundt's works dating from 1869 and 1873 appear to be the two first cleaning-related research publications in Norway. It exist many cleaning-related contributions dating from Sundt (1869) until the end of the 1940s, but these contributions cannot be defined as research as they mainly are commercial material and textbooks.

6.1 The 1950s and 1960s: positivistic research and the introduction of modern cleaning

The start of modern cleaning methods in Norway was marked by research on cleaning in hospitals. During the 1950s and 1960s there were, as shown in Figure 2, four contributions on cleaning-related research which all were within the positivism–realism category.

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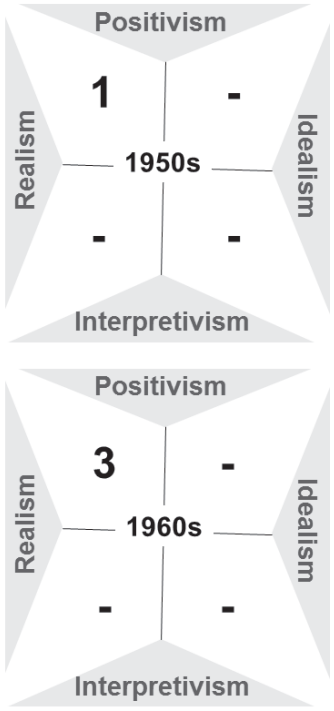

Figure 2 Norwegian cleaning research during 1950s and 1960s

Floors were at the time commonly cleaned with cloths, while Holt (1952) recommended the use of mops and cleaning machines instead. Holt tested different cleaning methods on linoleum floors in the hospital in Trondheim. He tested the floors' gloss, water resistance, stickiness, alkalinity, fouling, and the ability of polishing agent to separate from linoleum floors. He tested the gentleness of cleaning chemicals on linoleum and also their washing capability. In addition, he tested one cleaning lady's state of exhaustion, tiredness, and use of time in different settings. Even today, Holt's research is still quite often referred to in works on specialized cleaning.

Dedichen (1956) pointed out that it was time to research cleaning in Norwegian hospitals because the approach to cleaning seemed to be old fashioned compared to American hospitals, where men pulled wide mops through the corridors. Dedichen's criticism towards the Norwegian way of cleaning was not only concerned with the use of buckets and cloths but was also concerned with the cleaning frequency. One of Dedichen's concerns was that the methods disturbed the patients. The wards were cleaned twice daily in addition to several other cleaning activities. This created a "steady flow of serving spirits from 05.30 am until late evening" (Dedichen 1956). According to a visiting French doctor, the Norwegian hospitals were suffering from a serious "cleaning and polishing psychosis" (Dedichen 1956).

Ødegaard (1962), who was inspired by Dedichen (1956) and Stangebye (1958), found modern cleaning methods labour-saving, efficient and non-threatening to nosocomial infections when

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he conducted bacteriological test of new cleaning methods in hospitals. As a result Ullevål Hospital in Oslo achieved a major reduction in the amount of time spent on cleaning when they changed from old-fashioned floor cleaning methods to modern ones (50% reduction for offices and patient rooms and up to 86% reduction for corridors). Ødegaard took agar plate tests before, during, and after floors in patient's rooms in a medical department were cleaned. He tested modern and old-fashioned cleaning methods, and compared the use of damp, chemical-free mops on polished linoleum floors with the use of floor cloths, soft soap and water on unpolished linoleum floors. In addition, he tested the amount of bacteria in the air after polishing (every second day) with machines both with and without a vacuum cleaner. Ødegaard found that there was no hygienic-bacteriological concern as a result of implementing the new methods, as the method did not increase the numbers of bacteria.

At the end of the 1960s, the Occupational Health Institute investigated cleaning workloads and cleaning effectiveness (Hellstrøm *et al.*, 1968; Hellstrøm *et al.*, 1969). Hellstrøm *et al.* (1968) investigated traditional and modern cleaning methods including applying polish, polishing, the process of removing old polish, and cleaning dirty and clean stone floors. During tests, cleaners' respiration (oxygen), heartbeat rate, and use of time were measured. The cleaners' working posture was also documented in photographs. Hellstrøm *et al.* (1968) concluded that both dry and wet mopping involved heavy muscular work, but that dry mopping was preferable. According to them, cleaning stairs was heavy work and should not take up too much of the cleaners' working day. The test results also favored mechanical polish removal. In addition, Hellstrøm *et al.* (1968) state: "As an approximation, cleaning was adjudged qualitatively much better with the cleaning method using machines [translated by the authors]." Please note that all citations from Norwegian publications hereon are translated by the authors.

Modern techniques gradually gained acceptance (Hellstrøm *et al.*, 1969) and polishing and the process of removing polish was done mechanically, although cleaning was still done manually. Hellstrøm *et al.* (1969: 4) state the following as one of the reasons for researching modern cleaning methods:

> From several sources there have been questions (and doubts) as to whether floors really become clean using the new methods and whether instead one whirls up dust and bacteria from the floors. It has also been discussed whether the new methods are harder to work with than traditional ones.

Hellstrøm *et al. (1969)* conducted tests on dry and wet mopping, with twenty female cleaners. The results showed that cleaning with dry mops was less demanding than cleaning with wet mops. In addition, dry-mop cleaning was nine times quicker than wet-mop cleaning. Dry mops were found to be unsuitable for wet floors, while wet mops were more efficient on heavily soiled floors. However, there were no big differences between wet and dry mops in cases when floors were either slightly or moderately soiled. Hellstrøm *et al. (1969)* also intended to investigate whether from a health perspective it was necessary to clean different premises on a daily basis, but concluded that this was more a matter of esthetics. They claimed that their reason for not conducting an esthetic evaluation was that the findings could not be quantified in a satisfying way.

The 1950s and 1960s focused on efficient cleaning methods, possible health risks attached to them and the cleaners workload. The next decade, the 1970s, follows up on the previous

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research, but concentrates on cleaners work environment, daytime cleaning and maps the cleaning industry.

6.2 The 1970s focus on work environment

Seven of the twelve contributions to cleaning-related research in the 1970s (Figure 3) were initiated by the National Federation of Cleaning Industries (RBL). In 1976 the Norwegian Union of General Workers (NAF) launched the project "Organization and Work Environment in the Cleaning Industry." The project was the result of an ongoing debate in Norwegian newspapers. The project produced three preliminary study reports written by Ebeltoft in 1977 (Ebeltoft, 1979). The reports investigated work environment (Ebeltoft, 1977a, 1977b) and normalized working hours (Ebeltoft, 1977c). Within the frame of the project, Ebeltoft and his colleagues produced further three reports, on cleaning ladies' trade union in a historical perspective (Berg, 1979), cleaning versus division of labor in society (Bermann, 1979a), and conditions of employment related to job attachment (Bermann, 1979b). In addition, Ebeltoft produced a further two reports: one regarding work environment issues (Ebeltoft, 1979), and a co-authored report on the work environment and health of cleaners working for the Norwegian railway service (Ebeltoft *et al.*, 1979). In total, Ebeltoft and his colleagues contributed with eight cleaning-related research reports between 1977 and 1979. Three of these reports (Ebeltoft, 1977a, 1977c, 1979) fall into the category interpretivism–realism, three reports (Ebeltoft, 1977b; Bermann 1979a, 1979b) are in the category positivism–realism, one report (Ebeltoft *et al.*, 1979) is in the category positivism–idealism, and one (Berg, 1979) is in the category interpretivism–idealism.

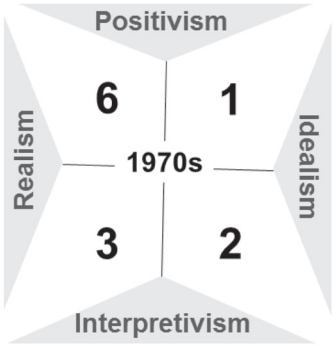

Figure 3 Norwegian cleaning research during the 1970s

A further three reports produced during the 1970s fall into the category positivism–realism, namely those by Bing & Schjødt (1970), Ringen (1976), and Blaalid (1979). In 1970, the Norwegian Building Research Institute (Byggforsk) investigated surface finishing, cleaning, and maintenance of stone floors on behalf of the Stoneoffice (Stenkontoret). In total, twenty-three different detergents were tested covering twenty-two different types of stone floors at thirty-three different locations. It was concluded that in general caution should be exercised when using synthetic floor washing powder on stone and that mild soap and certain soft soaps (green soaps) were preferable. The Norwegian Building Research Institute also reported that a) soft soap often leaves a membrane that in time results in a polished effect, b) cleaning with mops was without doubt the most efficient way of cleaning stone floors, and c) porous and rough stones surfaces should be treated to enable easier cleaning. The cost of cleaning by dry

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mopping was calculated to be NOK 15–20 per m^2 while wet washing was estimated to cost NOK 40 per m^2 (Bing & Schjødt, 1970).

In 1976, Ringen investigated cleaning workers in an attempt to answer questions raised during a parliamentary debate on 21 January 1976 regarding skills training for cleaners and the cleaning industry's organization conditions and ownership. Ringen (1976: 23) stated:

> The main impression from the analysis is that cleaning workers' circumstances are problematic and that they have a very difficult position in working life. The problem is so striking that it seems essential to point at that one positive feature existing, namely the lack of formal working conditions. It seems that part of the initiative mentioned in the parliamentary debate – fixed working hours and skills training – seeks to resolve some of the problems in cleaning work in such a way that it also will harm the positive features.

One year later Blaalid (1979) published his statistical analysis of the cleaning industry. The report recommends ways to achieve a better working environment for employees in the cleaning industry. It also focused on companies' activities, employment practices, equity capital, working environment, and so forth. Blaalid (1979) found that in 1977 there was a total of 737 cleaning companies employing a total of 6915 cleaning assistants in Norway.

The last report dating from the 1970s, by Kalleberg (1977) falls into the category interpretivism–idealism and investigates women in the cleaning industry in relation to child care in families and inconvenient working hours.

The 1970s mapped the cleaning industry and concentrated on cleaners work environment and daytime cleaning. During this decade the first tendency of cleaning emerging as a research field is seen. The following decade, the 1980s, shifted the focus toward gender equality and cleaning ladies home and working situation.

6.3 The 1980s: focus on health issues and gender equality

During the 1980s there were only seven contributions to cleaning-related research. As shown in Figure 4, two reports fall into the category positivism–realism, one in positivism–idealism, two in interpretivism–idealism, and two in interpretivism–realism.

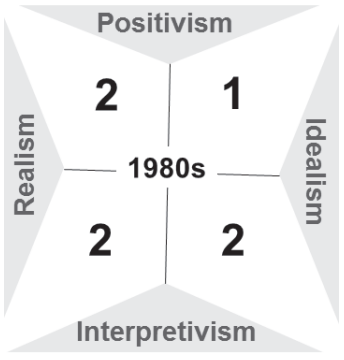

Figure 4 Norwegian cleaning research during 1980s

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One of the two interpretivism–idealism reports presents the results of an investigation into gender equality and women's labor market position and was concerned with discrimination against women (Bringslid, 1989). The other study was initiated by the Local Government Pension Fund (Kommunal Landspensjonskasse, KLP) and the cleaners' labor union, and presented the results of an investigation into the high incidence of disabled pensioners among cleaners (Kalleberg, 1983). The study was unable to find any explanations but pointed to several factors, such as physical heavy work, lack of good social environment, and the way work was organized, thus rendering cleaning work invisible and disparaging it.

One of the two positivism–realism reports was prepared by Ebeltoft (1981), who looked for causal relations between repetitive strain injuries (RSIs) and morbidity. The other report was prepared on behalf of the Department of Health and Social Security and mapped variations in cleaning costs in mental hospitals, somatic hospitals, and somatic nursing homes (Willassen, 1987).

The report categorized as positivism–idealism presented the results of an investigation of working hours, work time arrangements, and working environment (Abrahamsen & Kalleberg, 1986). The two reports in the category interpretivism–realism presented the results of an investigation into ergonomic initiatives among cleaners (Winge *et al.*, 1983) and the labor market, job design, and family bonds in the cleaning industry (Kalleberg, 1980).

The 1980s were marked by research on gender equality and different risk factors in cleaning personnel's working situation and private life.

6.4 The 1990s: an explosion in cleaning-related research

The 1990s is marked by a significant increase in research activities related to cleaning. As shown in Figure 5, twenty-two contributions were found. Only one report falls within the idealism category, namely the positivistic report by Gamperiene *et al.* (1999). Two contributions fall into the interpretivism–realism category, namely those by Brochgrevink (1995) and Kitterød (1999). The remaining nineteen contributions all fall into the positivism–realism category. One of these reports presents the findings of investigations into the level of cleaning quality and cost analysis (Myrvang, 1991).

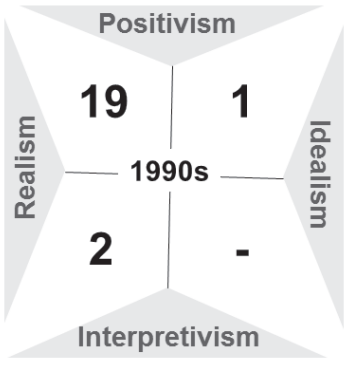

Figure 5 Norwegian cleaning research during 1990s

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Tryland *et al.* (1991a–c) evaluated health and environmental risks of tensides (surfactants) and other components in washing and cleaning detergents. ECON (1994) looked into competition between private and public cleaning services within public organizations that was a result of the value added tax on private services.

Nielsen (1996) attempted to define a cleaning index for occupied rooms, while Schneider and his colleagues investigated how cleaning quality could be quantified (Schneider *et al.*, 1994a), and also the effectiveness of different cleaning methods and how much airborne dust generation they contributed to (Schneider *et al.*, 1994b). Schneider *et al.* (1994b) found that the use of oil mops was the most effective method among the six tested floor cleaning methods. The researchers also studied whether or not cleaning with microfiber cloths was a good alternative to cleaning with chemicals (Nilsen *et al.*, 1999), and the cleaning effect, wear resistance of microfiber cloths and the effect of microfiber cloths on surfaces (Nilsen *et al.*, 1997).

Two contributions in 1996 investigated indoor climates in schools. One of the reports looked closely at the relations between illness and health complaints and indoor climate (Aas, 1996). One of the findings was that cleaning had a great importance for the health of pupils and members of staff. The other contribution investigated the indoor climate in nine schools in the town Larvik (Gustavsen, 1996) and is most likely one of the starting points for the Norwegian cleaning concept known as the Larvik model.

In the mid-1990s newspapers debated the high occurrence of cleaning personnel in receipt of disability benefit. The debate was based on two reports produced by Riktstrygdeverket and KLP and caught the attention of the National Federation of Service Industries (SBL). This resulted in a project that investigated why cleaners became disabled pensioners. The two-phase project was carried out by the Norwegian Work Research Institute. The first phase was based on a categorization of disability insurance records and sorted the cleaners into three categories: *stable cleaners*, who were long-term employees who developed health issues as a result of cleaning occupancy; *unstable cleaners*, who were short-term employees who developed health issues as a result of other occupancies than cleaning; and *temporary cleaners*, who often were young, working part time, had a high level of education and good health (Enehaug *et al.*, 2008). The second phase was based on a survey in 1997 and described work environment challenges and health consequences in different companies in Norway. The analysis was seen in relation to the doctoral research carried out by Gamperiene (2008). The results from the first phase were published by Gamperiene *et al.* (1999), while the results from the second phase were published by Enehaug *et al.* (2008).

In 1995 the cleaning industry produced a report that evaluated the foundation Ren Utvikling (Clean Development) which started up in 1993 with the intention of awarding a certificate to cleaning companies which operate according to laws and regulations and which contribute to developments in cleaning (Brochgrevink, 1995).

Nesheim & Rokkan (1997) looked into the consequences for workers when cleaning services were either kept in-house or outsourced. Skulberg *et al.* (1998) investigated how methods for dust removal would aid the indoor climate in the office. At about the same time, the National Federation of Service Industries (SBL) initiated research by Sjøvold & Dahl (1999), who investigated key figures in cleaning.

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Kitterød produced five contributions in the 1990s, all of which related to women and family research. The use of time spent by parents with young children and help with house cleaning in the period from 1996–1999 were analyzed statistically (Kitterød, 1996, 1997, 1998a, 1988b, 1999). Kitterød (1999) is the only work that falls into the category of interpretivism–realism. The remaining four by Kitterød fall into the category positivism–realism.

Cleaning seems to emerge for real as a research field during the 1990s, numerous contributions were made to cleaning research during this decade and this seems to have continued in the new millennium.

6.5 From 2000 onwards: publication continues at a high rate

A total of thirty-three publications have been found dating to the period 2000–2009. Two of the publications fall into the category positivism–idealism, five reports in interpretivism–realism, and five in interpretivism–idealism. As shown in Figure 6, twenty-one of the contributions are in the positivism–realism category.

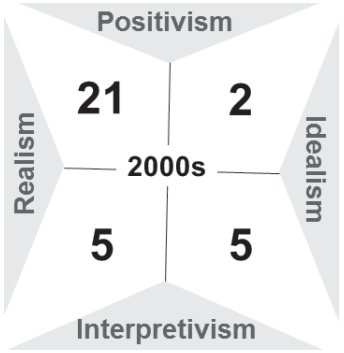

Figure 6 Norwegian cleaning research during 2000s

One of the two positivism–idealism reports is a PhD thesis which uses the results of surveys and quantitative interviews to investigate ergonomic risk factors, disability pensions, psychosocial organizational work conditions, and mental health among cleaners (Gamperiene, 2008). The other report is closely linked to the previous one and represents the second stage of a project in which Enehaug *et al.* (2008) researched why cleaners become disabled pensioners. Their findings included the following: a) job satisfaction and mental health issues were related to the level and quality of cooperation and management; b) language skills are a vital factor when it comes to health-related issues in companies with many non-native speakers; and c) there was no connection between length of service and probability of becoming a disabled pensioner. Enehaug *et al. (2008)* explain that persons with poor general health typically are recruited to professions with low entrance requirements. As a result, such professions may have a higher number of incidences of illness than other professions, they may gain an undeservedly bad reputation, and their work-related risk factors may be overestimated.

Two of the five interpretivism–idealism contributions deal with the issues related to immigrants. One looks into female immigrants' working life (Sollund, 2004), while the other investigates immigrants' work environment and whether or not the labor unions includes

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immigrants (Lund and Friberg, 2004). Moland & Andersen (2007) investigated how Norwegian local authorities dealt with part-time work. Størkersen (2008) investigated the occupational identity of janitorial cleaners on oil platforms as part of a larger project titled "Presence in the Catering Department"[2]. Related to the same project, Gjøsund, Størkersen & Schiefloe (2007) looked into catering departments on oil platforms, including cleaning services.

The interpretivism–realism reports are mainly based on the results of qualitative interviews. One of the four reports draws on a combination of quantitative and qualitative interviews, while another report uses the results of both qualitative interviews and fieldwork. Two of the reports represent gender research. One of the reports investigates how the Norwegian textile washing powder producer Lilleborg won the "washing powder war" through their market strategy towards housewives in the period 1950–1970 (Lund, 2008), while the other uses the results of interviews and fieldwork to investigate how the dimensions gender and class can be understood through unskilled women's situation in the labor market, in their job, and their experience of their work and their occupational identity (Skilbrei, 2003). The report draws on a combination of qualitative face-to-face interviews and quantitative phone interviews, and describes and analyses processes, development progress, and adaptation within local authorities, and also attempts to gain an overview of local authorities' use of market-related instruments (Nesheim and Vathne, 2000). The two reports based solely on qualitative interviews examine the needs and possibilities for use of robot and sensor technology in the health care sector (Holbø *et al.*, 2009), and compare pension schemes in the private sector with those in the public sector (Pedersen, 2000). In 2002, Bjørseth *et al.* (2002) focused on floor polishing procedures in their investigation of airway hypersensitivity related to incorrect polishing procedures. In the same year Bakke *et al.* (2002) produced a report characterizing the emissions from PCV floors which had been polished mechanically.

Eleven of the twenty-one positivism–realism contributions dating to the 2000s were produced by Nilsen and his colleagues. In short, their contributions relate to linoleum floors, microfiber cloths, cleaning quality standards, indoor climates, and the cleaning concept "Best Practice Cleaning". Nilsen *et al.* (2000) presented a standard for measuring cleaning quality - INSTA 800 - which is currently used in the Nordic countries for measuring cleaning quality. Blom & Nilsen (2000) followed up on the reports from the 1950s and 1960s relating linoleum floors and investigated today's linoleum floors properties, maintenance, and effect on indoor climate. Nilsen *et al.* (2003) followed up on this through investigation of powdering problems and VOC emissions on linoleum floors while Dahl *et al.* (2003) recommended methods for cleaning and maintenance of linoleum floors. In 2002 Nilsen and colleagues published their work regarding textile floor coverings as part of indoor environments (Dahl *et al.*, 2002a), microfiber cloths' characteristics, cleaning effect, abrasion on surfaces, friction, and wear resistance (Nilsen *et al.*, 2002), the cleaning properties of different microfiber-based mop systems (Dahl *et al.*, 2002b), and an intervention study in an office setting regarding the relationship between indoor air-related health problems, productivity, and cleanliness (Nilsen *et al.* , 2002). The introduction of the cleaning concept Best Practice Cleaning has led to reductions in costs, dust levels, and chemical loads (Nilsen *et al.*, 2006) and to reductions in costs, waste and use of chemical (Nilsen *et al.*, 2008). Dahl *et al* (2006) have investigated dust loads in new and renovated buildings.

Five of the positivism–realism contributions in the 2000s focus partly on cleaning but in most cases this is closely related to indoor climate. Berner (2000) looked into building and

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technical design related to hygiene and cleaning in the case of a building under construction. Mathisen (2001) evaluated the Larvik model and compared studies made by Aas (1996) and Gustavsen (1996). Klavenes *et al.* (2002) investigated how the food bacteria *Bacillus cereus* could be washed off steel surfaces. Skulberg (2006) had cleaning as one of his perspectives in intervention studies of indoor air dust exposures and health in office workers.

Hayat & Sæther (2008) published a rate index for cleaning operations, while Fevang, Strøm & Sæther (2008) investigated whether the public sector and/or local authorities were wage leaders and compared salary levels for employees in local authorities, the state, and the private sector.

Kitterød looked into families' use of janitorial cleaners. She concluded that few Norwegian families employ cleaners (Kitterød, 2002), but that the practice is most common among upper class groups (Kitterød, 2009).

The new millennium seems to continue with the high rate of publications as was seen during the 1990s. Contributions made in the 2000s built on the previous research, but represent a broadening in the research topics as it starts to research how cleaning services are used by families in addition to possible future cleaning methods as robotics.

7. Concluding discussion

Research approaches and disciplines represented in Norwegian cleaning research have been summarized in this article. The majority of the research contributions were made after 1950. However, we glimpse towards the 1800s which may well be the foundation for Norwegians interest towards cleaning. The categorization shows the overall distribution of Norwegian cleaning research during the whole period. The majority of the 80 research contributions (78 publications) were found after the Second World War. Only two publications where published earlier. As shown in Figure 7, the majority of the postwar research contributions that have been studied are categorized as positivism–realism. This category is also the largest in all of the studied time periods (equal to other categories in the 1980s). There are basically three types of research in this category: engineering (mainly civil and chemical engineering), medicine, and quantitative social science.

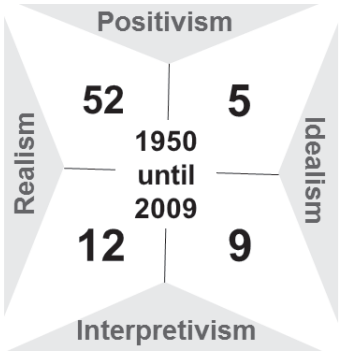

Figure 7 Norwegian cleaning research total

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The second largest group is interpretivism–realism, with a total of twelve publications. These report the findings of studies which draw on qualitative analyses based on interviews or qualitative analyses combined with interviews. The majority of the studies were carried out by social science researchers.

Idealism was most frequently combined with interpretivism. Nine studies fall into this category, typically performed by social science researchers who utilized methods that included observations and interviews. Five studies fall into the positivism–idealism category, and used quantitative analyses in a value-based context.

Research approaches have shifted during the studied period and the development in cleaning-related research has evolved. The evolvement in cleaning-related research approaches seems to be consistent with the history of both science and the development of Norwegian universities. With the exception of Sundt's publications in the late 1800s, only positivism–realism contributions are to be found in cleaning research before the 1977. This corresponds with what Neurath (1973) writes about sociological and psychological investigation around the 1900s, namely that these research directions were still in their early stages. During the 1950s and 1960s cleaning research focused on modern cleaning methods and whether or not they were more efficient and if there was any risk involved if they were implemented. It is interesting to note that Hellstrøm *et al.* (1969) failed to evaluate esthetic appearance with positivistic methods, as their findings could not be quantified in a satisfying way.

The ideological change in universities and the political events that occurred at the end of the 1960s correspond to the broadening of cleaning research approaches in the 1970s and 1980s. In 1976, just after the economic crisis, cleaning-related research started to emerge as a discipline. This is the same time as universities in general got a new role as suppliers of new knowledge on how to renew society (Collet, 1997). During the four years from 1976 till 1979 as much as eleven publications where published while it previously had taken 106 years to produce eleven contributions from Sundt's first cleaning related publication in 1869 until 1975, when cleaning research broadened. The research was no longer only concerned with technical issues such as efficiency but had started to map the complete cleaning industry and investigate cleaning personnel's skill training, work environment, working hours, and their families' ability to cope with their inconvenient working hours.

It took over 100 years - from Sundt's publications in 1869 and 1873 until 1977 - before the third cleaning-related publication categorized as interpretivism appeared in Norway. At about the same time, interest in subjects such as the humanities, social sciences, and the sciences increased (Collet, 1997). This corresponds to the time when cleaning-related research experienced a broadening in research approaches within all four categories in the 1970s and 1980s. In the 1980s, topics such as gender equality, job design, working hours, disability levels, repetitive strain injuries, egomaniacal initiatives, and variations in cleaning costs were investigated.

In the 1990s and 2000s the broad spectrum of research approaches continued, but the majority of the research contributions fall into the category positivism–realism. During the 1990s Norwegian cleaning research explored ways of detecting cleaning quality, chemical-free cleaning methods, the effects of cleaning on indoor environments, cleaning personnel's health and consequences for cleaning personnel in relation to outsourcing, key figures in cleaning services, families' use of cleaning services, and improvement possibilities within the

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Norwegian cleaning industry. In the 2000s, cleaning-related research maintained its focus on cleaning personnel's health, cleaning quality, chemical-free cleaning, and relation to indoor environments. During this period the research also covered topics such as immigrants' appearance in the industry, the use of part-time, wages within the private and public sectors, cleaning personnel's occupational identity, unskilled women's situation, and possibilities in relation to robot and sensor technology.

The development of cleaning-related research can be summarized as shown in Figure 8.

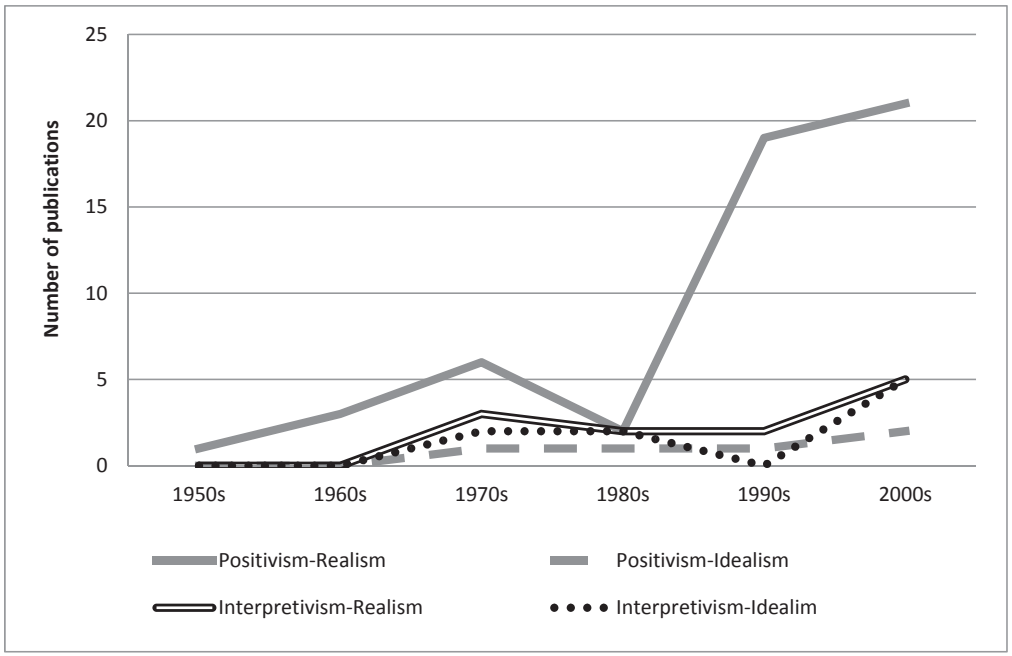

Figure 8 Development in Norwegian cleaning research since 1800s until 2000s

8. Further research

This article shows that significantly more research has been inspired by positivism than interpretivism. Hence, there may be a need for more interpretivistic research. To date, interviews have been the major research method within interpretivistic research, and this may indicate a need for further broadening in research methods. The article shows that few researchers have investigated cleaning work from the perspective of cleaning personnel and that that there has been little focus on the usability of buildings for cleaning personnel. It is clear that observation methods such as time and diary studies have been used since the 1950s but there are several observation techniques that have not yet been applied, such as shadowing.

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References

Alexander, K. (2010). "Integration of Core Business and Facility Management. Research Perspectives." *Plenary Session for Researchers presentation 1st June 2010. European Facility Management Conference* (EFMC).

Abrahamsen, B. & Kalleberg, A. (1986). *Arbeidstid og arbeidsmiljø. En artikkelsamling om arbeidstid, arbeidstidsordninger og arbeidsmiljø*. Rap 3/1986. Institutt for samfunnsforskning, Oslo.

Bakke, J.V., Askeland, A., Bjørseth, O., Iversen, N., Martens, B. & Aasen, T.B. (2002). "Airway hypersensitivity related to incorrect polishing procedures". *Proceedings of the 9th International conference on Indoor Air Quality and Climate - Indoor Air 2002, Montery*, Vol. 1, pp. 131-136.

Berg, A.M. (1979). *Rengjøringskvinnenes faglige organisering i et historisk perspektiv,* Arbeidspsykologisk institutt, Oslo.

Bermann, T. (1979a). *Rengjøring og arbeidsdeling i samfunnet. Data fra folketellingen i 1970,* Rapport 8/1979, Arbeidspsykologisk institutt, Oslo.

Bermann, T. (1979b). *Arbeidsnotat om rengjøring. 1. Allment om undersøkelsen. 2. Ansettelsesforhold og jobbtilknytning,* Rap 12/1979, Arbeidspsykologisk institutt, Oslo.

Berner, M. (2000). *Bygningsteknisk og teknisk design relatert til hygiene og renhold for et nybygg under oppføring,* A5162, ISAN, SBL & SINTEF, Trondheim.

Bing, J. & Schjødt (1970). *Rapport til stenkontoret om undersøkelse av steingulv,* NBI-rapport nr 0-3096. Norges byggforskningsinstitutt, Oslo.

Bjørberg, S., Larsen, A. & Øiseth, H. (2007). *Livssykluskonstader for bygninger***,** RIF - Organisasjonen for rådgivere Norges bygg- og eiendomsforening, Oslo.

Bjørseth, O., Bakke, J.V., Iversen, N. & Martensen, B. (2002). "Characterization of emission from mechanical polishing of PCV floors", *Proceedings of the 9th International conference on Indoor Air Quality and Climate - Indoor Air 2002, Montery*, Vol. 3, pp. 104.-109.

Blaalid, J. (1979). *Undersøkelse av renholdsbedrifter 1977***.** Statistisk sentralbyrå, Oslo, available at: http://www.ssb.no/histstat/rapp/rapp_197903.pdf (Accessed 17th April 2011).

Blom, P. & Nilsen, S. (2000). *Linoleum gulvbelegg. Egenskaper, vedlikehold og innemiljø*. Prosjektrap 283/2000. Norges byggforskningsinstitutt, Oslo, available at: http://www.sintef.no/upload/Byggforsk/Publikasjoner/Prosjektrapport283.pdf (Accessed 17th April 2011).

Bringslid, M.B. (1989). *Eg synes ikkje eg kunne gå fra det sånn… En rapport om reinhaldarar sitt arbeidsmiljø***,** UiB, Gruppe for flerfaglig arbeidslivsforskning, Oslo.

Brochgrevink, T. (1995). *Som en svane… Rapport fra et utviklingsprosjekt i renholdsbransjen,* AFI-notat 11/95. Arbeidsforskningsinstituttet og Ren Utvikling, Oslo.

Christophersen, O.H., Christie, N. & Petersen, K. (ed.) (1975). *En fakkel bok. Verker i utvalg 9. Eilert Sundt. Om renslighets-stellet i Norge*, Gyldendal Norsk Forlag, Oslo.

Cold, B., Kolstad, A. & Larssæther, S. (1998). *Aesthetics, Well-being and Health. Abstracts on theoretical and empirical research within environmental aestethics,* Norsk Form, Oslo.

Collett, J.P. (1997). "Vendepunkter i norsk universitetshistorie", Andersen, A.F. & Hjeltnes, G. (ed.): *Universitet, samfunn og politikk : 18 innlegg om universitets- og vitenskapshistorie,* Forum for universitetshistorie, Skriftserie 2/1997, pp. 91-106.

Creswell, J.W. (2009) *Research design. Qualitative, quantitative, and mixed methods approaches***,** Third Edition. Sage Publications, California.

DOI for this article is http://dx.doi.org/10.1108/02632771311317457

Dahl, I. E., Holøs, S. B. and Nilsen, S.K. (2002a).“Textile floor covering as part of indoor environment”, *Indoor Air 2002, the Ninth International Conference on Indoor Air Quality and Climate, 30 June-5 July 2002, Monterey, California***,** vol. 1, pp. 986-991.

Dahl, I., Nilsen, S., Holøs, S.B. (2002b). “Cleaning properties of four microfiber based modern mopsystems”, *Proceedings Cleaning in Tomorrows world 2002, 30th September – 1st October 2002*, Helsinki.

Dahl, I., Nilsen,S. & Blom, P. (2003). “Linoleums Floors – Properties, maintenance and effect on indoor air quality – Recommended methods for cleaning and maintenance”, *The 7th international conference on Healthy buildings, Healthy Buildings 2003, Singapore,* pp. 478-483.

Dahl, I., S.K. Nilsen and T.M. Kalbakk (2006) . “A survey of dust loads in new and renovated Norwegian buildings”, *Healthy Buildings 2006, 6th-8th June, Lisbon,* Proceedings III, pp. 383-386.

Danielsen, D.C. & Boeck, C.W. (1847). *Om spedalskhed*. Departementet, Christiania, Norway.

Dedichen, N.N. (1956). “Rengjøring ved våre sykehus.” T.norske Lægeforen. 1956, vol.12, p.442.

Ebeltoft, A. (1977a). *Arbeidsmiljø i rengjøringen. Del A. En eksplorerende undersøkelse,* Rapport 30:1977. Arbeidspsykologisk Institutt, Oslo.

Ebeltoft, A. (1977b). *Arbeidsmiljø i rengjøringen. Del B. Data fra andre undersøkelser,* Rapport 36:1977. Arbeidspsykologisk Institutt, Oslo.

Ebeltoft, A. (1977c). *Virkningene av ”normalisert” arbeidstid i rengjøring,* Arbeidspsykologisk Institutt, Oslo.

Ebeltoft, A. (1979). *Arbeidsmiljøproblemer i rengjøringen. Tilretteleggelse av arbeid belastninger og helse. En intervjuundersøkelse,* Arbeidspsykologisk Institutt, Oslo.

Ebeltoft, A. (1981). *Arbeidsnotat om belastningslidelser, sykelighet, registreringer og årsaksmodeller,* Arbeidspsykologisk institutt, Oslo.

Ebeltoft, A., Erikstad, T. og Slaatto, G. (1979). *Arbeidsmiljø- og helseundersøkelse av rengjøringspersonalet i Norsk Jernbaneverk,* Rapport 28/1979. Arbeidspsykologisk institutt, Oslo.

ECON (1994). *Produksjon i egenregi i kommunene innenfor renhold og vaskeri- og renserivirksomhet,* ECON rap 107/1994.

Enehaug, H., Gamperiene, M., Hetle, A., Wærsted, M. og Bruusgaard, D. (2008). *Arbeidsmiljø og helse i renholdsbransjen. Sluttrapport.* Arbeidsforskningsinstituttet, Oslo, available at: http://www.afi-wri.no/stream_file.asp?iEntityId=3273 (Accessed 17th April 2011).

Fellows, R. and Lui, A. (2008). *Research Methods for Construction***,** Third Edition. Blackwell Publishing Ltd, Chichester.

Fevang, E., Strøm, S., Sæther, E.M. (2008). *Er kommunesektoren og/eller Staten lønnsledende? En sammenlikning av lønnsnivå for arbeidstakere I kommunal, statlig og privat sektor,* Stiftelsen Frischsenteret for samfunnsøkonomisk forskning og Pricewater Coopers, available at: http://www.frisch.uio.no//pdf/rapp08_01.pdf (Accessed 17th April 2011).

Frascati Manual (2002). *Proposed standard practice for surveys on research and experimental development,* OECD – Organisation for Economic Co-operation and Development, available at: http://www.tubitak.gov.tr/tubitak_content_files/BTYPD/kilavuzlar/Frascati.pdf (Accessed 17th April 2011).

Gamperiene, M. (2008). “Health and work environment among women in unskilled occupations”**,** PhD Thesis. Section of Occupational and Social Insurance Medicine, University of Oslo. Oslo, August 2007, available at:

DOI for this article is http://dx.doi.org/10.1108/02632771311317457

http://www.duo.uio.no/publ/allmen/2007/69229/DUO_576_Gamperiene_17x24.pdf , (Accessed 17th April 2011).

Gamperiene, M., Bruusgaard, D., Claussen, B., Nygård, J.F. & Wærsted, M. (1999). "Arbeidsmiljø, helseplager og utstøtning i renholdsyrket. Trinn 1 fra prosjektet "Hvorfor blir renholdere uførepensjonert?"**,** University of Oslo, Oslo.

Gjøsund, G., Størkersen, K. V. og Schiefloe, P.M. (2007). *Nærvær i forpleiningen*, Prosjektrapport nr 2/2007. Studio Apertura, Trondheim.

Gustavsen, K. (1996). *Inneklima resultat fra Rødbøl skole, Frostvedt skole, Byskogen skole, Langestrand skole, Berg skole, Brunla Ungdomsskole, Mesterfjellet Ungdomsskole, Mellomhagen Ungdomsskole og Østre Halsen skole,* Larvik kommune.

Hayat, A. & Sæter, T.T. (2008). *Prisindeks for rengjøringsvirksomhet. Notater 49/2008. Statistisk Sentralbyrå*, available at: http://www.ssb.no/emner/08/02/20/notat_200849/notat_200849.pdf (Accessed 17th April 2011).

Hellstrøm, B., Greger, I. & Janssen, T. (1968). *Arbeidstyngden ved gulvrengjøring,* Teknisk rapport, Yrkeshygienisk Institutt, Oslo, available at: http://bilder.bibits.no/stami/Diverse/1968/Arbeidstyngde_gulvrengjøring.pdf (Accessed 01 November 2011).

Hellstrøm, B., Greger, I., Janssen, T. & Jahr, J. (1969). *Gulvrengjøring. Arbeidsbelastning og rengjøringseffekt ved bruk av våtvask og tørrmopp,* Yrkeshygienisk Institutt, Arbeidsforskningsinstituttene,Oslo, Januar 1969, available at: http://bilder.bibits.no/stami/Diverse/1969/Gulvrengjoring_69.pdf (Accessed 01st November 2011).

Holbø, K., Schjølberg, I., Svagård, I., Øderud, T., Storholmen, T.C. & Sandsund, M. (2009). *Kartlegging av behov og muligheter for robot. Og sensorteknologi i helse- og omsorgssektoren*, A9521. SINTEF, Oslo, available at: http://www.ks.no/PageFiles/5904/084015_KS%20Rapport%20Robot%20og%20Sensor.pdf (Accessed 17th April 2011).

Holland, G. A. (2008) "Information science: an interdisciplinary effort?", *Journal of Documentation* 64.1 (2008), pp.7-23.

Holt, K. (1952). *Vedlikehold og rengjøring av linoleumsgulv***,** SINTEF, Trondheim.

Høst, H. (2007). *"Utdanningsreformer som moderniseringsoffensiv",* En studie av hjelpepleieryrkets rekruttering og dannelseshistorie, 1960 - 2006. Avhandling for graden doctor rerum politicarum (dr.polit.). Universitetet i Bergen, available at: https://bora.uib.no/bitstream/1956/2327/1/PhD_%20Haakon_Host.pdf (Accessed 17th April 2011).

Kalleberg, A. (1977). *Kvinner i rengjøringsfaget,* Delrapport fra undersøkelsen "Barnetilsyn i familier hvor foreldrene har ubekvem arbeidstid". Institutt for samfunnsforskning, Oslo.

Kalleberg, A. (1980). "Arbeidsmarked, jobbutforming og familiebinding. En analyse av Rengjøringsbransjen", In: Hanisch, T. *et al. Marked for arbeid. Lønnsarbeid i velferdssamfunnet.* Universitetsforlaget 1980. Institutt for samfunnsforskning, Oslo.

Kalleberg, A. (1983). "The making of a Female Occupation. A case study of cleaning work**",** In: Leira.A (ed) *Work and Womanhood. Norwegian study.* ISF no 8/83. Institutt for samfunnsforskning, Oslo.

Kitterød, R.H. (1996). "Hjelp til rengjøring?", Samfunnsspeilet, nr. 2, pp. 25-34, available at: http://www.ssb.no/histstat/ssp/ssp_199602.pdf (Accessed 17th April 2011).

Kitterød, R.H. (1997). *Leid hjelp til husarbeid? Bruk av privat rengjøringshjelp 1980-1995***,** Statistisk sentralbyrå, Oslo, avialable at: http://www.ssb.no/histstat/rapp/rapp_199706.pdf (Accessed 17th April 2011).

Kitterød, R.H. (1998a). "Fremdeles få småbarnsfamilier med rengjøringshjelp"**,** Samfunnsspeilet, nr 5, pp 34-41, available at: http://www.ssb.no/histstat/ssp/ssp_199805.pdf (Accessed 17 th April 2011).

DOI for this article is http://dx.doi.org/10.1108/02632771311317457

Kitterød, R.H. (1998b). "Kjøp av rengjøringstjenester – større sosiale ulikheter blant kvinner?", *Sosiologisk tidsskrift*, årg 6, nr 3, pp. 185-208.

Kitterød, R.H. (1999). "Privat rengjøringshjelp - et gode for mødre eller for hele husholdningen?", *Tidsskrift for samfunnsforskning*, nr. 3, pp. 335-367.

Kitterød, R.H. (2002). "Få har rengjøringshjelp, men stor variasjon mellom grupper", Samfunnsspeilet nr.4-5, pp.32-36, available at: http://www.ssb.no/samfunnsspeilet/utg/200204/ssp.pdf (Accessed 17th April 2011).

Kitterød, R.H. (2009). "Vaskehjelp vanligst i høystatusgrupper", Samfunnsspeilet nr.1, pp. 58-62, available at: http://www.ssb.no/ssp/utg/200901/ssp.pdf (Accessed 17th April 2011).

Klavenes, A., Stalheim, T., Sjøvold, O., Josefsen,K. & Granum, P.E. (2002). "Attachment of Bacillis cerus spores without appendages to stainless steel surfaces", *Institution of chemical engineers TransInstitution of Chemical Engineers (Trans IChemE)*, Vol 80, Part C, December 2002.

Krishnan, A. (2009). "What are Academic Disciplines? Some observations on the Disciplinarity vs. Interdisciplinarity debate", ESRC National Centre for Research Methods, NCRM, Working Paper Series 03/09. University of Southampton.

Lund, M. and Friberg, J. H. (2004). *En inkluderende fagbevegelse? Innvandrere, arbeidsmiljø og fagorganisering i renholds- og hotell og restaurantbransjen***,** Rapport 446. FAFO, available at: http://www.fafo.no/pub/rapp/446/446.pdf (Accessed 17th April 2011).

Lund, E. C. (2008). *Branding Blenda. Lilleborgs markedsførings overfor husmødre 1950-1970***,** PhD Thesis. Universitetet i Oslo.

Mathisen, H. M. (2001). *Evaluering av Larviksmodellen*, TR A5409. SINTEF, Trondheim.

Moland, L. E. and Andersen, R. K. (2007). *Hva gjør norske kommuner med deltid?*, FAFO, available at: http://www.fafo.no/pub/rapp/20025/20025.pdf (Accessed 17th April 2011).

Myrvang, R. (1991). *Renhold. Årskostnader og kvalitetsnivå*, Master Thesis. Universitetet i Trondheim.

Mysen, M., Magnussen, K., Nilsen, S.K., & Schild, P.G. (2006). "Emission from different types of used ventilation bag filters and their impact on perceived air quality", *Healthy Buildings 2006, Lisboa 4-6 June 2006*, Proceedings Vol. IV, pp. 471-474.

Nasar, J. L. (2000). "The evaluative Image of Place". *Walsh, Craik & Price (eds): Person-Environment Psychology: New Directions and Perspectives,* Second Edition, Lawrence Erlbaum Associates, London, pp. 345.

Nesheim, T. & Rokkan, A.I. (1997). *Renhold i egen regi eller kjøp av rengjøringstjenester. Konsekvenser for arbeidstakerne,* Stiftelsen for samfunns- og næringslivsforskning, Bergen.

Nesheim, T. og Vathne, K. (2000). *Konkurranseutsetting av bestiller-utfører organisering i norske kommuner*, Stiftelsen for samfunns- og næringslivsforskning, Bergen, available at: http://bora.nhh.no/bitstream/2330/1079/1/R59_00.pdf (Accessed 17th April 2011).

Neuman, W. L. (2006). *Social research methods: Qualitative and quantitative approaches,* Sixth Edition. Pearson International Edition, Boston.

Neurath, O. (1973). *Empiricism and sociology***,** D. Reidel Publishing Company, Dordrecht, Holland.

Nielsen, A. (1996). "Defining the Cleaning Index for occupied rooms." *Indoor Air'96, 7th International Conference on IndoorAir Quality and Climate, July 21-26, 1996 Nagoya, Japan*, Vol. 3, pp. 779-784.

Nilsen, S.K., Dahl, I. Jørgensen, O. & Schneider, T. (1997). "*Micro-fibre cloths, their cleaning effect, wear resistance and effect on surfaces*", Cleaning in Tomorrows world, Helsingfors.

DOI for this article is http://dx.doi.org/10.1108/02632771311317457

Nilsen, S. K., Dahl, I., Jørgensen, O. & Schneider, T. (1999) "Cleaning with Micro-fibre cloths- A Good alternative to cleaning with chemicals", *Indoor Air'99, Edinburgh, 8th-13th August,* Proceedings vol. 3, pp 62-67

Nilsen, S. K., Schjønning, A.L., Dahl, I., & Stiiskjær, J. (2000). "New internordic standard for measuring cleaning quality", *Healthy Buildings 2000 6th - 10th August 2000 - Espoo, Finland,* proceedings vol 4, pp. 375-378.

Nilsen, S.K., Dahl, I., Jørgensen, O. & Schneider, T. (2002). "Micro-fibre and ultra-micro-fibre cloths, their physical characteristics, cleaning effect, abrasion on surfaces, friction and wear resistance*." Building and Environment 37/2002*, pp. 1373-1378.

Nilsen, SK., Blom, P., Rydock, J., Nersveen, J. & Fostervold, K.I. (2002). "An intervention study of relationship between indoor air-related health problems, productivity and cleanliness in office setting". *Indoor Air 2002*. Proceedings Vol. 1, pp. 472-477.

Nilsen, S.K., Blom, P. & Dahl, I.E. (2003). "Linoleums Floors – Properties, maintenance and effects on indoor air quality – Maintenance with floor polish – Powdering problems and VOC emission." *The 7th international conference on Healthy buildings, Singapore, 7th to 11th December 2003,* proceedings, pp. 484-489.

Nilsen, S. K., Dahl, I.E, Kristiansen, T.H. , Neby, H.A., Reiersen, T. & Brønstad, B. (2006). "Best practice Cleaning – Reducing cost, dust levels and chemical load by introducing a modern cleaning concept." *Healthy Buildings 2006, 6 - 8 June 2006, Lisbon,* Vol. A, pp. 572.

Nilsen, S. K., Dahl, I.E, Kristiansen, T.H., Brønstad, B.O. & Høstmark, A.G. (2008). Best Practice Cleaning – Reducing cost, waste and use of chemicals by introducing a modern cleaning concept, *Sustainable Buildings 2008, 21-25th September 2008 in Melbourne* pp. 110-117.

Nilsson, I. (1984) "Vetenskapshistoria. Att studera vetenskapens forändring", In Bärmark, J. (ed): *Forskning om forskning eller Konsten at beskriva en elefant,* Natur och Kultur, 1984, pp. 105-141.

Nossum, I.J. (1999). *Stabekk i våre hjerter,* En 90-års kavalkade. Yrkeslitteratur AS, Oslo.

OECD (2007). *Revised field of science and technology (FOS) classification in the frascati manual*, 26-Feb-2007, Unclassified, DSTI/EAS/STP/NESTI(2006)19/FINAL, available at: http://www.oecd.org/dataoecd/36/44/38235147.pdf (Accessed 17th April 2011).

Pedersen, A.W. (2000). *Konkurranseutsetting og pensjon – en kvalitativ undersøkelse av pensjonsforholdene blant private bedrifter i tre bransjer,* FAFO, available at: http://www.fafo.no/pub/rapp/338/index.htm (Accessed 17th April 2011).

Pratt, J.B. (1933). "Is Idealism Realism?", *The Journal of Philosophy*, Vol. 30, No.7, pp. 169-178.

Ringen, S. (1976). "Undersøkelse av rengjøringsarbeidere**",** Stensil. Institutt for samfunnsforskning, Oslo.

Schneider, T., Løbner, T., Nilsen, S.K. & Petersen, O.H. (1994a). "Quality of Cleaning Quantified.", *Indoor Air '93 Congress 1993, Helsinki*, Vol, 6, pp 291-296.

Schneider, T., Nilsen, S. K. & Dahl, I. (1994b). "Cleaning methods, their effectiveness and airborne dust generation", *Indoor Air '93 Congress 1993, Helsinki*, Vol 6, page 327-332.

Seip, A.L. (1986). "Eilert Sundt. A Founding Father of the Social Sciences in Norway", *Scandinavian Journal of History*, 1986, vol. 11, nr.1.

Sjøvold, O. & Dahl, P.A. (1999). *Nøkkeltall for renhold*, A4904. SINTEF, Trondheim.

Skilbrei, M.L. (2003). *Dette er jo en husmorjobb. Ufaglærte kvinner i arbeidslivet,* PhD Thesis, NOVA, available at: http://www.nova.no/asset/2837/1/2837_1.pdf (Accessed 17th April 2011).

DOI for this article is http://dx.doi.org/10.1108/02632771311317457

Skulberg, K.R. (2006). *Intervention studies of indoor air dust exposures and health in office workers,* PhD Thesis. Univercty of Oslo.

Skulberg, K.R., Skyberg, K., Eduard, W., Kruse, K., Huser, P.O., Kjuus, H., Djupesland, P. & Levy, F. (1998). *Inneklima på kontoret – hjelper støvsanerende tiltak?,* HD 1097/98 FOU. Statens arbeidsmiljøinstitutt.

Sollund, R.A. (2004). *Rammer, rom og mobilitet. Innvandrerkvinners arbeidsliv,* PhD Thesis. Institutt for samfunsforskning.

Stangebye, H.P. (1958). *Rapport vedrørende renholdsforsøk på Ullevål sykehus avd. VI,* Ullevål Sykehus, Oslo.

Størkersen, K.V. (2008). *Kunsten å la lodotter ligge. Yrkesidentitet blat renholdere i utaskjærs virksomhet,.* MSc. Thesis. NTNU, Trondheim.

Sundt, E. (1869). *Om rensligheds-stellet i Norge. Til opplysningom flid og fremskrit i Landet,* Abelsted, Christiania.

Sundt, E. (1873). *Om huslivet i Norge.Fortsettelse av boken "Om Renslighetsstellet i Norge."Og med særlig hensyn til de tre vestlandske Amter Romstal samt Nordre og Søndre Bergenhus,* Abelsted, Christiania.

Tryland, Ø., Serck-Hanssen, C. & Haraldstad, Ø. (1991a). *Materialanalyse, helsefare- og miljøvurdering av tensider og andre komponenter i vaske- og rengjøringsmidler.* Statens forurensningsinstitutt, Oslo.

Tryland, Ø., Serck-Hanssen, C. & Haraldstad, Ø. (1991b). *Helsefarevurdering av utvalgte komponenter i vaske- og rengjøringsmidler, Delrapport B,* Statens forurensningsinstitutt, Oslo.

Tryland, Ø., Serck-Hanssen, C. & Haraldstad, Ø. (1991c). *Miljøvurdering av tensider og andre komponenter i vaske- og rengjøringsmidler, Delrapport C,* Statens forurensningsinstitutt, Oslo.

Tøsse, S. (2004) *Frå folkeopplysning til Vaksenopplæring.* PhD Thesis, Fakultet for samfunnsvitenskap og teknologiledelse. Pedagogisk institutt Norges teknisk-naturvitenskapelige universitet, NTNU Trondheim, available at: http://202.198.141.77/upload/soft/0-article/+++++0/146.pdf (Accessed 17th April 2011).

Willassen, W. (1987). *Kartlegging av variasjoner i renholdskostnader i somatiske sykehus, psykiatriske sykehus og somatiske sykehjem,* Norsk institutt for samfunnsforskning, Trondheim.

Winge, T., Fløtre, J.O. & Klyve, O. (1983). *Ergonomiske tiltak blant renholdere***,** Statens teknologiske institutt & ISS, Bergen.

Ødegaard, A. (1962). "Renhold av gulv på sykehus. Bakteriologiske undersøkelser ved prøving av nye metoder", *Nordisk Medicin 15.III.1962*, bd 67, nr 11, pp. 344-348.

Aas, K. (1996) *Miljørenhold i Bærumskolene: en undersøkelse av sammenhenger mellom inneklimaet i 10 skoler i Bærum og sykdom og helseplager hos elever,* Bærum kommune, FDV-etaten, Sandvika.

[1] Danielssen had two publications in 1854: an autobiography, and *Den spedalske Sygdom: dens Aarsager og dens Forebyggelsesmidler: et Folkeskrift* [The Leprosy Illness: Its Causes and Its Preventive Resources: A National Letter], 22 pages.

[2] Størkelsen (2008) is the only publically avaiable report in the project "Presence in the Cleaning Department."

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Article 1

Article 2

Article 3

Paper 1

Paper 2

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Article 1

Article 2

Article 3

Paper 1

Paper 2

Post-print version

Organising Cleaning in Norwegian Public FM

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Abstract

Purpose: This paper aims to give an overview of the alternatives that Norwegian municipalities have regarding organisational models for their facility management (FM) and cleaning organisations, and to investigate what organisational models they apply, if building category or size of municipality influences their use of organisational models and whether their FM and cleaning organisations are organised similarly within identical municipalities.

Design/methodology/approach: The research is based on a national survey conducted during year 2010. All Norwegian municipalities were invited to respond. The survey asked the head of the FM departments (or the chief executive officer [CEO] if the first could not answer) what organisational models they used for their FM and cleaning organisations and what changes they planned for the organisation in the future. All questions were asked according to different building categories to determine whether building category had any influence on their choices.

Findings: Limited research has been published regarding the structure of the FM organisations in Norwegian municipalities and even less regarding their cleaning organisations. The results show that Norwegian municipalities prefer integrated models and also purchasing services from the private sector prior to applying decoupled models as inter-municipal alternatives and Municipal Limited Companies. The results do also indicate that Norwegian municipalities' interest in such models is rising and that they seem to be moving away from traditional and integrated alternatives.

Research limitations/implications: Although all municipalities were invited to the survey, only one-third responded.

Originality/value: The article may represent a first thorough overview of what organisational models and what combinations of models Norwegian municipalities use for their FM and cleaning organisations. Compared to former studies, this article explores a greater variety in organisational models and a greater variety in researched building categories.

Keywords: Public sector, Privatisation, Outsourcing, Norway, Facility management, Cleaning, Real estate management, Organisational models, Integrated FM, Out-tasking

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1 Introduction and research questions

New styles of management emerged in public facility management (FM) approximately 30 years ago owing to the economic challenges and new political climate of the late 1970s and early 1980s (Evers, van der Schaaf & Dewulf, 2002). Complete building portfolios, rather than individual buildings, became the focus, and issues involving selling, buying, and renting buildings gained prominence. Services were also discussed: should they be privatised, outsourced or retained in-house, and centralised or decentralised?

FM departments can be organised in many different ways, and most likely no two departments are identical, because they are designed to meet the needs of the organisations that they support (Haugen, 1990; Barret, 1995; Barret & Baldry, 2003; Hansen, 2012). The structure of an FM organisation depends on the type of facilities, the total number of buildings, and the geographical distribution of those buildings (Haugen, 2008) (i.e., relatively scattered or centrally gathered) in a building portfolio, as well as the organisation's strategy (Evers, van der Schaaf & Dewulf, 2002).

Regarding organisational structure, organisations may manage FM related services in-house, outsource tasks formerly provided in-house, or use a combination of in-house and outsourced services. An in-house services organisation may be fully integrated in a municipality or county, be managed through a collaborative arrangement with other municipalities and counties—that is, an inter-municipal alternative—or be managed by a decoupled entity, which may even be a separate legal entity formed as, for instance, a public limited company.

The purpose of this article is to provide an overview of the current situation in Norway with regards to the variety of organisational models available to Norwegian municipalities, including their use of these models. Since cleaning in general have attracted little attention in the research community (Klungseth and Olsson, 2013), the article aims at providing a deeper understanding of the usage of organisational models for both FM services and Cleaning services, also within identical municipalities.

In 2003, studies examined whether public services were outsourced or managed in-house in the national contexts of Norway, Finland, Sweden, the Netherlands, the UK, and the US (Leväinen, 2003; Bröchner, 2003; van Wagenberg, 2003; Zumpano, 2003; Alexander, 2003; Haugen, 2003.) These studies showed that public services in the US were generally outsourced and privatised—mostly at the local government level, but also at the state and federal levels. In the UK, however, only 35.5 % of municipal FM services were outsourced. In Sweden, 50 % of municipalities outsourced services, whereas more than 90 % of Dutch municipalities contracted out their cleaning services. In Finland, 78 % of municipalities retained in-house cleaning services. According to Haugen (2003), public FM in Norway has evolved slowly. Haugen (2003) commented that Norwegian municipalities out-tasked (i.e., purchased single services for cleaning or catering) more often than they outsourced services.

In 2000, Clark and Rees looked into how UK local authorities organised their FM services and found that UK local authorities maintain fully integrated FM (29 %), partly integrated FM departments that are responsible for both delivering and procuring most of the FM services (33 %), and the most common, a

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traditional separate support service (38 %). Later studies of UK local authorities show that they still prefer to maintain their services in-house – at least for cleaning.

Annually, the Association of Public Service Excellence (APSE) in the UK conducts cleaning benchmarking surveys. Respectively, their 2008/09 and 2009/10 surveys show that their member authorities predominantly maintain an internal cleaning service organisation (89 % - 87 %), some prefer a mix of internal and external contractors (11 % - 12 %), whereas few keep external contractors (0 % - 1 %). The service providers' responsibilities within these authorities are predominantly building cleaning only (42 % - 37 %), some do however combine building cleaning with catering services (20 % - 16 %), whereas several others combine building cleaning with other direct services (38 % - 46 %). Please note that these findings may mirror APSE's member organisation more than they mirror the general population of UK local authorities.

FM in Norwegian counties and municipalities has received increasing attention in recent years. The government's release of a public report investigating FM-related issues, NOU 2004:22, resulted in the establishment of a research program on public FM at the Norwegian University of Science and Technology (NTNU). This article is a part of that research program and is funded by the Norwegian Ministry of Local and Regional Development (KRD). In NOU 2004:22, the main focus was on building maintenance. The report investigated whether the size of a municipality has any relevance for the condition of its buildings and found that municipality size, municipality income, and population changes do not have any influence on building conditions. Although the report examined municipalities' use of organisational models, it did not examine whether municipality size has any influence on the use of organisational models. However, NOU 2004:22 did indicate that municipality size might be an important factor in the use of organisational models. For example, decentralised departments were mostly used by small municipalities, Municipal Undertakings (KF) were mainly used by medium-sized and large municipalities, and half of the municipalities planning to implement changes in their FM organisation planned a transition from decentralised departments and other (unknown) organisational models towards centralised departments.

Research into public FM in Norway can be traced back to the early 1990s (Hansen, 2012). Initially, the focus was primarily technical issues—i.e., efficient budget allocation for maintenance. Since then, many studies have adopted a maintenance-related orientation. Some studies have focused on the structure of public FM organisations. For example, Bergsen and Håkonsen (2001) explored whether a municipality's choice of organisational structure could explain the conditions of buildings in its building portfolio. ECON and Multiconsult (2002) mainly focused on maintenance management and advocated for centralised organisations. Haugen (2003) discussed Norwegian municipalities' use of out-tasking and outsourcing. In addition, numerous studies, including internal audits such as Trondheim kommunerevisjon (2008) and research studies such as Haugen and Blakstad (1996) and Stang and Flyen (1993), have focused on specific municipalities. Finally, recent studies, such as Rohn (2011), Brattås and Gissinger (2011), and Gjertsen (2011), have examined municipalities in general.

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All the above mentioned studies investigated municipalities' FM organisations. The findings from these studies indicate that knowledge about Norwegian public FM and cleaning organisations can be advanced. FM research has engaged in a limited discussion of applied organisational models—both within and outside Norway—and seems to have sustained a main focus on FM as a whole, with the notable exception of maintenance. The author's impression is that FM research to a lesser extent has focused on FMs different tasks. Accordingly, this article aims to explore and advance the current knowledge regarding Norwegian public FM and cleaning organisations. For this purpose, the following research questions have been formulated:

- How are public FM and cleaning services currently organised in Norwegian municipalities?
- What organisational models can Norwegian municipalities use?
- Are Norwegian municipalities' cleaning departments organised in a manner similar to their FM organisations?

The author's hypothesis is that researchers treat FM organisations as if the related services are organised in a manner similar to the main FM organisation. One of the aims of this article is to test whether that hypothesis is correct—i.e., whether FM and cleaning organisations are organised similarly - that is whether municipalities are using the same organisational alternative for their general FM organisation and their Cleaning organisation. Another aim is to determine whether building types and municipality size have any influence on the choice of organisational model. In the sections that follow, after a short introduction discussing recent developments within regional and local governments, the organisational models that Norwegian municipalities can use for their service organisations are presented. The Norwegian regulations that apply to municipalities also apply to counties. For simplicity, the abbreviations 'LA' and 'Norwegian LA' are used in this article and refer to Norwegian regional (counties) and local (municipal) authorities.

Information is also provided on the Norwegian government's current knowledge regarding municipalities FM and Cleaning organisations. In the following sections, Norwegian terminology is added in parentheses after certain expressions. Subsequently, original research is presented: first, the data collection methods are described; second, the findings regarding Norwegian municipalities' use of the different organisational models within their FM and cleaning organisations are elaborated. Finally, a concluding discussion is presented.

2 Developments within regional and local governments

Cultural differences in FM can be found between northern and southern Europe and between the US and Europe. A main difference between Europe and the US are the focus. The US is more private sectors oriented whereas Europe has a greater emphasis on the public sector. Generally, FM in the Nordic countries are closely related (Jensen, 2008). Similarly, European and Nordic countries have similarities in local government structure. Commonly, three levels of government exist; state, county and municipal. The Nordic Counties (that is Norway, Sweden, Denmark and Finland) are by Sellers and Lindström (2007) described as unitary Northern European/Scandinavian Social Democratic Welfare states.

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The Scandinavian countries (Norway, Sweden and Denmark) are all small countries with high taxation and large public sectors that employ around one third of the total labour force. They are (ceremonial) monarchies that have unitary decentralized states with constitutions where the prime minister and the cabinet hold the executive power. Outsiders have described the three countries as "*modernizers rather than marketizers*" (Hansen, 2011, p.113).

Compared to Norway, the UK has a more 'fluid' view of the relationship between state and society (Halligan, 2011). The Anglo-Saxon countries (UK, Australia, Canada and New Zealand) are all monarchies with parliamentary systems. However, it is only the UK and New Zealand that have unitary systems. In contrast to the Scandinavian countries, the structure of UK local authorities is not uniform. In UK two main structures can be found within local authorities; a single tier system and a two-tier system (Alexander, 2003). The single tier system (that applies for Scotland, Wales and parts of England) has an 'all-purpose council' that may be described as a Unitary authority, a Metropolitan authority or a London Borough. The two-tier system (that applies for the rest of England) resembles the Nordic structure of local authorities (Alexander, 2003; Brattås et al, 2009).

However, it should be noted that there is a lack of a common and coherent framework in research on comparative local government that makes it difficult to research, present (both descriptive and analytical) findings and to generalize across countries. The existing comparative descriptions of local government systems have mainly been descriptive and related to themes such as local government reforms. Predominantly, resent studies involve country-by-country descriptions (Wolman, 2008). Thus this article predominantly focuses on how Norwegian local government organizes their activities as opposed to attempting a strong comparison with other countries. However, some insight to other countries will be provided.

After the Second World War, both in the US and Europe, calls were made for larger, general-purpose local governments in the belief that this would improve (administrative) efficiency, equity and scale economies (Nelson, 1990). Thus, several European countries restructured their local government as opposed to the US. In particular, Sweden, Demark and West Germany restructured their local government substantially, e.g. Sweden reduced the number of municipalities from 2.500 (in 1950) to 300 (late 1980s). A similar restructuring took place in Norway who reduced the number of municipalities from 747 (during the 1930) to 454 (midst 1960s). Originally, Norway established 392 municipalities in 1837 (Jacobsen, 2009).

The number of municipalities in the Scandinavian countries are today 98 in Denmark (since 2007), 304 in Finland (since 2013), and Norway 428 (in 2014) (Nelson, 1990; Jacobsen, 2009; KMD, 2014). Currently, Norway is embarking on a new territorial reform in order to reduce the number of municipalities. Thus, it is believed that this article represents a first, and possibly a last overview of how FM and Cleaning is organised in identical municipalities' today, consequently, enabling a future study on how (and whether) increased municipal size have importance to municipalities organisation of public FM and Cleaning services.

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Norwegian regional and local government experienced major changes during the 1990s (Gravdahl & Hagen, 1997; Bukve and Saxi, 2013). First, two trends were developing: (a) New Public Management (NPM), with its drive for efficiency and marketisation, introduced management by objective (MBO), strategic policy orientation and a clearer division between municipal politics and administration; and (b) increasing concern about LAs' roles as political bodies, which was related to citizen involvement in political elections and debates. Second, the Local Government Act of 1992 increased the number of organisational models that were available to Norwegian Las, and also allowed municipalities to use a parliamentary system of government as opposed to earlier when the alderman model with proportionally elected (consensus-based) executives (Formannskap) was mandatory. In this model, a chief executive officer (CEO) leads the municipal administration as opposed to in the parliamentary system where a political executive replaces the CEO. The Parliamentary system is only used by the three municipalities of Oslo, Bergen and Tromsø, and by the four counties of Nordland, Troms, Nord-Trøndelag and Hedemark (Blåka, Tjerbo & Zeiner, 2012). Third, the Norwegian government started to regularly collect data on LAs related to political organisations, administrative organisations, service organisations (by some also referred to as task organisation), NPM measure implementation, and so forth. These data are collected every four years—after municipal and county elections. Thus, Norway has a suitable overview of the changes that are occurring in public bodies. However, the FM related data have not been compared to each other, e.g. information on FM in general and on cleaning exists, but the information has not been related to each (not even within single LAs). Thus, this article attempts to fill this gap of knowledge, and hopes to simulate further research (also in other countries) so that future, and comparative, research may be performed.

Sweden, that is regarded similar to Norway, is considered to be a (unitary) and rather decentralized country with one of the stronger local government forms in Europe (both politically and functionally) and also one of the most financially independent European local governments. As in Norway, NPM also entered the Swedish municipalities which started to outsource, provide municipality-funded 'vouchers' (in particular for education) and selling of their assets to private sector (Wollmann, 2004).

Just as Norway, many European countries have small municipalities and consequently intermunicipal cooperations for the production of services are common. However the application of cooperation varies. In Spain, it is compatible to privatizing, and in Portugal, it includes partnerships, whereas in Norway and the Netherlands cooperation means the public is maintaining the production of services (Bel, Fageda & Mur, 2013). Intermunicipal cooperation and privatization are viewed as useful to reduce the cost of service delivery, e.g. trough scale economies, however, principal-agent complications have been detected both in Norway and Italy where an increased distance have been observed between municipal government and the body in charge of production (Bel, Fageda & Mur, 2013). Studies of on solid waste services in Aragonese municipalities in Spain have showed that municipal size influence the municipalities use of cooperation and privatization; large municipalities prefer to privatize whereas small municipalities prefer to cooperate (Bel, Fageda & Mur, 2013).

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The NPM reforms of the 1990s should have resulted in both increased exposure to competition and increased privatisation of public services. However, for Norwegian LAs' service organisations, the increase in competition and privatisation was limited. In the year 2000, notable effects were only observed with renovation services, with 72 % of municipalities collaborating on renovation services (Vabo & Stigen, 2000). FM-related services were primarily kept in-house. Only canteen and laundry services showed some degree of privatisation. Hovik and Stigen (2004) commented that services such as cleaning, canteen, accounting, salary, and archive services were most commonly performed internally—i.e., they were fully integrated as traditional departments. The services that were affected by privatisation tendencies were (in addition to the renovation services) road maintenance/snow-cleaning and building design services (Hovik & Stigen, 2004). In 2008, the trends were similar: most municipal services where maintained in-house, fully integrated as traditional departments (Hovik & Stigen, 2008). In 2012, Blåka, Tjerbo, and Zeiner commented that only renovation and auditing services showed notable trends, with more than 50 % of municipalities entering into inter-municipal alternatives for these services.

However, to a limited degree, these studies examined whether the use of organisational models varies according to building categories and whether FM and cleaning organisations within a single LA are organised similarly or not. Norwegian LAs are relatively free to choose their structure as only parts of the structure is required by the law. No matter the political structure, every Norwegian municipality is required to have a Control Committee supervising the municipal management (Koml § 77) and at minimum one multidisciplinary Management Committee that deals with employer-employee relations unless ¾ of the Municipal Council decides to arrange for other solutions (Koml §25). In addition a Municipal Council can – if they would like to – establish different forms of committees, Boards for Institutions and District Councils, which can be appointed, reorganized and abolished according to preference by the Municipal Council (this do however not apply to District Councils that have been elected directly).

Since the 1990s, a decrees in the use of traditional departments ('etat/fagavdeling') and an increase of a flatter, two-tier structure (where services links directly to the CEO (administrasjonssjef/rådmann), thus, avoiding the middle manager level of Department Executives - 'etatssjefer') were registered, including an increase in the CEO's span of control (Hovik & Stigen, 2004). This flatter, two-tier structure is also referred to as the Result Unit model and the Business model ('virksomhetsmodellen'). Here each process (that is each Result Unit) is treated as relatively independent unit that is almost entirely responsible for their own result, e.g. a single school can represent one result unit (Jacobsen, 2009). Each service manager (e.g. the principal at a school) is here held accountable – being almost fully responsible for their own service – and reports ideally directly to the CEO.

In the section that follows, the alternatives available to Norwegian LAs for organising their services are elaborated. Norwegian LAs can organise their services according to several models. For years, the number of models has been increasing. However, few models have been used by FM and cleaning organisations. The end of the section that follows presents the relevant information that the Norwegian

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government has collected regarding FM and cleaning services, including relevant findings by NOU 2004:22.

3 Organisational models for Norwegian counties and municipalities

The following organisational models are available to Norwegian LAs for organising their services (NOU 2004:22, Hovik & Stigen 2008; Jacobsen, 2009; Brattås, Gissinger & Klungseth, 2009; Gjertsen, 2011): Traditional Department (Etat), Municipal Undertaking (KF), Inter-Municipal *Cooperation* (IKS), Inter-Municipal *Corporation* (*in Norway also abbreviated to* IKS), Cooperative Municipality (Samkommune), Host Municipality (Vertskommune), wholly/partly owned Municipal Limited Company (AS), and Foundation (Stiftelse). In addition, Norwegian LAs can purchase services from either the private or voluntary sectors and can be part of other organisational constellations via co-ownership (sameie) or association (forening) arrangements.

A Traditional Department (Etat) can have centralised, decentralised, or both centralised and decentralised services (Haugen, 1990). When mixed versions are used, services can either be divided according to responsibility (e.g., maintenance, cleaning, educational buildings and sheltered housing) or divided according to single buildings. In addition, a Traditional Department can be organised using a flatter, two-tier model (often referred to as an Institution or a Result Unit). This flatter, two-tier model is regarded as rather independent compared with the other Etat models (Jacobsen, 2009).

An overview of Norwegian LAs' organisational models is presented in Figure 1, which is based on Jacobsen (2009), Brattås, Gissinger, and Klungseth (2009), the Norwegian Local Government Act (Koml), LOV-2012-05-25-28, and Blåka, Tjerbo, and Zeiner (2012). However, whether services are purchased from the private and/or voluntary sectors is not illustrated in Figure 1. In Figure 1, the boxes represent singular LAs, whereas the circles represent LAs' service organisations. The abbreviations in the circles are the Norwegian abbreviations for the particular organisational models that are illustrated. These abbreviations are maintained throughout this article. The position of a circle in relation to a box, denoted as the figure's background colour, illustrates whether—and partially to what degree—service is either integrated into an LA or regarded as its own legal entity. Figure 1 also presents an overview of the laws that regulate the different organisational models.

The organisational models can be distinguished in different ways. One method of distinguishing between organisational models is related to regulating laws; another is related to whether the alternatives are reserved for a single LA. Some of the alternatives can involve collaboration with other LAs, the private sector, or the voluntary sector. Alternatives within *one* LA that are regulated by the Norwegian Local Government Act are Traditional Departments (Etat), Institution/Result Units, and KFs. Other alternatives within *one* LA are wholly owned ASs, which are regulated by the Limited Liability Companies Act (which also applies to private companies), and wholly owned Foundations (Stiftelse), which are regulated by the Foundation Act. However, these alternatives can also be used in collaboration with several LAs, the private sector, or the voluntary sector, in which case they are referred to as partly owned alternatives. IKSs are collaborative and can involve cooperation with other LAs, the private sector, and/or the

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voluntary sector. The only inter-municipal alternative that is *not* regulated by the Norwegian Local Government Act is the Inter-Municipal Corporation, which has been regulated by the Inter-Municipal Corporation Act (Intkomsel) since 2000.

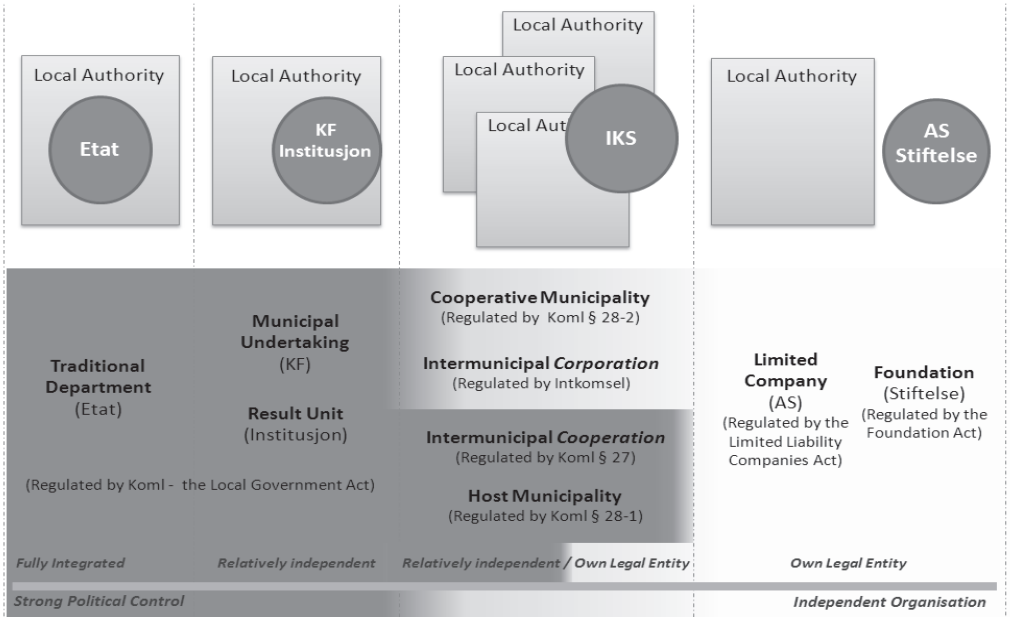

Figure 1 Organisational Models Available to Norwegian Municipalities and Counties

Another distinguishing feature is that IKSs, ASs, Foundations (Stiftelse), and Cooperative Municipalities are considered to be separate legal entities (Koml § 28-2a; Jacobsen, 2009). Furthermore, because LAs are not economically responsible for ASs, one benefit of the Inter-Municipal *Corporation*, as opposed to the AS, is that it cannot become bankrupt (Jacobsen, 2009; Brattås, Gissinger & Klungseth, 2009).

The information provided in Figures 2-4 represents the current knowledge regarding Norwegian municipalities' FM and cleaning organisations. Figures 2 and 3 are based on Gravdahl & Hagen (1997); Vabo & Stigen (2000), Hovik & Stigen (2004; 2008), and Blåka, Tjerbo & Zeiner (2012), whereas Figure 4 displays findings by NOU 2004:22. According to these figures, most Norwegian municipalities maintain their FM and cleaning services as integrated, traditional departments, whereas only a few use the KF alternative. However, cleaning organisations are more commonly integrated than FM organisations.

Since the 1990s, the use of decoupled organisational models has increased, and in particular services purchased from the private sector. Moreover, since 2008, municipalities have started to use more than one organisational model for their FM and cleaning organisations, as indicated by the sum of all the organisational models that exceeds 100 %. Furthermore, note that the reported IKSs in Figures 2 and 3 are Inter-Municipal Corporations.

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Municipal FM organisation	1996 N=203,357	2000 N=314,359	2004 N=149,298	2008 N=270,320	2012 N=98-121
Traditional Department (Etat)			*88.1 %*	*96.6 %*	*95.9 %*
Municipal Undertaking (KF)			*1.7 %*	*5.0 %*	*5.8 %*
SUM - INTEGRATED ALTERNATIVES	*86.6 %*	*95.5 %*	*89.8 %*	*101.6 %*	*101.7 %*
Inter-Municipal alternatives (IKS)		0.3 %	*0.0 %*	*0.0 %*	*0.0 %*
Limited Company (AS) *Please note that Foundation (Stiftelse) was also part of this category In year 1997 and year 2000.*	9.1 %	3.6 %	*0.9 %*	*2.5 %*	*0.8 %*
Purchase from Private sector	4.3 %	0.6 %	*8.9 %*	*27.0 %*	*20.7 %*
Purchase from Voluntary sector			*0.0 %*	*0.3 %*	*0.8 %*
SUM - ALL ALTERNATIVES	*100.0 %*	*100.0 %*	*99.6 %*	*131.4 %*	*124.0 %*

Figure 2 Norwegian Municipal FM Organisations, 1996-2012

Municipal Cleaning organisation	1996 N= 203,357	2000* N= 314,359	2004 N=149,298	2008 N=270,320	2012 N=98-121
Traditional Department (Etat)			*94.9 %*	*96.6 %*	*94.9%*
Municipal Undertaking (KF)			1.2 %	3.1 %	4.2 %
SUM - INTEGRATED ALTERNATIVES	*98.9 %*	*98.6 %*	*96.1 %*	*99.7 %*	*99.1 %*
Inter-Municipal alternatives (IKS)		0.3 %		0.3 %	0.8 %
Limited Company (AS) *Please note that Foundation (Stiftelse) was also part of this category In year 1997 and year 2000.*			0.5 %	0.3 %	
Purchase from Private sector	1.1 %	1.1 %	3.0 %	12.9 %	9.3 %
Purchase from Voluntary sector				0.3 %	
SUM - ALL ALTERNATIVES	*100.0 %*	*100.0 %*	*99.6 %*	*113.5 %*	*109.2 %*

* The numbers for 2000 are reports on municipal cleaning organisations for school buildings. This year, information on health care facilities was also collected. However, the difference in the findings was minor (a maximum difference of 0.3 %).

Figure 3 Norwegian Municipal Cleaning Organisations, 1996-2012

Municipal FM organisation	School Buildings	Health care Buildings	Other Buildings
Each institution/core business is responsible for managing their own buildings	7.4 %	6.9 %	4.6 %
Each central department (school, day care, health care etc.) manages the buildings on behalf of their institutions / core businesses	6.9 %	6.5 %	6.9 %
Own facility management unit within the central administration of the municipality	76.5 %	76.9 %	77.0
Own Municipal Undertaking (KF)	5.1 %	5.6 %	5.5 %
Municipal wholly/partly owned Limited Company (AS)	0.5 %	0.5 %	1.4 %
Other organisational model	3.7 %	3.7 %	4.6 %
SUM	*100.1 %*	*100.1 %*	*100.0 %*

Figure 4 Municipal FM Organisations, as mapped by NOU 2004:22

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The section that follows presents this article's original research on municipal FM and cleaning organisations. The methodology is elaborated prior to the presentation of the findings. Thereafter, an elaborate concluding discussion is provided.

4 Methodology, data collection, and limitations

A national survey was distributed in 2010 to Norway's 430 municipalities and to Longyearbyen at Svalbard. Measured according to the population as of 1 January 2010, Norwegian municipalities vary greatly in size from the smallest, Utsira, representing 218 inhabitants, to the largest, Oslo (which is also a county), representing a total of 586,860 inhabitants (Statistics Norway 2010). The second-largest municipality, Bergen, represents a total of 256,600 inhabitants.

The survey was open for response from June through October 2010. The survey was managed through the survey software ConfirmIt, which emailed the survey to the target group. The survey appeared as a link in all of the emails. The email addresses were bought from the Norwegian Municipality publisher (Kommuneforlaget). Sadly, the majority of the purchased email addresses were of the type 'post@municipality.no', thus, the municipality's mail office would have to identify the appropriate receiver and then forward the survey to that person.

To ensure highest possible participation an information email were sent out a week prior to the survey stating that a survey was forthcoming and who the desired respondents were. After the survey was sent out, follow-up emails (with link to the survey) were sent to the municipalities both prior to and after summer vacation and also after schools autumn vacation. Furthermore, non-completed respondents (who had provided a contact phone-number) were called and encouraged to complete their response.

The survey contained 40 questions that both built on and expanded the survey questions in NOU 2004:22. Accordingly, the manner of questioning was known to the municipalities, which should reduce the risk of errors. Please note that only certain parts of the survey that was conducted in 2010 are presented in this article. Please also note that the survey in NOU 2004:22 did not require any information about Norwegian LAs' cleaning organisations. Thus, part of the FM-related findings and all of the cleaning-related findings (to the extent that they exceed the information presented earlier) are believed to be unique.

In accordance with the Norwegian Data Protection Official for Research the first page of the survey provided information on the surveys intended purpose (FM research for a PhD study), the surveys estimated response time (15-20 minutes) and, furthermore, that it was voluntary to participate. Thus, respondents who did not find its purpose relevant, or who did not want to invest the needed time, were not obligated to respond.

The survey was sent to a total of 431 recipients of which 55.5 % received the survey (239 recipients) and 44.5 % (192 recipients) never opened the survey (indicating that the survey either never reached the appropriate recipients or that recipient did not find it required to respond). Of the recipients that opened the survey 33.9 % completed the survey (hereon these 146 municipalities are referred to as

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respondents), whereas 21.6 % (that is 93 recipients) chose *not* to complete the survey. The majority of these 21.6 % recipients did not leave any information, indicating that they only read the surveys info leaflet stating the surveys purpose and volunteer character, and thus, refrained from responding.

A low response rate (RR) can be due to two principal reasons (Baruch, 1999). Either the respondent had no wish to respond or s/he did not receive the survey at all. To a certain extent a researcher can control whether a survey actually reaches it intended respondents, e.g. through updated and non-ambiguous list of addresses, and also a respondent's willingness to respond. A 100% RR is unlikely and should never be expected, not even in cases when a response is volunteered or forced. For forced responses, that is in administrated surveys, researchers have experienced a RR of 60-94 %. For volunteered responses where participants have accepted to take part in a survey prior to the survey being sent out, Baruch (1999) reefer to Benton (1975) and Webster and Trevino (1995) who respectively received 80 % RR (from 641 volunteering cartographers at the U.S. Army) and receive 83 % RR (from 531 volunteering academic employees) illustrating that higher RR than 60-90 % should not be expected.

It may be argued that the survey obtained a low response rate as it is only 33.9 %, thus, it may be argued that the survey presented in this article will have challenges regarding reliable data. Please note that the undertaken survey in this article invited the entire population of Norwegian local (municipal) authorities to respond voluntarily (without being volunteered prior to its send-out), and only those actually receiving the survey and those deeming its purpose important would thus respond.

The introduction of modern technology has change the nature of surveys. Today, many surveys are conducted online. Issues of non-response in web surveys, that is surveys sent out by a program as SurveyMonkey or ConfirmIt were surveys appear as a link in an email, can be due to variations in respondents' computer configuration, web browsers or internet transmission capacity that cause the survey to be displayed in a way that prevent respondents from being able to submit their response (Fan and Yan, 2010). The length of a web survey do also affect the RR, in this regard Fan and Yan (2010) recommends a completion time that is 13 minutes or less (that is up to 7 minutes shorter than the undertaken survey in this article).

The RR in web surveys tend to be approximately 10 % less than postal or telephone surveys (Fan and Yan, 2010). According to Fellows and Liu (2009, p.153) a usable RR for postal questionnaires is 25 to 35%. Thus, even a response rate of 15 to 25 % could be seen as usable for web surveys (such as the one undertaken in this article). Furthermore, surveys to CEOs and other managers are, according to Baruch (1999, p.423), typically *"characterized by a lower RR compared to populations of individuals".* Such RRs can be as low as 20-30 % and may even be seen as *"fairly typical for a mail-out survey to a large sample of firms"* (Baruch, 1999, p.423). Based on this, and the previous finding regarding web surveys, (pre send-out) volunteered surveys and forced (administered) surveys, this articles RR should be appropriate. This is also supported by the analysis of respondents' regional distribution and municipal size (in Figures 5 and 6).

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Low RR are often linked to biased data, however, according to Leslie (1972) RR bias are unlikely for surveys having homogeneous populations. This article's 146 respondents ranged from many smaller municipalities to fewer larger municipalities (see Figure 5). Analysis of the responding municipalities' sizes (of small, medium and large) and geographically distribution (of East, West, Middle, North and South Norway) show a balanced participation (compared to the total response rate of 33.9 %) with an approximate equal portion of responding municipalities (30-40 %) within each category (see Figures 5 and 6). Thus, the findings in this article are also considered to be unbiased and reliable.

Number of Municipalities	Survey *Total*	Small *(< 5000 inhabitants)*	Medium *(5 000-20 000 inhab.)*	Large *(>20 000 inhabitants)*
Total Norway 1st January 2010	*431*	*235*	*145*	*51*
Responding Municipalities	146	74	52	20
Response rate	33.9%	31.5 %	35.9%	39.2%

Figure 5 Responding Municipalities according to total population and municipal size

Number of Municipalities	Survey *Total*	Responding municipalities	Response rate *By County*	Response rate *By region*
County of Østfold	18	7	38.9 %	*Eastern Norway 38.0 %*
Counties of Oslo and Akershus	23	7	30.4 %	
County of Hedemark	22	9	40.9 %	
County of Oppland	26	12	46.2 %	
County of Buskerud	21	7	33.3 %	
County of Vestfold	14	7	50.0 %	
County of Telemark	18	5	27.8 %	
County of Aust-Agder	15	5	33.3 %	Southern Norway 33.3 %
County of Vest-Agder	15	5	33.3 %	
County of Rogaland	26	8	30.8 %	Western Norway 30.6 %
County of Hordaland	33	9	27.3 %	
County of Sogn og Fjordane	26	8	30.8 %	
County of Møre og Romsdal	36	12	33.3 %	
County of Sør-Trøndelag	25	11	44.0 %	Middle Norway 36.7 %
County of Nord-Trøndelag	24	7	29.2 %	
County of Nordland	44	15	34.1 %	Northern Norway 30.3 %
County of Troms	25	7	28.0 %	
County of Finmark + Svalbard	20	5	25.0 %	

Figure 6 Responding Municipalities according to Counties and Regions

The presented data relate to municipalities' FM and cleaning organisations during 2010. Information was collected about both the organisational models used in 2010 and planned changes in organisational structure. Several organisational models were provided for the FM organisations (see Figure 7), including 'other organisational models', which was added to determine whether the provided alternatives were sufficient. For the municipalities' cleaning organisations, three additional alternatives were provided. *These additional alternatives are designated by the italicised text in Figure 7.*

Furthermore, in relation to cleaning organisations, the municipalities were asked to specify their use of models for their main organisation and daily used organisations (that were not the main organisation)

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and to indicate whether they also used a third organisational alterative: an occasionally used organisation. With respect to this question, the municipalities were given the opportunity to respond that such alternatives were 'not applicable'.

To determine whether building types have any influence on the use of organisational models, the municipalities were asked to respond according to the following five building types: 1) school buildings; 2) day care and preschool buildings; 3) health care facilities, including institutions for the elderly; 4) administration buildings; and 5) 'other' buildings.

Abbreviation	Description
FDD	Fully Decentralised Department, in which each institution/core business is responsible for managing its own buildings
PDD	Partly Decentralised Department, in which each central department (school, day care, health care, etc.) manages its buildings on behalf of their institutions/core businesses
FCD	Fully Centralised Department, with a facility management unit (*or a cleaning unit*) within the municipality's central administration
KF	Municipal Undertaking
IKS	Inter-Municipal alternative
AS	Wholly/Partly Municipal-Owned Limited Company
'Other'	Other organisational model
Partly Private	*A portion of the cleaning services are obtained from the private market*
Entirely Private	*All of the cleaning services are obtained from the private market*
Voluntary	*Cleaning services are entirely/partly obtained from non-governmental organisations or non-profit organisations*

Figure 7 The Organisational Models Provided by the Survey

	Survey total		Small municipalities		Medium municipalities		Large municipalities	
CEO	8	5.5 %	4	5.4 %	3	5.8 %	1	5.0 %
CFM	64	43.8 %	20	27.0 %	33	63.5 %	11	55.0 %
Other	74	50.7 %	50	67.6 %	16	30.8 %	8	40.0 %
Total	*146*	*100.0 %*	*74*	*100.0 %*	*52*	*100.1 %*	*20*	*100.0 %*

Figure 8 Respondents, According to Occupation

The respondents were categorised according to occupation (see Figure 8). The majority of respondents work within an FM organisation. Only 8 respondents were chief (municipal) executive officer CEOs, whereas 64 reported their occupation as chief facility manager (CFM). The largest group of respondents, 74 persons, reported other occupations. The majority of these respondents reported other chief manager titles, such as real estate manager, technical manager, general manager, section manager or a similar position, indicating positions the same as or similar to CFM. Only a few respondents reported occupations of charted engineer (with responsibility for maintenance or operations), consultant, facility manager, economy consultant, or special adviser or reported their units without specifying a position.

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The section that follows presents the survey results. First, the municipalities' reports on FM organisation are given. Next, the results related to the municipalities' main cleaning organisations are presented, followed by the results for their daily used (but not main) and occasionally used cleaning organisations.

5 Norwegian municipalities' FM and cleaning organisations

This section presents the results regarding use of organisational models according to building categories. Thereafter, planned changes in organisational models are presented.

Please note that the total number of respondents (N) for FM organisations is 146 and that the total number of respondents for cleaning organisations is 139. This difference is a consequence of the 7 municipalities that did not specify what cleaning organisations they used. These municipalities did, however, report that they used the same organisational model for the cleaning organisation on their entire building portfolio.

5.1 FM and cleaning organisations, 2010

The results presented in Figures 9-12 show that the majority of the municipalities maintain integrated FM and cleaning organisations (as FDDs, PDDs, FCDs, or KFs) and that municipalities more commonly purchase services from the private or the voluntary sector than use decoupled organisational models, such as IKSs and ASs. In fact, none of the municipalities reported using IKSs for any of their services—including their FM organisations, their main cleaning organisations, their daily used cleaning organisations, and their occasionally used cleaning organisations.

Furthermore, the use of ASs and 'other organisational models' was only reported in relation to municipal FM organisations. ASs were only used by a few municipalities and only in relation to day care, administration, and 'other' buildings. Within all building categories, approximately 7 % of the municipalities reported using 'other organisational models' for their FM organisations. These alternatives may be related to services purchased from either the private or voluntary sectors, as indicated by the findings related to cleaning organisations, given that no municipality reported using an 'other organisational model' for any of their cleaning organisations. Moreover, services purchased from the voluntary sector were only reported in relation to main cleaning organisations for 'other' building types.

The results related to cleaning organisations also show that municipalities commonly use several organisational models concurrently—a main, a daily used, and/or an occasionally used organisational model. A total of 11 municipalities reported that they used three different cleaning organisations for all building categories. Small, medium, and large municipalities were represented among these 11 municipalities. Despite the municipalities' reluctance to decouple organisational models as IKSs and ASs, their use of KFs may be an indication of Norwegian municipalities' interest in alternatives to traditional departments.

The most-preferred organisational model for both FM and main cleaning organisations was an FCD, whereas the most-preferred organisational model for 'daily used, but not main' and 'occasionally used' cleaning organisations was to partly purchase services from the private sector. However, with respect to

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main cleaning organisations, one municipality reported that it purchased services from the private sector for all its building types, whereas a few other municipalities reported that they purchased cleaning services from the private or voluntary sectors only for certain building types. For FM organisations, 'other organisational models' and KFs were more commonly used than both of the decentralised department alternatives (FDDs and PDDs), whereas for main cleaning organisations, both FDDs and PDDs were more commonly used than KFs.

Municipalities' FM organisations, 2010											
TOTAL SURVEY RESULTS		Schools		Day care		Health Care		Administration		Other buildings	
Code	*Rank*	Resp.	Percent	Resp.	Percent	Resp.	Percent	Resp.	Percent	Resp.	Percent
FDD	*4*	4	2.7 %	3	2.1 %	5	3.4 %	4	2.7 %	2	1.4 %
PDD	*5*	3	2.1 %	3	2.1 %	4	2.7 %	2	1.4 %	2	1.4 %
FCD	*1*	119	81.5 %	118	80.8 %	118	80.8 %	118	80.8 %	121	82.9 %
KF	*3*	10	6.8 %	10	6.8 %	10	6.8 %	8	5.5 %	10	6.8 %
IKS	*7*	0	0.0 %	0	0.0 %	0	0.0 %	0	0.0 %	0	0.0 %
AS	*6*	0	0.0 %	1	0.7 %	0	0.0 %	5	3.4 %	1	0.7 %
Other	*2*	10	6.8 %	11	7.5 %	9	6.2 %	9	6.2 %	10	6.8 %
TOTAL		146	100.0 %	146	100.0 %	146	100.0 %	146	100.0 %	146	100.0 %

Figure 9 Municipalities' FM Organisations, 2010

With respect to Figures 10-12, which address the cleaning organisations that were used by municipalities, please note that respondents that used the same organisational model for all building categories were only requested to report their organisational models for school buildings. Accordingly, in Figures 10-12, the number of respondents for school buildings is higher than that for the remaining building categories.

Municipalities' *Main* Cleaning Organisations, 2010											
TOTAL SURVEY RESULTS		Schools		Day care		Health Care		Administration		Other buildings	
Code	*Rank*	Resp.	Percent	Resp.	Percent	Resp.	Percent	Resp.	Percent	Resp.	Percent
FDD	*2*	19	13.7 %	12	11.4 %	24	23.1 %	10	9.6 %	15	14.4 %
PDD	*3*	10	7.2 %	7	6.7 %	15	14.4 %	8	7.7 %	8	7.7 %
FCD	*1*	100	71.9 %	75	71.4 %	57	54.8 %	75	72.1 %	68	65.4 %
KF	*4*	7	5.0 %	8	7.6 %	6	5.8 %	7	6.7 %	7	6.7 %
IKS	-	0	0.0 %	0	0.0 %	0	0.0 %	0	0.0 %	0	0.0 %
AS	-	0	0.0 %	0	0.0 %	0	0.0 %	0	0.0 %	0	0.0 %
Other	-	0	0.0 %	0	0.0 %	0	0.0 %	0	0.0 %	0	0.0 %
Partly Private	*5*	1	0.7 %	1	1.0 %	1	1.0 %	1	1.0 %	2	1.9 %
Entirely Private	*6*	1	0.7 %	1	1.0 %	0	0.0 %	2	1.9 %	1	1.0 %
Voluntary	*7*	0	0.0 %	0	0.0 %	0	0.0 %	0	0.0 %	1	1.0 %
Not Applicable		1	0.7 %	1	1.0 %	1	1.0 %	1	1.0 %	2	1.9 %
SUM		139	100.0 %	105	100.0 %	104	100.0 %	104	100.0 %	104	100.0 %

Figure 10 Municipalities' Main Cleaning Organisations, 2010

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Municipalities' *Daily used (but not main)* Cleaning Organisations, 2010											
TOTAL SURVEY RESULTS		Schools		Day care		Health Care		Administration		Other buildings	
Code	*Rank*	Resp.	Percent	Resp.	Percent	Resp.	Percent	Resp.	Percent	Resp.	Percent
FDD	*3*	5	3.6 %	3	2.9 %	6	5.8 %	3	2.9 %	5	4.9 %
PDD	*2*	9	6.5 %	4	3.8 %	3	2.9 %	5	4.9 %	5	4.9 %
FCD	*4*	2	1.5 %	1	1.0 %	3	2.9 %	0	0.0 %	1	1.0 %
KF	*6*	1	0.7 %	1	1.0 %	1	1.0 %	0	0.0 %	2	1.9 %
IKS	-	0	0.0 %	0	0.0 %	0	0.0 %	0	0.0 %	0	0.0 %
AS	-	0	0.0 %	0	0.0 %	0	0.0 %	0	0.0 %	0	0.0 %
Other	-	0	0.0 %	0	0.0 %	0	0.0 %	0	0.0 %	0	0.0 %
Partly Private	*1*	8	5.8 %	8	7.7 %	6	5.8 %	8	7.8 %	8	7.8 %
Entirely Private	*5*	1	0.7 %	1	1.0 %	1	1.0 %	2	1.9 %	1	1.0 %
Voluntary	-	0	0.0 %	0	0.0 %	0	0.0 %	0	0.0 %	0	0.0 %
Not Applicable	-	112	81.2 %	86	82.7 %	83	80.6 %	85	82.5 %	81	78.6 %
SUM		138	100.0 %	104	100.0 %	103	100.0 %	103	100.0 %	103	100.0 %

Figure 11 Municipalities' Daily Used Cleaning Organisations, 2010

Municipalities' *Occasionally used* Cleaning Organisations, 2010											
TOTAL SURVEY RESULTS		Schools		Day care		Health Care		Administration		Other buildings	
Code	*Rank*	Resp.	Percent	Resp.	Percent	Resp.	Percent	Resp.	Percent	Resp.	Percent
FDD	*2*	5	3.6 %	4	3.8 %	3	2.9 %	3	2.9 %	3	2.9 %
PDD	*4*	2	1.4 %	3	2.9 %	2	1.9 %	1	1.0 %	1	1.0 %
FCD	*3*	2	1.4 %	2	1.9 %	2	1.9 %	2	1.9 %	5	4.9 %
KF	-	0	0.0 %	0	0.0 %	0	0.0 %	0	0.0 %	0	0.0 %
IKS	-	0	0.0 %	0	0.0 %	0	0.0 %	0	0.0 %	0	0.0 %
AS	-	0	0.0 %	0	0.0 %	0	0.0 %	0	0.0 %	0	0.0 %
Other	-	0	0.0 %	0	0.0 %	0	0.0 %	0	0.0 %	0	0.0 %
Partly Private	*1*	7	5.1 %	2	1.9 %	3	2.9 %	4	3.9 %	6	5.8 %
Entirely Private	*5*	1	0.7 %	1	1.0 %	1	1.0 %	0	0.0 %	1	1.0 %
Voluntary	-	0	0.0 %	0	0.0 %	0	0.0 %	0	0.0 %	0	0.0 %
Not Applicable	-	121	87.7 %	92	88.5 %	92	89.3 %	93	90.3 %	87	84.5 %
SUM		138	100.0 %	104	100.0 %	103	100.0 %	103	100.0 %	103	100.0 %

Figure 12 Municipalities' Occasionally Used Cleaning Organisations, 2010

Surprisingly, one municipality reported that it used *no* 'main cleaning organisation'. This particular municipality provided a reliable response where the cleaning and FM organisations were organised similarly for all building categories—as a PDD. The cleaning organisation, however, was consistently

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categorised as a 'daily used, but not main organisation' for all building types. Thus, the municipality may view its FM organisation as its main organisation. In the category 'other building', yet another municipality reported having *no* main organisation. This municipality reported only an 'occasionally used cleaning organisation' for their 'other' buildings. This organisational model—an FCD—is also used by that municipality as its main cleaning organisation for all the remaining building types. This response could indicate that the municipality's 'other' buildings are only occasionally cleaned.

Several municipalities reported using a second organisational model on a daily basis (see Figure 11). The trend in the use of organisational models for daily used cleaning organisations is similar to the trends related to FM and main cleaning organisations but differs slightly. Overall, the municipalities still prefer integrated alternatives, but the most common alternative is to partially purchase cleaning services. All of the integrated alternatives (FDDs, PDDs, FCDs, and KFs) were used as additional daily organisational models. Nevertheless, the use of a PDD for school buildings and the use of FDDs for health care buildings were almost equally as common as the use of cleaning services purchased from the private sector.

Quite a few municipalities also reported using a third organisational model (see Figure 12). The trend shown in Figures 9-11 is similar. The municipalities still employ integrated alternatives—except for KFs—as their occasionally used cleaning organisations. Of the municipalities that reported using traditional department alternatives, FDDs were the most common. However, municipalities even more commonly reported purchasing services from the private sector.

5.2 Planned changes in FM and cleaning organisations

A total of 39 municipalities reported planned changes to their FM organisations, and 14 municipalities reported planned changes to their cleaning organisations (see Figure 13). Please note that the municipalities reported changes involving one or two new organisational models[i]. Please also note that the manner of questioning regarding planned changes differed between the municipalities' FM organisations and the municipalities' cleaning organisations. For the FM organisations, the municipalities were given the opportunity to report changes within the seven organisational models for every building category (see Figure 14), whereas for the cleaning organisations, the municipalities were given an open-ended question so that planned changes could be specified (see Figure 15).

Planned changes	Survey total		Small municipalities		Medium municipalities		Large municipalities	
FM organisations	39 *(N=146)*	*26.7 %*	19 *(N=74)*	25.7 %	16 *(N=52)*	30.8 %	4 *(N=20)*	20.0 %
Cleaning organisations	14 *(N=139)*	*10.1 %*	9 *(N=72)*	12.5 %	5 *(N=48)*	10.4 %	0 *(N=19)*	0.0 %

Figure 13 Planned Changes In Municipalities' FM and Cleaning Organisations

Figure 14 shows that one can expect a decrease in the use of traditional department alternatives and an increase in the use of KFs, IKSs, and particularly 'other' organisational models, whereas Figure 15 shows that changes within cleaning organisations are not necessarily related to the provided organisational

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models but may be related to management within present organisational models. Furthermore, that cleaning in some cases most likely is just considered as one of the tasks within the FM organisation.

	Used in 2010	Planned changes in alternatives used	Planned changes to new alternatives by municipalities *not using* those alternatives in 2010	Use of alternatives after changes
FDD	5	One small municipality reported a change, for school buildings only, to the very same alternative—that is, to and from FDDs.	0	5
PDD	6	One small municipality that used an FCD for its 'other' buildings only reported that it planned a change to using an FCD for its entire building portfolio.	0	5
FCD	125	Thirty-four municipalities reported changes for one or several of their building categories. *Twenty* (11S, 7M, 2L) reported changes only from and to the very same organisational model—an FCD. *Fourteen* (4S, 7M, 3L) reported changes to 1-2 other organisational models[ii].	Zero municipalities not currently using an FCD reported that they wanted to start using an FCD for their FM services.	122
KF	10	Two municipalities reported changes. One planned to change to 'other organisational model' for its entire building portfolio. Another planned to change to an IKS for its day care buildings and to the very same alternative—KF—for its school buildings.	Four reported that they wanted to start using a KF for their FM services. Two medium-sized municipalities reported a change from an FCD to a KF for their entire building portfolio. One medium-sized municipality that had an FCD for its entire building portfolio reported a change to an FCD only for its health care buildings, 'other organisational model' for its day care buildings, and a KF for its school, administration, and 'other' buildings. One large municipality, which in 2010 had an FCD for its entire building portfolio, planned to change to a KF for its 'other' buildings only.	15
IKS	0	0	Two municipalities reported that they wanted to start using an IKS for their FM services. One medium-sized municipality that used an FCD for its entire building portfolio reported a planned change to an IKS for its 'other' buildings. One large municipality using a KF for its entire building portfolio reported a planned change to an IKS for its day care centres.	2
AS	6	One small municipality using an AS for its administrative buildings reported a change to an FCD for its entire building portfolio.	One small municipality using an FCD for its entire building portfolio reported that it wanted to start using an AS for its administration and 'other' buildings.	6
'Other'	12	Four small municipalities reported changes. All of them reported changes from and to the very same organisational models. Three of these municipalities had 'other organisational model' for their entire building portfolio, whereas the fourth only had this alternative for its day care, with an FCD for its remaining building categories.	Ten municipalities reported that they planned to start using this alternative (2S, 6M, 2L). One medium-sized municipality that had KF for its entire building portfolio reported a change to an 'other' alternative for its entire building portfolio. The remaining 9 municipalities had an FCD for their entire building portfolio. Except for one of these municipalities, which reported a full change to 'other', the remaining municipalities reported a change for 1-3 building categories—mostly for schools, health care, and day care buildings, but also for administrative and 'other' buildings.	22

Figure 14 Details of Planned Changes to Municipal FM Organisations

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Municipalities' planned changes to cleaning organisations	Cleaning organisation 2010	FM organisation 2010	Population (approx.)
Organised as part of the FM department	PDD+FCD	PDD+FCD	500
Under examination	FCD	FCD	1,000
Changing to having a cleaning team with its own cleaning manager (which could be interpreted as its own team leader)	FDD+FCD	FCD	1,000
Establishing a central cleaning group in which each employee has primary responsibility for individual building(s)	PDD	FCD	2,000
Developing more and better collaboration among cleaners in different buildings	FCD	FCD	2,500
Considering making the cleaning organisation a subunit beneath the FM organisation	PDD	FCD	2,500
Considering employing a cleaning manager*	FCD	FCD	3,000
Considering employing a cleaning manager*	FCD	FCD	3,000
Planning to make cleaning the responsibility of the centralised FM organisation	PDD	FCD	4,500
Planning to make the cleaning organisation its own unit within the FM organisation	FDD+PDD	FCD	5,000
Has recently changed its FM organisation and employed a new FM manager, but has not yet managed to employ any cleaning manager, until then cleaning is being… (response incomplete)	FDD	FCD	5,500
Currently dividing up cleaning areas	FCD	FCD	6,000
Municipal undertaking (KF)	FDD	FCD	8,000
Have not chosen	KF	KF	12,000

*These reposes are two similarly-sized municipalities with identical response and information.

Figure 15 Details of Planned Changes to Municipal Cleaning Organisations

6 Discussion

This article set out to explore the organisational models that are available to Norwegian municipalities and to examine the current state of those alternatives within Norwegian municipalities' FM and cleaning organisations. The findings show that Norwegian municipalities are relatively autonomous in selecting the structure of their service organisations, which include integrated alternatives, decoupled alternatives, and other organisational constellations, such as co-ownership and association. In addition, Norwegian municipalities can purchase services from the private and/or voluntary sectors.

As pointed out in the literature review, the Norwegian municipalities have been influenced, to a limited degree, by NPM, and FM in Norway has evolved slowly. However, since the mid-1990s, municipalities have been given a wider variety of alternatives, and in particular, since the mid-2000s, Norwegian municipalities seem to have expanded their use of different models and have begun to use several models concurrently for their FM and cleaning services. These conclusions are supported by the data from both this article's original research and preceding research. Although different models are available, Norwegian municipalities seem to prefer either using traditional models (as UK local authorities) or purchasing services over using any of the available decoupled models, such as IKSs and ASs (indicating a similar preference as large Aragonese municipalities in Spain). The municipalities more commonly purchase services from the private sector for occasionally used cleaning organisations,

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followed by daily used (but not main) and main cleaning organisations, indicating that purchasing services from private sector is most commonly used as an additional alternative. Depending on the building category, up to 3 municipalities reported purchasing services for their main cleaning organisation, whereas up to 8-9 municipalities reported purchasing services for their daily used (but not main) and occasionally used cleaning organisations. With respect to purchasing services from the voluntary sector, only one municipality reported purchasing services from the voluntary sector for its main cleaning organisation, and that municipality only did so for one building category—'other' buildings. Thus, no clear conclusion can be made for FM organisations because all possible services purchased from either the private or voluntary sectors were reported as part of an 'other organisational model'.

6. 1 Do building categories influence organisational structure?

Building category seems to have little impact on municipalities' use of FM organisations. The responses are relatively similar throughout all the building categories. The only organisational model that seems to be affected by building category is AS (see Figures 9 and 14). Five of the six municipalities that had an AS used it for administration buildings only, whereas the sixth municipality used an AS for its day care and 'other' buildings. The municipality that planned to use an AS only planned to use that alternative for its administrative and 'other' buildings. Thus, we can conclude that AS is mostly used for administrative buildings.

Moreover, 8 of the 10 municipalities with a KF used this organisational model for their entire building portfolio, and KFs were only combined with ASs. However, one municipality planned to use a KF in combination with an IKS for its day care building, and another planned an entire shift to an 'other organisational model'.

Furthermore, 8 of 12 municipalities reported using an 'other organisational model' for their entire building portfolio. The remaining 4 municipalities combined an 'other organisational model' with an FCD only. Curiously, all of the changes reported by these 12 municipalities were changes to and from the very same alternative. This finding may suggest that there are several variants of 'other organisational models' or that the changes are related to management within the present model.

Reaching a similar conclusion for the municipalities' cleaning organisations is challenging, however, because municipalities that used the same organisational model for all building categories were only requested to report their organisation for school. However, a few varieties can be found according to building type, e.g., decentralised departments are more often used for the *main cleaning organisation* of health care buildings than for any other building category.

For the municipalities' *daily used (but not main) cleaning organisations,* municipalities most commonly used an FDD or partly purchased services from the private sector for health care buildings. However, for day care and administration buildings, municipalities used integrated alternatives (i.e., FDDs, PDDs, FCDs, and KFs collectively) almost equally as commonly as they partly purchased services from the private

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sector. Nevertheless, regarding the municipalities' *occasionally used cleaning organisations,* regardless of the building category, municipalities more commonly used an integrated alternative (i.e., all four models collectively) than partly purchased services.

6. 2 Does municipality size influence organisational structure?

The influence of municipality size on organisational structure is explored in Figure 16, which corresponds to the text in Figure 14. Figure 16 summarises the findings related to the use of organisational models in 2010 and provides insight regarding new and expected combinations (if the municipalities follow through with planned changes). However, accurate numbers are only given for the combinations that were used in 2010. In the figure, the size of the circles illustrates the attractiveness of the models. The greater the attractiveness is, the larger the circle is. A grey circle indicates an organisational model that is used for an entire building portfolio. Lines connecting circles illustrate combinations of models. The letters S, M, and L refer to small, medium, and large municipalities. Adding up the different numbers provides an accurate overview of how many municipalities use a particular model, how many municipalities use a particular model for their entire building portfolio, and how many municipalities combine a particular model with another model. As an example, 5 municipalities use an FDD as their FM organisation for one or several building categories (see the number inside the circle on the left side of FDD). Of these 5 municipalities, 2 small municipalities use an FDD for their entire building portfolio (see the italicised number to the right of FDD and the letter at the bottom of the circle), 2 small municipalities also use an FCD for parts of their building portfolio (see the number and letter on the line connecting the FCD and FDD circles), and 1 medium-sized municipality also uses AS for part of its building portfolio. Adding the numbers on the lines connected to FDD results in a sum of 3. Adding this sum to the italicised number in the FDD circle results in a sum of 5, which represents the number of all of the municipalities that use an FDD for either a portion of their building portfolio or their entire building portfolio. The total number of responding municipalities (N=146 for FM and N=138[iii] for cleaning) can be found by adding all of the numbers on connecting lines to all of the italicised numbers inside the circles.

Initially, municipality size does not seem to be important. Small, medium, and large municipalities use most of the organisational models. FDDs and PDDs are the only alternatives that are notable, because they are primarily used by small municipalities. Notably, both of the decentralised alternatives seem to be more commonly used for cleaning organisations than for FM organisations. With respect to cleaning organisations, both FDDs and PDDs are also used as alternatives by large municipalities, including for entire building portfolios. For cleaning organisations, an FDD is the second most common organisational model, whereas a PDD is the third most common. Moreover, municipalities only use combinations of an FDD and a PDD concurrently in relation to cleaning organisations. Otherwise, combinations with decentralised alternatives mostly involve FCDs. Interestingly, in 2010, one large municipality combined an FCD with a KF for its cleaning services, whereas no large municipality did so for its FM services—they only planned to do so. Furthermore, 'other organisational models' (for FM services) and services purchased from the private or voluntary sectors (for cleaning services) are mostly used by small municipalities. Medium-sized municipalities are represented, however, and large municipalities use

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'other organisational model' or purchase from private/voluntary sector in combination with FCD. Notably, ASs and IKSs seem to be more attractive for FM services than for cleaning services. In short, municipality size seems to influence the use of organisational models—particularly for small municipalities.

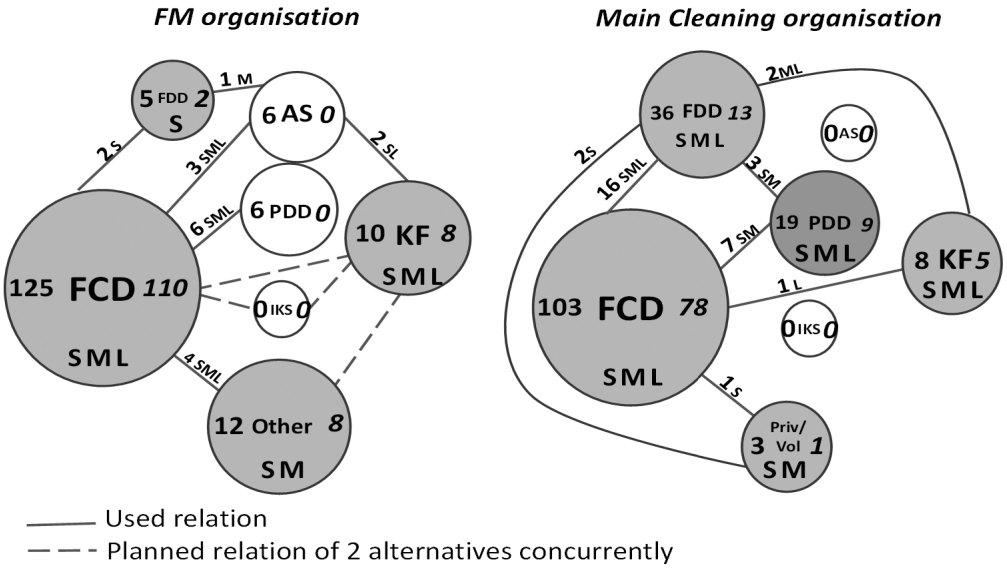

Figure 16 Alternatives' Attractiveness for FM and Main Cleaning Organisations, 2010

6. 3 Are FM and cleaning organisations structured similarly?

Comparing the municipalities' FM organisations to their main cleaning organisations reveals that many municipalities organise their FM and cleaning services similarly but that several municipalities use different organisational models for their cleaning and FM organisations (see Figure 17).

The most notable organisational combination, regardless of building category, is the FCD, which 78-92 of the municipalities use for both their FM and cleaning organisations (see Figure 17). In general, an FCD is the preferred alternative for FM organisations and mostly is combined with another traditional department alternative (FDDs, PDDs, or FCDs) for cleaning organisations. In particular, for health care buildings, the combination of an FCD for FM organisations and an FDD for cleaning organisations stands out.

Up to 11 municipalities reported using 'other organisational models' for their FM organisation, whereas none used 'other organisational models' for any of their three alternative cleaning organisations. This

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result might indicate that the additional organisational models provided for cleaning organisations were sufficient and that the used 'other organisational models' for FM organisations may be purchasing services from the private or voluntary sector.

School N=139		FM Organisation						
		FDD	PDD	FCD	KF	IKS	AS	Other
Cleaning Organisations	FDD	4		12	1			2
	PDD		1#	8				2
	FCD		2	91	1			6
	KF				7			
	IKS							
	AS							
	Other							
	Partly private			1				
	Entierly private			1				
	Voluntary							

Day Care N=139		FM Organisation						
		FDD	PDD	FCD	KF	IKS	AS	Other
Cleaning Organisations	FDD	3		11	1		1	3
	PDD		2#	7				1
	FCD		1	92				7
	KF				8			
	IKS							
	AS							
	Other							
	Partly private				1			
	Entierly private			1				
	Voluntary							

Other N=139		FM Organisation						
		FDD	PDD	FCD	KF	IKS	AS	Other
Cleaning Organisations	FDD	2	1	14	1		1	3
	PDD		1	9#				1
	FCD			89*	1			5
	KF				7			
	IKS							
	AS							
	Other							
	Partly private			1	1			
	Entierly private			1				
	Voluntary			1				

Health N=139		FM Organisation						
		FDD	PDD	FCD	KF	IKS	AS	Other
Cleaning Organisations	FDD	4		20	4			3
	PDD		4#	12				2
	FCD	1		78				4
	KF				6			
	IKS							
	AS							
	Other							
	Partly private			1				
	Entierly private							
	Voluntary							

Admin N=139		FM Organisation						
		FDD	PDD	FCD	KF	IKS	AS	Other
Cleaning Organisations	FDD	4		9		1		3
	PDD		1	9#				1
	FCD		1	91			4	5
	KF				6		1	
	IKS							
	AS							
	Other							
	Partly private			1				
	Entierly private			1	1			
	Voluntary							

** Included on 'Other buildings' is one municipality that reported their 'Main cleaning organisation' to be not applicable on 'Other buildings'. This respondent did however report to use an 'Occationally used cleaning organisation'. The municipality's report on cleaning organisation model is the same for all building categories, namely FCD. On School, Day care, Health care and Administration buildings their cleaning organisations was registered as a 'Main Cleaning organisation'. It was only on the category 'Other buildings' that they reported their cleaning organisation to be occationally used. An explanation for this could be that they do not clean other buildings on a daily basis.*

 # The municipality that consistently though out all building categories marked their Cleaning organisation as a Daily used, but not main organisation is included here. As can be seen in the table providing an overview over the municipalities' Main Cleaning organisations, this muncipality has registered their Main Cleaning organisations to be not applicable on all building categories.

Figure 17 FM and Main Cleaning Organisations—Are They Structured Similarly?

7 Conclusion—Are there any developing trends in Norway?

Several research questions are addressed in this article's introduction. In short, these questions and their corresponding answers can be expressed as follows: *How are public FM and cleaning organisation currently organised?* They are mainly organised in-house as traditional departments. *What models can the municipalities use?* They can use a wide range of alternatives (i.e., FDD, PDD, FCD, KF, four different IKS, AS and 'other organisational models', including purchasing services from private and voluntary sector). *Is municipality size important for organisational structure?* Yes, municipality size is important for decentralised alternatives—particularly for FDDs, which are used primarily by small municipalities. *Is building category important for organisational structure?* Yes, building category is important for AS, which are mostly used for administrative buildings, and KFs, which are mostly used for entire building portfolios. *Are FM and cleaning organisation structured similarly?* Yes, FM and cleaning organisations are structured similarly to a certain extent; most, but not all, municipalities use the same alternative for their FM and cleaning organisations.

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Thus, are there any organisational models that are notable? Yes, there are. Many municipalities use FCDs, KFs, and 'other organisational models' for their entire building portfolio, whereas no municipality uses PDDs, IKSs, and ASs for its entire building portfolio. In general, FCDs are the most attractive alternative, and IKSs and ASs are the least attractive. In fact, 'other organisational models' (for FM organisations) and partly purchased services from the private sector (for cleaning organisations) stand out as more attractive than both IKS and AS – and also just about to KF.

Does this article make a contribution? Yes, to a certain extent, it does. One major difference between this article's original research and the research identified in the literature review is the level of detail. In this article's original research, the traditional departments (the Etat alternatives) were split into three categories—FDDs, PDDs, and FCDs. Furthermore, IKSs and services purchased from the private and voluntary sectors are added as organisational models. Moreover, this article's original research requested information on an extensive number of building categories.

Accordingly, this article contributes to the field with a better understanding of 1) municipalities' use and planned use of traditional department alternatives; 2) municipalities' use and planned use of IKSs and services purchased from the private and voluntary sectors; 3) municipalities' concurrent use of organisational models; 4) the impact of building categories on municipalities' use of organisational models; 5) the impact of municipality size on the use of organisational models; 6) cross-service combinations used by municipalities; and 7) a possible developing trend towards decoupled alternatives (see Figure 19).

Figures 18 and 19 summarises the combinations of alternatives that are used by the municipalities and their planned combinations of organisational models. This figure illustrates the municipalities' increasing curiosity regarding new and less traditional organisational models and may indicate that municipalities have started to move away from the traditional department alternatives. This assumption is supported by the findings from NOU 2004:22 that found that municipalities who at that time planned changes intended a transition from decentralized departments (and other organisational models) to centralised departments, and also by this articles original findings regarding FM organisations: 1) few municipalities use decentralised departments; 2) no municipality plan a transition to decentralised departments, 3) only two small municipalities reported changing to a centralised department; and 4) several municipalities were, in 2010, planning a transition from centralised departments—some for their entire building portfolio. These municipalities planned to change to KFs, IKSs, ASs, and 'other' organisational models. Furthermore, FM organisations seem to be ahead of cleaning organisations in such developments (in Figure 17). However, the reported plans to change may indicate that cleaning organisations will experience similar developments.

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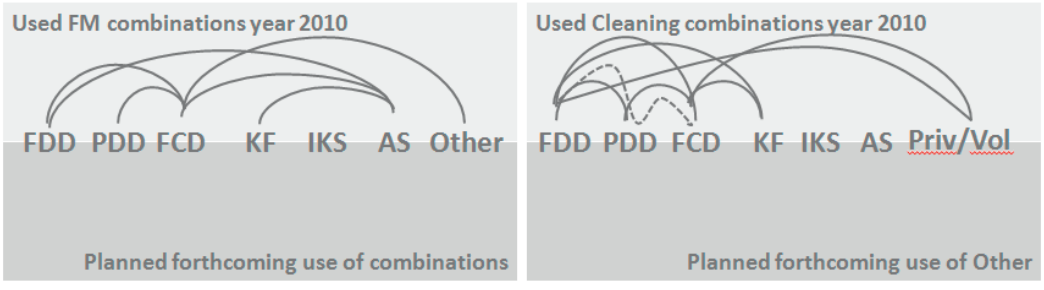

Figure 18 Use of combinations year 2010

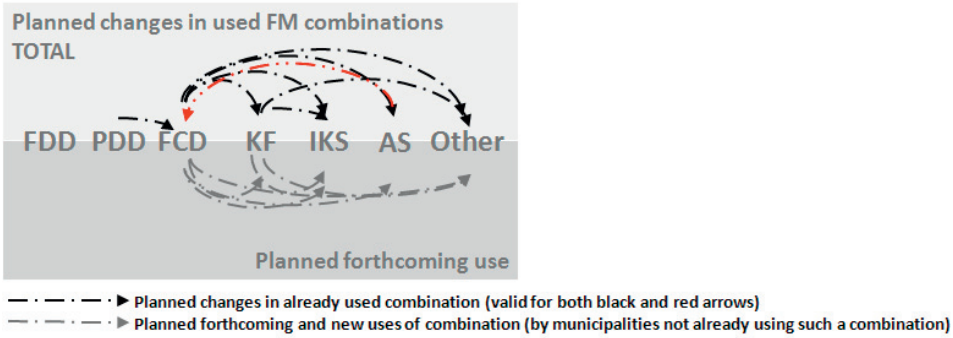

Figure 19 Developing Trends for Municipal FM and Main Cleaning Organisations?

References

Alexander, Keith (2003). The United Kingdom: Local Authority FM in the UK. Nordic Journal of surveying and real estate, Vol 1 (2003) Special series: Property and facilities services in local government -- contracting out or managing in-house.

Association of Public Service Excellence (2010) Building Cleaning. Summary report, 2008/09. APSE Performance networks. Association for public Service Excellence (APSE), Manchester, UK.

Association of Public Service Excellence (2011) Building Cleaning. Summary report, 2009/10. APSE Performance networks. Association for public Service Excellence (APSE), Manchester, UK.

Barret, Peter (ed.) (1995). Facilities management towards best practice. Blackwell Science Ltd.

Barret, Peter & Baldry, David (2003). Facility management. Towards best practice. Second edition. Blackwell Science Ltd, UK.

DOI for the article is http://dx.doi.org/10.1108/JFM-02-2014-0007

Baruch Y (1999) Response Rate in Academic Studies – A Comparative Analysis. Human Relations, Vol.52, No. 4, pp. 421-438.

Benton A L (1975) Inventories vocational interests of cartographers. Journal of Applied Phycology, 1975, 60 (1), 150-153.

Bel G, Fageda X & Mur M (2013) Why do municipalities cooperate to provide local public services? An empirical analyais. Local Government Studies, Vol. 39, No. 3, pp. 435-454.

Bergsen & Håkonsen (2001) Forvaltning, drift og vedlikehold av eiendom i offentlig og privat sektor. Arbeidsrapport nr 7/2001, Telemarksforskning-Bø, Bø I Telemark.

Blåka S, Tjerbo T, Zeiner HH (2012) Kommunal organisering 2012. Redegjørelse for Kommunal- og regionaldepartementets organisasjonsdatabase. NIBR-rapport 2012:21 Norwegian Institute for Urban and Regional Research (NIBR). Last excessed 15th October 2013: http://www.nibr.no/filer/2012-21.pdf

Brattås H og Gissinger HK (2011) Spørreundersøkelse. Det politiske eierskap til eiendomsforvaltningen. Rambøll Norge AS. Last excessed 16th October 2013: http://www.dibk.no/Documents/Eksisterende%20bygg/Publikasjoner/politiskeierskap.pdf

Brattås H, Gissinger HK & Klungseth NJ (2009) IKS I Kommunal Eiendomsforvaltning. En mulighet I et milder av kommunale og interkommunale organisasjonsløsninger? FoU Rapport 1-2009. NTNU. Also available in pdf: http://www.metamorfose.ntnu.no/Artikler/FoUrapporter/FoUrapport1_2009.pdf

Bröchner J (2003) Sweden: Notes on Municipal FM Contracts in Sweden. Nordic Journal of surveying and real estate, Special series, Vol 1, pp.45-50.

Bukve O and Saxi HP (2013) Parliamentarianism in Norwegian Regions: Majority Rule and Excluded Opposition. Local Government Studies, Vol. 40, No.2, 163-181.

Clark L and Rees D (2000) Professional facilities management in public sector organisations. Facilities, Vol 18, No. 10/11/12, pp. 435-443.

ECON & Multiconsult (2002) Organisering av kommunal eiendomsforvalnting. Oslo: ECON rapport 18/02, Kommunenes sentralforbund/Multiconsult/Econ.

Evers F, van der Schaaf P & Dewulf G (2002) Sucessful Management Strategies. Public Real Estate. DUP Science.

Fan W and Yan Z (2010). Factors affecting response rates of the web survey: A systematic review. Computers in Human Behaviour 26 (2010) 132-139.

Fellows R and Liu A (2009) Research methods for construction. Third edition. Wiley-Blackwell.

Gjertsen, A (2011) Kommunal eiendomsforvalnting og organisasjonsformer. NF-rapport nr 6/2011. Nordslands forskning – Nordland Research Institute, Norway. Last excessed 16th October 2013: http://www.dibk.no/Documents/Eksisterende%20bygg/Publikasjoner/NFrapp_06_2011.pdf

DOI for the article is http://dx.doi.org/10.1108/JFM-02-2014-0007

Gravdahl HP & Hagen TP (1997) Ny kommunelov, ny organisering? Organisasjon og arbeidsformer I kommuner og fylkeskommuner i 1996. NIBR-notat 1997:105. Norwegian Institute for Urban and Regional Research (NIBR).

Halligan J (2011) NPM in Anglo-Saxon Countries. In Christensen T and Lægreid P (2011) The Ashgate research companion to New Public Management. Ashgate Publishing Limited.

Hansen, G (2012) Overview and status of FM research for practice in Norway. In: Jensen PA, & Balslev Nielsen S (eds) Facilities management research in the Nordic countries. Past, present and future. Politeknisk forlag, Denmark, pp. 32-49.

Hansen H F (2011) NPM in Scandinavia. In Christensen T and Lægreid P (2011) The Ashgate research companion to New Public Management. Ashgate Publishing Limited.

Haugen T & Blakstad SH (1996) Samordning av byggningsforvaltningen I Trondheim kommune, forslag til framtidig prganisering og gjennomføring av FDV.

Haugen T (1990) Bygningsforvaltning. Økonomisk drift og vedlikehald – organisasjon, informasjon og system. Bind 1. Doktor ingeniøravhandling 1990:8. Institutt for husbyggingsteknikk, Trondheim. NTH – Universitetet i Trondheim. Norges Tekniske Høgskole.

Haugen T (2003) Norway: Contracting out Property and Facility Services in Norwegian Municipalities. Nordic Journal of surveying and real estate, Vol 1 (2003) Special series: Property and facilities services in local government -- contracting out or managing in-house.

Haugen T (2008) Temahefte 1 Facility Management. Forvaltning, drift, vedlikehold og utvikling av bygninger. NTNU Norges Teknisk-naturvitenskaplige universitet. Fakultet for arkitektur og billedkunst. Tapir akademsik forlag.

Hovik S & Stigen IM (2004) Kommunal organisering 2004. Redegjøresle for kommunal- og regionaldepartementets organisasjonsdatabase. NIBR-Notat 2004:124. Norwegian Institute for Urban and Regional Research (NIBR).

Hovik S & Stigen IM (2008). Kommunal organisasjon 2008. Redegjørelse for Kommunal- og regionanaldepartementets organisasjonsdatabase. NIBR-rapport 2008:20 Norwegian Institute for Urban and Regional Research (NIBR). Last excessed 15th October 2013: http://www.nibr.no/filer/2008-20.pdf

Jacobsen, DI (2009) Perspektiver på Kommune-Norge – en innføring I kommunalkunnskap. Fagbokforlaget.

Jensen P A (2008) Facilities Management for students and practitioners. Center for Facilities Management, Realdania Research. DTU Management Engineering, Technical University of Denmark.

Klungseth NJ and Olsson NOE (2013) Norwegian cleaning research: an overview and categorization. Facilities, Vol. 31, No. 7/8, pp. 290-313.

KMD (2014) Kriterier for god kommunestruktur. Delrapport fra ekspertutvalg. Mars 2014. Kommunal- og moderniseringsdepartementet (KMD), Norway. Last excessed 3rd June 2014: http://www.regjeringen.no/nb/dep/kmd/dok/rapporter_planer/rapporter/2014/Kriterier-for-god-kommunestruktur.html?id=754164

DOI for the article is http://dx.doi.org/10.1108/JFM-02-2014-0007

KOML. LOV-1992-09-25-107 Lov om kommuner og fylkeskommuner (kommuneloven). The Norwegian Local Government Act including amendments from 1st July 2013. Last excessed 21th November 2013: http://lovdata.no/dokument/NL/lov/1992-09-25-107. *An unofficial translation of the Act with amendments from 1st July 2012 can be found on the Norwegian Governments web page (last excessed 21th November 2013): http://www.regjeringen.no/upload/KRD/TX-23249-Kommuneloven-eng.pdf*

Leslie, L.L. (1972) Are High Response Rates Essential to Valid Surveys? Social Science Research 1, 323-334 (1972).

Leväinen, KI (2003) Finland: Contracted Property and Facilities Services in the Finnish Municipalities. Nordic Journal of Surveying and Real Estate Research – Special Series. Vol 1, pp. 34-44.

LOV-2012-05-25-28 Lov om endringar i kommunelova m.m. (samkommune mv.) Last excessed 21th November 2013: http://lovdata.no/dokument/LTI/lov/2012-05-25-28

Nelson, M.A. (1990) Decentralization of the Subnational Public Sector: AN Empirical Analysis of the Determinants of Local Government Structure in Metropolitan Areas in the U.S. Southern Economic Journal, Vol. 57, No. 2 (Oct., 1990), pp. 443-457.

NOU 2004:22. Velholdte bygninger gir mer til alle. Om eiendomsforvaltningen i kommunesektoren. Norwegian Public Report. Available at: http://www.regjeringen.no/Rpub/NOU/20042004/022/PDFS/NOU200420040022000DDDPDFS.pdf

Rohn, H (2011) Rapport om eierskap og organisering av eiendomsforvaltning i kommunesektoren. Reisnertsen, KoBE, Semco. Last excessed 16th October 2013: http://dibk.no/Documents/Eksisterende%20bygg/Publikasjoner/Rohn_Eierskap_og_organisering.pdf

Sellers J M and Lindström A (2007) Decentralization, Local Government, and the Welfare State. Governance: AN International Journal of Policy, Administration, and Institutions, Vol. 0, No. 4, October 2007, pp. 609-632.

Stang & Flyen (1993) Kommunal bygge – og eiendomsforvaltning. Samarbeid mellom Asker, Bodø, Sandnes og Steinkjer kommuner og Byggforsk. Prosjektrapport 135-1993.

Statistics Norway (2010): Tabell 07459: Folkemengde, etter kjønn og ettårig alder 1. Januar 2010 (K). Last accessed 6th December 2013: https://www.ssb.no/statistikkbanken/SelectVarVal/Define.asp?MainTable=NY3026&KortNavnWeb=folkemengde&PLanguage=0&checked=true

Trondheim kommunerevisjon (2008) Ny organisering av eiendomsforvaltningen i Trondheim kommune fra 2006 – er målene innfridd? September 2008. Rapport 10/2008 F. Last excessed 16th October 2013: http://www.trondheim.kommune.no/content/1117728873/Ny-organisering-av-eiendomsforvaltningen-i-Trondheim-kommune-fra-2006---er-malene-innfridd

Vabo & Stigen (2000) Kommunal organisering 2000. Redegjørelse for Kommunal- og regionaldepartementets organisasjonsdatabase. NIBR-notat 2000:128. Norwegian Institute for Urban and Regional Research (NIBR).

DOI for the article is http://dx.doi.org/10.1108/JFM-02-2014-0007

van Wagenberg, AF (2003) The Netherlands: Facility Management in Dutch Municipalities. Nordic Journal of surveying and real estate, Special series: Property and facilities services in local government -- contracting out or managing in-house, Vol 1, pp. 89-97.

Webster J and Trevino LK (1995) Rational and social theories as complementary explanations of communication media choices: Two policy-capturing studies. Academy of Management Journal, 1995, 38 (6), 1544-1572.

Wollmann H (2004) Local Government Reforms in Great Britain, Sweden, Germany and France: Between Multi-Function and Single-Purpose Organisations. Local Government Studies, Vol. 30, No. 4, Winter 2004, pp.639-665.

Wolman H (2008) Comparing local government systems across countries: conceptual and methodological challenges to building a field of comparative local government studies. Environment and Planning C: Government and Policy. Vol. 26, pp. 87-103.

Zumpano, LV (2003) The United States: The Privatization of Real Estate Related Public Goods and Services in the United States. Nordic Journal of surveying and real estate, Special series: Property and facilities services in local government -- contracting out or managing in-house, Vol 1, pp. 98-113.

[i] If all of the reported changes related to FM organisation are followed through, then one of the responding municipalities will be using three organisational models for their FM organisation. This particular municipality (of medium size) has reported that it plans to keep an FCD for its health care buildings, an 'other organisational model' for its day care buildings, and a KF for its remaining buildings.

[ii] The details of the 14 municipalities that plan to change away from FCDs are as follows:
One small municipality using an FCD for its entire building portfolio reported changing **to an AS** for its administrative and 'other' buildings.
One medium municipality using an FCD for its entire building portfolio reported changing **to an IKS** for its 'other' buildings only.
Four municipalities (3M, 1L) reported changing **to a KF**—two reported changing from an FCD to a KF for their entire building portfolio. One medium-sized municipality reported changing to an 'other organisational model' for its day care and to a KF for its school, administration and 'other' buildings. One large municipality using an FCD for its entire building portfolio reported changing to a KF for its 'other' buildings only.
Nine municipalities (2S, 5M, 2L)—all using FCDs for their entire building portfolio in 2010—reported changing **to an 'other organisational model'** for one or several building categories, including entire building portfolios. One small municipality reported changes for school and day care buildings. One small municipality reported changes for health care buildings only. One medium-sized municipality reported changes for its entire building portfolio. One medium-sized municipality reported changes for its school and health care buildings. One medium-sized municipality reported changes for day care and administration buildings. One medium-sized municipality reported changes for school buildings only. One medium-sized administration reported changing to an 'other organisational model' for day care buildings only and to a KF for its school, administration, and 'other' buildings, only maintaining an FCD for its health care buildings. One large municipality reported changing to an 'other organisational model' for its day care buildings only. One large municipality reported changing to an 'other organisational model' for its school, health care, and 'other' buildings.
Please note that an account of planned changes from an FCD for one medium-sized municipality is commented on twice—once in relation to a KF and once in relation to an 'other organisational model'.

[iii] A small municipality using three organisational models for their cleaning organisation is not illustrated in Figure 16 – this gives N=138. For the FM organisation, this particular municipality is using FCD for the entire building portfolio, whereas for the Cleaning organisation the municipality is using FDD for school and day care, PDD for health care and FCD for administration and 'other' buildings.

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Article 1

Article 2

Article 3

Paper 1

Paper 2

Klungseth NJ and Blakstad SH (to be published)
Organising In-house Cleaning Services in Public FM.

Article 1

Article 2

Article 3

Paper 1

Paper 2

Organising In-house Cleaning Services in Public FM

Nora Johann Klungseth and Siri Hunnes Blakstad, Norwegian University of Science and Technology

Abstract

Purpose: This article aims to describe and discuss public in-house cleaning services in Norway and the UK to gain a better understanding of current practises. Previous studies provide little detailed information regarding the organisational structure of facility management (FM) and little information connected directly to management-related issues, such as manager-to-frontline-staff ratios and relationships.

Design/methodology/approach: This research is based on two descriptive case studies of public FM departments, one in Norway and one in the UK. The case studies are based on semi-structured, face-to-face, in-depth interviews with managers at several levels, from service supervisors to strategic managers, and document reviews.

Findings: The cases demonstrate that in-house cleaning services can be structured and managed in different ways, particularly with respect to the split in services, management of staff and customer contracts, workforce flexibility, span of control, chain of command, self-managed leadership, cleaners' hours of duty and the use of outsourcing.

Research limitations/implications: Although previous research on particular FM services is limited, this article's detailed descriptions of current organisational structures – which span from the operational levels to the authority councils and include descriptions of specific practices within the organisations studied – may stimulate further development and research within the field.

Originality/value: This article may constitute the first detailed description of in-house cleaning departments in public FM, and it includes descriptions of both how these departments are connected to the overall municipal organisation and how cleaning services are structured and managed.

Keywords: Public sector, Cleaning, Organizational structure, Case Studies, Facilities management, Management

1. Introduction

Clean facilities are vital to the health and satisfaction of their occupants. Cleaning is also one of the most costly services to provide when operating a building. At the same time, it is one of the least-researched facility management (FM) services (May and Pitt, 2012; Klungseth and Olsson, 2013). To improve quality and reduce costs, we must know more about how cleaning services are structured, managed and operated. Optimisation and benchmarking, which aim at improved service quality and reduced costs, rely on thorough knowledge of the actual service. Thus, this study aims to provide deeper knowledge of cleaning services by focusing on cleaning in the public sector and investigating how the work is managed and organised. Cleaning is part of FM, and appropriate knowledge of cleaning services, both in-house and outsourced, is valuable for the FM organisation.

The current European definition of facility management states that FM is "an integration of processes within an organisation to maintain and develop the agreed services which support and improve the effectiveness of its primary activities" (EN 15221-1:2006, p. 5). Generally, the responsibility of an FM organisation is to manage the services required for a core business. The FM organisation must have enough knowledge of individual services (such as cleaning) to ensure that those services meet appropriate quality standards and add value to the core business. In the case of in-house cleaning, the service should preferably be able to compete with the market with respect to quality, cost and customer satisfaction. If the services are a combination of in-house and outsourced services, FM can use the outsourced service as a benchmark for the internal service. In the case of outsourced services, FM must have sufficient knowledge of the actual service to be able to negotiate and manage a suitable FM agreement, including related service-level agreements (SLAs). Thus, increased knowledge regarding the structure and management of cleaning services should be of value regardless of how the service is provided.

In FM, services are frequently categorised either as hard or soft. Hard services generally refer to building-related practices such as maintenance, systems operation, energy management and landscaping, and are sometimes referred to as "brick and mortar". By contrast, soft services are typically more people-related and involve practices such as cleaning, catering, reception, laundry, linen, ward housekeeping and portering (Liyanage and Egbu, 2005; Toumela and Salonen, 2005; May and Pinder, 2008; Atkin and Brooks, 2009; De Toni *et al*., 2009). In general, the FM literature provides a significant amount of information about the FM field but provides little detailed information about how to actually structure FM.

The assumption that there is a gap in the FM literature and research regarding the structure of FM organisations is supported by Kaya and Alexander (2006a, 2006b), who posit that studies of FM organisations have neglected the internal environments of organisations such as hierarchy, specialisation, centralisation, span of control, size and lines of reporting. Kaya and Alexander also indicate that the external environments of FM organisations—such as occupancy profile, change, visibility to customers and procurement options—have been widely covered in the FM literature.

1.1 Benchmarking relies on knowledge of cleaning

Benchmarking is an important step with respect to improvements and is viewed as important in FM. Research into key performance indicators (KPIs) frequently tends to focus on parameters related to a building's performance, including users' perceptions (see Pitt and Tucker, 2008; Tucker and Pitt, 2009a, 2009b, 2010; Lavy *et al*., 2010, 2014a, 2014b). In general, measurement and performance benchmarking can be conducted in a variety of ways (Clark and Rees, 2000; EN 15221-7:2012; Lam, 2008; Lavy, Garcia and Dixit, 2010). For example, measurements and benchmarking can be cost-oriented (e.g., £ per m^2, full-time equivalent or workstation), speed-oriented (e.g., m^2 per hour), environmentally oriented (e.g., tonnes, kWh or m^3 per annum), perception-oriented (e.g., customer satisfaction), productivity-oriented (e.g., operating hours, timeliness, uptime, recovery time, turnover or absenteeism) or value-oriented (e.g., cost measures versus perception measures).

Quantitative measures and performance benchmarking can provide information regarding how facilities or services are performing, but such information is less applicable without a solid understanding of the underlying factors. Recently, FM in Europe has developed a common framework for measurement known as EN 15221-7:2012. Prior to development of this framework, various businesses, countries and continents tended to measure services differently: "effectiveness and efficiency in Facility Management have been notoriously difficult to assess because there have been no common methodology and no standard data collection methods" (EN 15221-7:2012, p. 5). Thus, cross-context comparisons have been challenging, even within individual countries. In Germany, Stoy and Johrendt (2008) found that the national standard that defines cleaning cost is unsuitable for practical application. In Norway, appropriate KPIs have until recently been rather rare, particularly in public FM[i].

With respect to cleaning, Wauters (2005, p. 150) identifies cost, quality, time and risk as benchmarking parameters, and notes that benchmarking is pointless unless the benchmarked parameters and activities match: "Therefore, the peer group organisations need to be comparable in their activities and the classification/measurements protocols applied to the benchmark need to be clearly defined. If the latter is not the case a true like-for-like comparison is impossible". Such parameters also depend on organisational structure and management, but this dependence is not widely addressed; even Stoy and Johrendt (2008), who specifically analysed cleaning costs, limited their calculations of cleaning management to the degree of outsourcing. Organisations' formal structures and management-to-frontline-staff ratios are relevant issues to study because it provides insights into a more qualitative side of FM, which represents underlying factors that in turn impact costs, quality, time and risk. Mapping such information can highlight areas of improvement and barriers to improvement, and can thus be part of facilitating better cross-context studies and benchmarking possibilities in the future.

1.2 Cleaning costs and user experience

In terms of building users' experience and cost, cleaning is a significant FM service. Recently, cleaning has been acknowledged as the most important FM service for patients' experience of quality (May and Pinder, 2008), the most preferred property management attribute for housing estate tenants (Lo *et al*., 2013) and the second most important FM service for residential building users (Lai, 2014). Cigolini *et al*. (2011, p. 452) pinpoint some of the challenges regarding cleaning: they propose that the gaps between required service levels and those actually supplied seem too ambitious or misleading at times "in the cleaning service, where the perceived performances are very subjective and often an outstanding average customer satisfaction is hard to achieve".

In terms of costs, cleaning services have long been recognised as one of the most cost-intensive operational services. Estimations of cleaning costs have shown that cleaning can represent up to 30% of the total cost of a building over its life (Alexander and Marshall, 1987). Other studies of cleaning services have estimated cleaning to represent from 19% to 49% of the total operational costs of buildings (Horjen, 1995; MacSporran and Tucker, 1996; Strand, 2000; Bjørberg *et al*., 2005; Stoy and Johrendt, 2008; Jensen, 2008; Madritsch *et al*., 2008).

In general, the cost of services consists of various factors, such as labour and materials costs. Cleaners' use of time typically depends on work organisation, service management, specification of cleaning

methods and frequencies, cleaning machines' work rate, cleaning tools, chemicals, training of cleaning staff and a building's design (*Facilities*, 1984b; Bywater 1990; Campbell, 1990; Linn, 1995, 2002; Stoy and Johrendt, 2008; Campbell, 2005; Stoy and Kytzia, 2006). The high dependence on labour is distinctive to cleaning services; thus, how cleaners use their time is critical to the total cost of cleaning. Several sources estimate that cleaning labour accounts for approximately 80-95% of the total cost of cleaning (*Facilities*, 1984a; Campbell, 1990; NOU 1993:10; Ryan and Herod, 2006; Stoy and Johrendt, 2008; NHO service, 2009; Trygstad *et al*., 2012), which makes cleaning particularly vulnerable to inefficient organisation and practice. Small challenges may thus have great impacts.

1.3 Relevance of organisational structure

In 2003, Alexander indicated three emerging trends in FM: "managing customers, managing service and managing assets" (2003a, p. 271). Of these three emerging trends, management of services seems to be the one least addressed. This article maintains a service supply perspective; thus, aspects specifically addressing users' perceptions and a facility's performance have been omitted.

According to Kaya and Alexander (2006a), organisational structure is the formal representation of an organisation that provide clues about people, lines of influence, decision makers, terminologies, duplicated work orders and tasks, integration, synergies and political conflicts. This proposition is supported by Barley and Kunda (2001, p. 76), who argue that "work and organization are bound in dynamic tension because organizational structures are, by definition, descriptions of and templates for on-going patterns of action". Generally, organisations' internal structures vary, which is visible through variances in organisational charts. Variances in structure—how and what services and functions an organisation emphasises—also influences how an organisation delivers services. Although structure is not the only organisational characteristic that influences service quality and cost, well-structured organisations, clear roles and well managed staff are fundamental for good service delivery. Management practises impact service delivery. For example, unskilled staff will likely provide different cleaning service than trained staff, trained staff is likely to have fewer injuries than untrained staff, and cleaning staff members who feel that their employer invests in them are likely to remain with the business for a sustained period of time (Campbell, 1990; Campbell, 2005).

Cost optimisations tend to be pursued through benchmarking and outsourcing. Nonetheless, little is known about how cleaning services are actually managed and operated, except that they are known for being cost intensive, predominantly manual services that are often deemed desirable to outsource and/or downsize (Spedding, 1994; Alexander, 2003b; Stoy and Johrendt, 2008; Jensen, 2010). Outsourcing is frequently the strategy chosen because it is associated with improvements in cost and quality performance (Lam, 2012). This practice is long-standing, even in the public sector. According to Spedding (1994, p.184), *"*cleaning tends to be the first, not the last, cost centre to be cut when savings have to be made.*"* Nevertheless, cleaning remains one of the first services to be outsourced; for example, cleaning was included when the Hong Kong Housing Authority launched its first phase of outsourcing (Lam, 2012). However, outsourcing does not eliminate an organisation's need for services management. Even when cleaning services are outsourced, an organisation needs a team of experienced and dedicated staff to coordinate and supervise the required work (Hui, 2005).

1.4 In-house public cleaning

Regarding FM and the retention of services in-house, Atkin and Brooks (2009, p. 96) posit the following: "In a sector that has grown large on the back of a consistent wave of outsourcing one could be forgiven for seeing in-house provision as having lower economic worth. In fact, nothing could be further from the truth". These authors continue: "Retaining services in-house has to be the primary goal for the in-house team" (p. 100). Still, few studies address in-house provision, particularly with respect to in-house cleaning. Therefore, this article focuses on in-house public cleaning services.

The public sector focus is supported by the impression that FM studies have tended to focus on the private sector and on the improvement potential related to outsourcing and benchmarking. Generally, it may be argued that FM (throughout the world) was developed primarily by the private sector. This position is supported by Nutt (1999), who indicated that the public sector was less involved in the development of FM, and also by Jensen *et al*. (2008, p. 15), who stated that FM's international development occurred primarily in the private sector, although "the public sector plays an important role in the Nordic countries". Commonly, Norway is viewed as having a particular public sector orientation, whereas the UK is known for its private sector focus; for example, the UK is highest ranked in the OECD for outsourcing of government services (Halligan, 2013). Despite this, recent research indicates that in-house cleaning service provision is common in both Norwegian and UK local authorities (LAs) (Klungseth, 2014). Thus, this article focuses on in-house public cleaning services in the context of Norway and the UK.

Because cleaning is one of the most cost-intensive services and commonly exposed to competition, it seems appropriate to research this service further. As the FM profession was developed primarily in the private sector, and as there seems to be a gap in the literature regarding the structure and management of individual FM services such as cleaning, this article focuses on these issues by posing the following research question:

How are in-house cleaning service organisations structured and managed in public FM?

This article focuses on describing in-house cleaning services through descriptive case studies. Because Nordic countries are characterised by a particular focus on the public sector and Anglo-American countries are generally known for a private-sector focus, it should be interesting to study separate cases from these two contexts. Thus, one case from the UK and one case from Norway were selected. The focus on Norway and the UK is supported by statements from both Ventovuori *et al*. (2007) and Jensen and Balslev Nielsen (2012) that the leading countries in FM development—the Nordic countries, the Netherlands, the UK, the US, Australia and Hong Kong—are the most frequently researched FM markets. Of these countries, Norway's development has been characterised as slower (Haugen, 2003), whereas the Netherlands and the UK are considered the most trendsetting countries (Jensen, 2008). According to Jensen *et al*. (2008), trendsetting municipalities are characterised by customer orientation, a focus on professionalisation and increased employee competency. Trendsetters also use development ladders and recognise that development must be progressive.

In-house cases from such different contexts may reveal differences and similarities across countries and contexts. A deeper insight into how public in-house cleaning services are structured and managed might indicate areas that require research. At present, the authors view it as important to gain insight and describe the situation 'as is', as opposed to a normative approach that focuses on how it 'might be'. Thus, a broad and descriptive approach has been chosen rather than a focus on specific areas regarding the provision of cleaning services.

The next section presents relevant general organisational theory and includes articles in the FM literature that address related issues. Following this section, the data collection method is presented and discussed. Thereafter, the two case studies are presented, followed by a cross-case discussion and conclusions. Both case presentations are structured similarly, presenting first a general description of the local authority (LA) and its FM organisation, followed by a more detailed description of the FM organisation (including an organisational chart that shows the FM organisation's links to the council) and capped by a detailed description of the cleaning service.

2. FM organisations as formal structures

According to Friday (2012, p. 180), "Organisational structure comprises the organization components, their relationships and hierarchy, as well as determining where formal power and authority are located". Generally, organisation models—and perhaps chart models in particular—are related to structural approaches, such as Weber's Bureaucracy, Fayol's Classical Movement, Taylor's Scientific Management, Gulick's Scientific Administration and Herbert Simon's Administrative decision-making behaviour (Busch and Vanebo, 2003; Christensen *et al.*, 2007, 2009; Friday, 2012). In general, an organisation's structure is described by the following terms:

1) *Hierarchy*, which refers to an organisation's vertical levels, in which a higher level instructs a lower level and information is transmitted from lower levels to higher levels.
2) *Routines*, which comprise rules and procedures relating to both vertical and horizontal coordination. Routines determine who should do what and how it should be done (frequently through regulations, guidelines and manuals). The vertical coordination of routines relates to responsibilities.
3) *Division of labour*, which relates to specialisation on a horizontal basis and specifies where explicit tasks are to be allocated. The division of labour can be managed according to Gulick's four principals: purpose (e.g., defence, education, health), process (e.g., juridical, economical, human resources), clientele (e.g., particular segments of the public, such as immigrants, children, the elderly) and geography (e.g., north, south, east and west, or local, regional, national and international).
4) *Chain of command*, which relates to reporting relationships.
5) S*pan of control*, which relates to the number of subordinates (e.g., cleaners) beneath a superior (e.g., a service supervisor); in this regard, Friday (2012, p. 181) states: "There are no firm rules for managerial span of control… Sound management practice, however, indicates a span of control extending beyond 15 individuals, regardless of the above factors, may be too large".

6) *(De)Centralisation*, which relates to the placement of decision-making authority toward the top or the bottom of an organisation.
7) *Differentiation* (horizontal, vertical and personal), which relates to how different functions and areas of specialisation are grouped together.

FM organisations have been described in various ways; nevertheless, with few exceptions, often based on the early works of Cotts (1990, 1999) and IFMA (2001), there is not much emphasis on organisational models, design and structure, such as hierarchies, role descriptions, manager-to-frontline-staff ratios and relationships.

This knowledge gap is addressed by Kaya and Alexander (2006a, 2006b), who found commonly used classifications to be insufficient for FM organisations. They propose 10 organisational characteristics that are particular to FM. However, some of these are closely related to the general way of describing organisations. Kaya and Alexander's measures of *chain of command*, *reporting line* and *personnel's professional background* are closely related to hierarchy because they measure the number of vertical levels within an organisation to whom the FM director reports and the hierarchy among staff according to occupation and education. Likewise, Kaya and Alexander's measures of *specialisation* (the number of subordinates reporting to a superior) and *succession routes* (measures of the possibility that staff can move upward) are related to an organisation's span of control. Additionally, Kaya and Alexander proposed to describe FM organisation according to measures such as *change* (through the organisation's average churn rate), *customers* (through the speed of customer feedback and the duration of the service relationship), *procurement options* (from the total in-house to management agency), and *geographical dispersion*, as measured by the number of region/states/countries in which an FM organisation operates, including the FM organisation's *relative size*, which is determined by comparing the number of full-time employees in the FM organisation and the context organisations.

Some of the related and available knowledge regarding FM organisations' internal structures is on a rather high and generic level; see Clark and Rees (2000), IFMA (2001), Friday (2012) and Kaya and Alexander (2006b). Thus, there is a need to describe individual services in detail, including cleaning.

Clark and Rees (2000) studied LAs in the UK and found that integrated FM departments provided the highest level of value for the organisation. Moreover, the majority (62%) of LAs in the UK had either a partly or fully integrated FM department, whereas 38% used a traditional (separate) support services department (Clark and Rees, 2000). Generally, integrated FM departments reported directly to the Chief Executive or to the level just below the Chief Executive (98%), and the majority of 'FM heads' reported directly to a council committee (88%). Overall, Clark and Rees (2000) found a remarkable variation in the structure of FM organisations within LAs that did not have a fully integrated FM service; 50% spread FM services over two or three departments, and 12% scattered their FM services over six to nine different departments.

American and Canadian research shows that the predominant FM department structure is a tall bureaucracy with high vertical and personal differentiation—a highly specialised hierarchy (Friday, 2012). The majority of American and Canadian FM departments out-task their services (80%); the remainder

outsource their services (6%) or maintain them in-house (14%) (IFMA, 2001). FM organisations are rarely split between various departments (4%). Instead, FM departments are typically either a separate, standalone department (54%) or a division under a larger department (42%), which is typically Administration (21%), Human Resources (18%), Finance (14%), Operations (14%) or Real Estate (11%). FM departments are normally structured according to service (64%), customer (22%) or geography (13%), and 73% of FM departments consist of two to four vertical levels. In general, two to four functions report to FM heads; these functions typically include building maintenance (57%), facilities operations (44%), safety/security (32%), reception and administration (24%), office services (21%) and/or engineering (20%). The increase in the number of FM departments that report to senior management (CEOs, COOs and CFOs)—from 19% in 1996 to 45% in 2001 (Friday, 2012)—is also notable.

The descriptive case studies in this article highlight factors such as hierarchy, chain of command and reporting line, routines, differentiation, division of labour, the contractual (procurement) options offered by the cleaning service that are utilised, and the managerial span of control, including the cleaning organisation's relative size according to the context of its organisation—the FM organisation.

3. Methodology and data collection

This article includes two single and descriptive case studies from two different national contexts—one from Norway and one from the UK. The subject under investigation in these descriptive case studies is in-house cleaning services in LAs. The intention and motive has been to describe and discuss public in-house cleaning services to facilitate a deeper insight into *how in-house cleaning service organisations are structured and managed in LAs*.

Case studies involve "in-depth investigation of particular instances of a phenomenon" (Fellows and Lui, 2008, p. 110) and are understood as valuable when existing knowledge is limited. They are also preferred when 'how' or 'why' questions are posed.

3.1 Selection of cases

Case studies can be selected in various ways; they can be a general case (referred to by some as a typical case), a bespoke case or a random case (Fellows and Lui, 2008; Yin, 2009).

The specific selection criteria for the cases in this article were in-house providers of cleaning services in larger LAs within countries with similar governmental systems. Both Norway and the UK can be described as sovereign states that are constitutional monarchies with representative democracies. Each has a unitary parliamentary system with similar responsibilities regarding, for example, education and health. However, it might be emphasised that the split of responsibilities between state, county and municipality varies because of the influence of private sector ideas; for example, private schools and nursing and care homes are more common in the UK. Norway is known for its public sector orientation and for being a late New Public Management (NPM) implementer. It has been characterised as an NPM moderniser focusing on managerial and user-responsiveness strategies. Conversely, the UK is known as an NPM reformer and is considered an NPM marketiser focused on competition, marketisation and incentivisation strategies (Halligan, 2013; Hansen, 2013).

The cases were selected through snowballing in the UK and convenience/typicality in Norway. The Norwegian case represents the most common version of in-house organisation among Norwegian municipalities, which is a fully centralised department (see Klungseth, 2014). The Norwegian case represents the second tier—the municipal level—of the uniform Norwegian two-tier structure, whereas the UK case is a single-tier authority, with one level of local government that is responsible for all local services. Additionally, both organisations are considered among the frontrunners within their countries and both organisations have won awards for some of their FM services. The organisational characteristics indicate that both cases are representative of some of the more successful public organisations.

3.2 Data collection

Yin (2009) describes six sources of evidence that are commonly used in case studies, including documentation, archival records, interviews, direct observation, participant observations and physical artefacts. The data collection methods chosen for the descriptive case studies presented here include interviews and document reviews. In addition, direct observation was employed that entailed shadowing cleaners to gain an understanding of the cases and their context. The shadowing data are not directly used in this article but can be found in Klungseth (2012) and Klungseth and Blakstad (2012).

Interviews, document reviews and direct observation all have their strengths and weaknesses. The strength of *interviews* lies in their ability to focus directly on case study topics and the provision of perceived causal inferences and explanations. Their weaknesses include bias due to poorly articulated questions, response bias, inaccuracies due to poor recall and the fact that those interviewed may provide responses they believe the interviewer wants to hear. Some of these weaknesses can be reduced through the use of documentation. The strength of *documentation* is that documentation is not created specifically for the case study and can be reviewed repeatedly. Moreover, documentation spans a longer time period and contains exact information, such as names, references and details. The weakness of documentation is that it can be difficult to find, and access can be withheld. Additionally, the usage of documentation can be biased by incomplete collection (biased selectivity) and reporting bias inherent in the author of the documentation (Yin, 2009).

Yin (2009) regards interviews as the most common source of case study information. To ensure the accuracy of information provided during interviews, documentation was requested during each interview. Respondents were given informational leaflets that described the study and requested informed consent. These leaflets included an overview of the interview topics; as a result, several of the respondents brought documentation to the interviews to back up their accounts. A bias not highlighted by Yin (2009) but experienced by the researchers included a lack of specific details in the documents provided. As Yin (2009) recommends for case studies, the interviews were performed as guided conversations following a consistent line of inquiry where the stream of questions was more fluid than rigid. Interview guides were developed with topics to be covered and specific questions to be addressed. The questions acted as guides for the conversation to facilitate communication. To prevent inaccurate information and assist poor recall, the interviews were recorded and subsequently transcribed. They were later converted to a narrative describing the particular FM organisation, including the organisation

of cleaning services. Through this process, respondents were invited to review the collected material, which included the opportunity to comment on this article prior to submission.

Additionally, direct observation was conducted to provide researchers a snapshot of the cleaning organisations' day-to-day reality. These observations provided insight into the management of the cleaning organisations studied and the performance of the cleaning services, which enabled a deeper understanding of the context.

Research on the Norwegian case was conducted in 2010-2011; research on the UK case was conducted in 2011. Both cases were based on semi-structured, face-to-face, in-depth interviews with managers at three different levels; each interview lasted between one and two hours. Prior to the interviews, participants received written information about the study, including an interview guide that requested information on the following topics:

- General information about how the department operates, maintains and manages its properties
- Boundaries between core business and support services
- Collaborations and responsibilities within and outside of the department
- The department's goal, vision and strategy
- The department's organisation at strategic, tactical and operational levels
- The department's service deliveries
- The department's operations model
- The importance of focusing on operational services
- The development of buildings and adaptation of buildings for daily operations

Several managers within each country's LA were interviewed. In total, three managers were interviewed in the UK and four managers in Norway, including the following:

1) One Service Supervisor (SS) in the UK, which is a manager of cleaners.
2) The Operational Manager (OM) in the UK, which is the manager of the UK SSs.
3) The Strategic Manager (SM) in the UK, which is the head of the FM organisation.
4) One Service Supervisor (SS) in Norway, which is a manager of cleaners.
5) The Cleaning Manager (CM) in Norway, which is the manager of the Norwegian SSs.
6) The Strategic Manager (SM) in Norway, which is the head of the FM organisation.
7) The Accounting Manager (AM) from the FM organisation in Norway.

Due to obligations related to research ethics in Norway and the UK, and because of the promise to secure respondents' anonymity, limited information is provided regarding the respondents' education, work experience, age, gender and other identifying characteristics. In general, both cases involved male and female managers, and all participants were over 40. All managers, except one SS, had higher education in areas including business, management, social sciences or accounting. Several respondents had multiple degrees, for example, supplementing a five-year degree with additional education in community planning, residential planning and property law. Two of the respondents also had operational experience, one having been a cleaner and the other a service area manager before making upward career moves.

Norwegian Case	UK case
Documentation provided by respondents: General information provided to all newly employed staff on their first day, including detailed organisation charts for LA, the FM organisation and all sub-units in the FM organisation; general key figures regarding the LA area and population; the FM department's economic plan (general information); information about the key performance collaboration project (general information); the Indoor Environment Cleaning standard; examples of cleaning standards specifications for health care buildings; an introductory checklist for newly employed cleaning staff; an anonymised overview of all cleaning staff, including year of birth, educational level, position sizes and general accounts of sick leave within each cleaning service area; and a specific overview of the building portfolio within one cleaning service area that identified the type of building and location of buildings but with no information of m^2. *Documentation from webpage and other officials:* General information regarding the LA's organisational charts; measures of building portfolio (in approximate m^2); an overview of all management staff, including contact information; the FM department's annual reports, including general overview of the organisations, the services and the FM departments' annual accounts and results; and a floor plan of buildings where shadowing occurred.	*Documentation provided by respondents:* Organisational chart of the soft FM department; business map; performance plan with strategic links to LA's strategic priorities; key performance targets and delivery plans for all services; cleaning handbook containing general information provided to cleaners, including checklists for introductory training, advice on ergonomics and fire safety; documents addressing chemical safety and the importance of the 'Control of Substances Hazardous to Health' (COSHH) Regulations; documents addressing cleaning electrical equipment safely; documents addressing manual handling and lifting safely; documents addressing safety when working at heights (using step ladders); documents addressing asbestos awareness; phone numbers and other information such as order forms, time sheets, mileage forms, etc.; and the floor plan of buildings where shadowing occurred. Restricted information included specific and anonymised information on cleaners' ages, gender and education. *Documentation from webpage and other officials:* General information regarding local governments in the UK; general information regarding the LA's history, approximate population and area; maps, organisational charts and corporate strategy; and general information on the soft FM department and its services.

Table 1 Documents provided by the case studies

In general, the respondents had several years of experience with the organisations studied. The respondent with the least LA experience (three years) was recruited from the private sector after gaining extensive experience as a consultant and manager. The respondent with the most experience had worked as a manager in the particular organisation for 30 years.

Documentation provided by the respondents was supplemented by general information available on the LAs' webpages and by documentation provided by other LA officials upon request. Please see Table 1 for an overview of the documentation provided. Generally, public organisations in both Norway and the UK are transparent by law and thus provide substantial online information regarding their organisations. For the same reason, information can also be requested from LA officials other than those interviewed. Both cases were helpful in providing documentation. In one case, specific and anonymised information addressing cleaners' ages, gender and education was unavailable; the organisations did not gather it due to age and gender discrimination concerns.

3.3 Data analysis

According to Yin (2009), there are four general strategies and five analytical techniques for analysing case study evidence. The strategies include relying on theoretical propositions, developing case

descriptions, using both quantitative and qualitative data and examining rival explanations. The analytical techniques include pattern matching, explanation building, time-series analysis, logic models and cross-case synthesis.

Because information on public in-house cleaning organisations is limited, the strategy employed in this article is case description; the authors set out to describe public in-house cleaning organisations 'as is'. These case descriptions are presented traditionally, as narratives (Yin, 2009), first by separate case description and second by cross-case discussion. The analytical technique employed is cross-case synthesis, referred to in this article as cross-case discussion. Generally, cross-case synthesis can be employed when a study includes two or more cases. This technique treats each individual case study as a separate study. According to Yin (2009), this type of synthesis can be conducted whether the included cases are predesigned as part of the same study or have been conducted as separate and independent research studies.

The information provided in the two separate case descriptions and the cross-case discussion is derived from the interviews and documents. In the cross-case discussion, links to sited theory are clearly expressed by referencing particular studies or theories to distinguish case study information from general theoretical information.

In the subsequent sections, the two descriptive case studies will be presented separately, followed by cross-case discussion and conclusions.

4. Split FM service: the UK case

The UK case involves one of the larger LAs in the UK. The LA owns approximately 260 buildings, half of which are educational buildings. The FM organisation is split into two departments, hard FM and soft FM, that support one another by jointly addressing changes in the use of buildings. The hard FM department consists of five operators who manage the buildings on behalf of the LA. This FM team is responsible for ensuring that the buildings are fit for their purposes—that services such as heating, lighting and alarms work and that the fabric of the buildings functions properly. This team inspects the LA buildings every month.

The soft FM department is responsible for three main services: cleaning, catering and the school-crossing patrol. The soft FM department also manages two relatively minor service areas: a caretaking cover service (managed by the cleaning unit) and consultancy services that are provided to other LAs (primarily in connection with the cleaning services).

4.1 The UK FM organisation

The soft FM department belongs to the *People Directorate* and is situated under *Community Services*, which provides adult services (day centres and adult care homes) within the *Specialist and Targeted* division (see Figure 1).

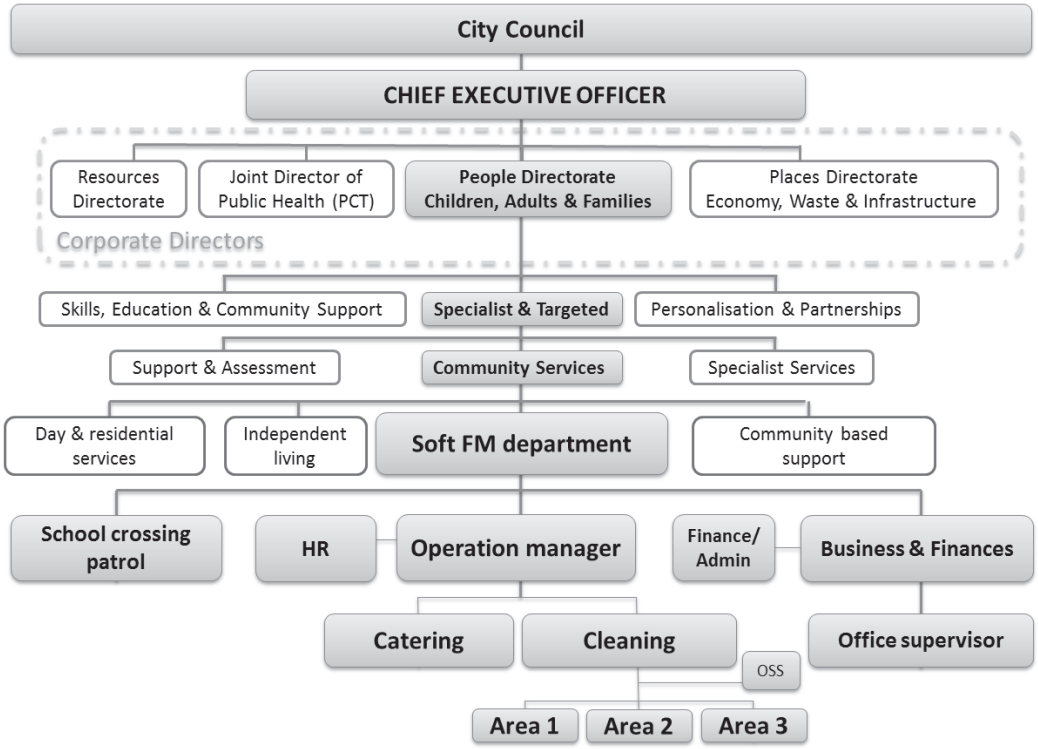

Figure 1 Organisational chart of the UK case study as of 2011

The soft FM department describes itself as an arms-length trading arm within the LA; each of its three main services operates on a financially independent basis. The soft FM department benchmarks these services in a national and public benchmarking group.

The FM department must generate enough income to cover its costs, in contrast to the LA's other departments, which receive funds from the LA to cover the costs of the services provided. Consequently, the FM department charges each client for the services it provides and has a *Business and Finance unit* that administers its finances, human resources and payroll. However, the LA manages the actual mechanisms at its corporate centre and charges the soft FM department an overhead fee for these centralised services.

The soft FM department is overseen by four managers who are collectively responsible for a staff of approximately 1 200 people and a business worth over £10M. The OM is the only manager responsible for two different services (the catering service and the building cleaning service, which includes the caretaking cover service).

Contracts with staff are centrally based and not linked to any specific location. In addition, the contracts require the staff to move according to the needs and demands of the business; staff can be reassigned

from one location to another with reasonable notice (a couple of weeks), which allows the department to maintain a flexible work force.

All staff is employed by the department, and the majority of the staff is female. Approximately 300-400 staff members are employed on multiple contracts across the business to create full-time positions. Many of the female cleaning staff have personal childcare responsibilities (either as parents or grandparents), and their work schedule suits their childcare needs.

The supervisory staff meets with the frontline staff every three months. The SM and OM also conduct twice-yearly meetings with the entire 1 200-member staff. The SM believes it is important to provide the staff with information regarding the FM's overall business performance and financial results.

4.2 The UK cleaning service

The cleaning service represents approximately £5M of the department's total business and cleans approximately 75% of the LA's buildings, including approximately 120 educational buildings and 85 non-educational buildings. The remaining 25% of the buildings are cleaned by private service providers.

The cleaning service offers daily cleaning and periodical cleaning. Periodical cleaning includes deep cleaning, window cleaning, barrier matting cleaning, jet washing and graffiti removal services.

The OM is responsible for over 400 staff members and manages the cleaning service with three SSs, who are supported by three operational support staff (OSS) members. On a typical day, the OM coordinates the SSs and ensures that all buildings in the portfolio receive their cleaning services correctly. The OM holds weekly meetings with the SSs in which they discuss staffing issues, customer complaints and finances. The OM also meets with customers, such as school principals and building/facility managers, to ensure that there are no concerns. Because the cleaning unit is an independent service, it rarely collaborates with other units in the LA, with the exception of the hard FM department (with which the OM meets monthly).

The three SSs are based in one central location; each SS is assigned a geographical service area (east, west and middle). Each SS manages approximately 150 cleaners and 60 customers. Additionally, the SSs manage the caretaking cover service. On average, each SS is responsible for 40 educational and 20 non-educational buildings. The SS interviewed for this study estimated that approximately 80% of her staff is female and that most of these are part-time workers. Of the 150 cleaners managed by the SS, approximately 20 are domestic caretakers. Most of the remainder are cleaners, but a few are custodians (i.e., cleaners with key responsibilities). The SSs' responsibilities include meeting with customers and building managers, addressing customers' needs and problems on a day-to-day basis, managing the cleaning staff, meeting the cleaners onsite and arranging for staffing coverage when cleaners are out sick. In addition, the SSs conducts cleaning quality audits every six weeks.

The three OSS members are responsible for doing "anything and everything" the SSs require, including orientation training for newly hired staff (e.g., reviewing basic health and safety procedures), job training

(e.g., how to use different machines and cleaning chemicals), moving equipment from one site to another and conducting quality checks and audits.

The soft FM department has begun implementing more environmentally friendly cleaning processes to reduce its carbon footprint. It has managed to reduce chemical bottle waste approximately 66% by switching to a concentrated cold water fill product and using an ionator that reduces the need for chemicals.

The department works according to input-based cleaning specifications running off of frequency schedules. The cleaning quality monitoring system uses both paper-based and electronic audits. Specifically, the SSs audit the buildings on paper and enter the results into the computer system before contacting clients by email to receive clients' audits as well. The results of the SS and client audits are then compared.

The cleaning units have four categories of frontline staff: caretakers, lead cleaners, custodians and cleaners. The hierarchy among them is a result of their respective responsibilities. In general, the staff works before and/or after business hours. Thus, cleaners rarely encounter building users. However, they may interact with the head teacher, the caretaker/site manager or the soft FM department's own staff at the site.

The regulation of customer relationships varies with the type of customer. Specifically, relationships with educational customers are regulated by SLAs, but relationships with non-educational customers just roll on and on without any formalised contract or SLA. Contracts are only used for customers external to the LA.

5. Fully integrated FM service: The Norwegian Case

The Norwegian LA is one of the largest in Norway. The LA owns buildings comprising 867 000 m^2 (as of 1 January 2010), but the FM department manages more than 1M m^2. School buildings represent almost 40% of the building portfolio.

The LA has one FM organisation that is responsible for everything that has to do with buildings. Its services include both soft and hard FM, and it is responsible for developing new buildings, maintaining and refurbishing current buildings and providing operational services such as cleaning. New buildings are only developed pursuant to orders from the chief municipal executive.

5.1 The Norwegian FM organisation

The FM department belongs to the *Directory for Urban Development*, which is responsible for everything related to the development of the city, from approving residential construction permits to sweeping chimneys and maintaining roads (see Figure 2).

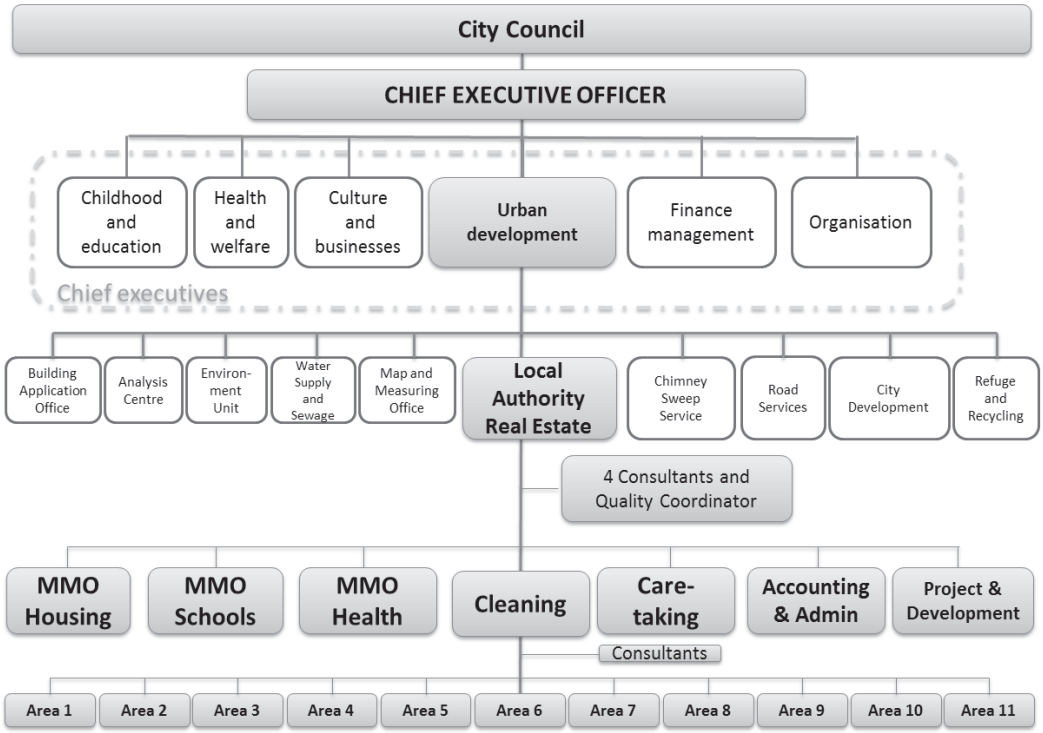

Figure 2 Organisational chart for Norwegian case study as of 2010

The FM department, which is a traditional municipal department, employs 550 staff members and manages a yearly budget of over 600M NOK (equal to about £64M). In addition, it manages an investment of approximately 1 000M NOK (equal to about £106M) each year. It does not have to generate its own income, nor does it charge its customers—customers do not even pay any rent for the premises—because the FM department is given a budget from the LA to provide the necessary services. Nonetheless, the department has its own *Accounting and Administration Unit* to manage its budget and staff. Currently, the department is taking part in a national study on how LAs can ensure that there are suitable benchmarks for their services by developing common KPIs.

The FM department is split into seven units, each with its own manager. All managers sit in the same manager group, which is led by the SM. All necessary staff is employed by the department.

5.2 The Norwegian cleaning service

The cleaning service is responsible for cleaning all buildings used by the LA, both owned and rented. No cleaning services are out-tasked. However, the cleaning service does provide cleaning services to the private sector to a limited extent. The cleaning unit consists of more than 300 employees. The CM and his 11 SSs are supported by personnel within the cleaning service who manage the accounting, the budget, the analysis of cleaning projects and human resources. If required, such personnel receive

support from the FM department's Accounting and Administration Department. The delivery of services is regulated by general contracts that have been developed according to building type.

The cleaning service is divided into 11 geographical areas, each of which is managed by one SS. The 11 SSs are based in one central location, and each SS is assigned a geographical service area. Each SS is responsible for approximately 25 cleaners who are split into cleaning teams consisting of five to eight cleaners. The SSs' responsibilities include conducting customer meetings and cleaning team meetings, measuring cleaning quality, managing sick leave coverage, convening all cleaners on a monthly basis to provide general information to the cleaners and conducting annual employee reviews (*medarbeidersamtale*).

Each cleaning team is responsible for a set of buildings that includes various building types; for example, one set of buildings might include an administration building, a kindergarten, two school buildings and a nursing home for the elderly. It is a cleaning team's responsibility to ensure that each customer receives the appropriate services. Each team decides among themselves how they want to be organised (e.g., which team member should be appointed as team leader, and whether the team leader role should rotate among team members or be assigned permanently to one cleaner) and how labour should be divided (e.g., whether cleaners should have dedicated buildings or rotate through different buildings). Because the team leader role can rotate among staff members, the team leader is paid the same as the other cleaners.

Normally, the SSs are out in the field approximately four days each week. On Wednesdays, most of the SSs remain at the office, and the CM and SSs meet to update one another.

Once a month, the SS who was interviewed for this study gathers all his cleaners for a two-hour meeting (*allmøte*). During this meeting, led by the SS, cleaners receive information mainly from the SS but occasionally from the CM or the SM; cleaners are also given the opportunity to ask questions. Information is handed out in written form for cleaners to keep in their team folder. The information might include changes relating to chemical usage, machines or cleaning equipment. Cleaners are also given the opportunity to attend educational training that could lead to a certificate of apprenticeship in cleaning (an upper-secondary educational achievement on the same level as a certificate for electricians). In addition, non-native cleaners are provided weekly classes in Norwegian as part of the national immigration service. Incorporated into the language class is a 30-minute session in which SSs (who take turns stopping by) may lecture on relevant topics, such as expressions frequently used in cleaning. Through this system, formerly illiterate personnel have achieved certificates of apprenticeship in cleaning.

Newly employed staff attend an orientation day. Their duties and rights are described, and they receive information on tax and salary issues, the services provided by the unit, quality standards, ergonomics and the organisational structure (both with respect to the unit and the department). Once a year, all cleaning staff meet for a "thematic day" that is dedicated to a single cleaning-related topic.

The LA has a policy that cleaners should have 100% full-time equivalents (FTE); as a result, most of the cleaners have over 80% FTE. To comply with this policy, many of the cleaners must be assigned to several

buildings because there may not be enough work at one school building. The cleaners can choose when to work between 0600 and 1800. It is beneficial to the cleaning service to have staff available in the afternoons, and cleaners are encouraged to work all their hours at one time, e.g., between 0600 and 1400 or 1000 and 1800. Because the cleaners work during business hours, they meet various building users on a daily basis, and building users are encouraged to tidy up before cleaners arrive. The cleaning staff can be divided into two groups: those with a certificate of apprenticeship and those without.

The cleaning unit conducts daily cleaning and certain periodical cleaning, such as window cleaning (internal and external), curtain steaming (once a year), varnish application and high-speed polishing, but it does not perform "deep cleans"[ii]. Part of the indoor environmental standard—a philosophy that comprises the cleaning quality-control system—requires that there be less than 5% dust build-up. This philosophy has a strong focus on the indoor environment and on building users' participation in maintaining a good indoor environment[iii]. However, the method by which the cleaning quality is audited was not explained during the interviews[iv].

The cleaning service describes its services as "ecological cleaning" because its use of chemicals is limited. Cleaners use microfibre materials, which does not require chemicals, and steam clean toilets instead of using chemicals. However, they do use chemicals to clean the inside of toilet bowls (to avoid calcium build-up) and to remove old floor varnish. Customers are provided with disposable shoe covers (available near building entrances) and encouraged to use indoor shoes so that floors are protected, which further reduces the need for chemicals.

6. Cross-case discussion

In the introduction, the following research question was posed: *How are in-house cleaning service organisations structured and managed in public FM?* Studies were conducted in two countries, the UK and Norway. To enhance the understanding of how such services are structured and managed, information regarding the respective structures of two FM departments was presented, including detailed descriptions of their respective in-house cleaning organisations. In this section, differences and similarities between the two cases will be emphasised, and links to sited theory will be demonstrated. All information provided is derived from the interviews and the document reviews unless clear reference to sited theory is provided.

6.1 Local context and building portfolio

The Norwegian LA is almost half the size of the UK LA in terms of number of inhabitants and number of employees. However, in terms of land area (km^2), the Norwegian LA is twice as large as the UK LA, which makes the population density quite different; it is approximately five times higher in the UK. It is difficult to compare the LAs' respective building portfolios because the Norwegian case provided an overview in square meters, whereas the UK case gave an overview in number of buildings. The soft FM department in the UK appeared to have no notion of the total square meters encompassed by the buildings. In any event, both LAs indicated a similar proportion of school buildings in their portfolios—40% in Norway and 50% in the UK. Another difference is that the Norwegian LA serves a mixed portfolio of owned and rented buildings.

6.2 Organisational differentiation and chain of command

It is possible to make a distinction between the Norwegian and Anglo-American chains of command, which is what Kaya and Alexander (2006a, 2006b) describe as the line of report. Specifically, the Norwegian chain of command links the FM organisation to Urban Development (a 'hard' approach), whereas the UK case, like the majority of American and Canadian FM organisations, is linked by a 'soft' approach (it is linked to the People Directorate in the UK). Similarly, FM organisations in America and Canada are commonly linked to Administration or Human Resources.

Economically and structurally, there are differences between the two cases. In the Norwegian case, all FM services are in-house and situated within a single FM organisation, whereas the UK case has a split in services, both within the LA and also with respect to the private sector, which corresponds to the finding by Clark and Rees (2000) that there is a remarkable variation in the structure of FM departments within UK LAs. The Norwegian LA has a fully integrated FM service, whereas the UK LA has only a partially integrated FM service—or, alternatively, a fully integrated *soft* FM service.

The Norwegian case, which is a traditional and fully centralised department (FCD), receives funds from its LA, just as many of the departments in the UK case do. However, the soft FM department in the UK is an arms-length department with financially independent services that must generate its own income to cover its costs; therefore, it does not receive funds as the Norwegian case does. Each UK customer is charged for the services provided; Norwegian customers are not.

The FM department in the UK operate more independently than the Norwegian FM department, given that the UK FM department is fully responsible for creating its own income and charging its clients. These differences may also be a consequence of the Norwegian case being a traditional department and the UK case being an arms-length trading department.

With respect to accounting, both cases have their own accounting function; however, the Norwegian case also has separate and relatively independent accounting and administrative functions specifically for its cleaning services. In the UK, the soft FM department has its own business and finance unit, in addition to the central unit within the LA, so that human resources, payroll and finances can be administered. For the most part, these services are handled locally by the soft FM department, whereas the systems (the actual mechanisms) are managed centrally by the LA. The Norwegian case has similar administrative units to manage its staff and budgets both within their FM department and their Cleaning unit. When required, the administrative FM unit assists the administrative cleaning unit. The administrative cleaning unit manages certain specifics of the cleaning service, (e.g., accounting, budgets, analysis of cleaning projects and also human resources), whereas the administrative FM unit has overall responsibility, including responsibility for the investment budget for new construction. Moreover, to enable benchmarking of their services, the administrative FM unit in the Norwegian case is participating with several other larger Norwegian LAs in a national study developing common KPIs for FM in the public sector. This benchmarking forum is an example of NPMs' influence on FM as well as NPM effects in Norway.

The FM Department	Norway	UK
Total building portfolio (TBP)	Unknown number of buildings 867 000 m^2 However, manages over 1 M m^2	260 buildings Unknown number of m^2
Schools building % of TBP	40% school buildings	50% school buildings
Budget, FM department (Exchange rate of 9.4)	£64M / 600M NOK (operation) £106M / 1 000M NOK (investment)	More than £10M *(£10M is equal to approximately 94M NOK)*
Employees, FM department	550 employees	1200 employees
Employee: operation budget ratio (approx.)	1 employee: £116 054	1 employee: £8 334
Building owner	The LA, except space hired on the private market	The LA
FM model	Fully integrated FM	Partly integrated FM with a split in soft and hard FM
FM provision	In-house only	In-house and outsourced
FM services	All building-related services, including new construction, building management, maintenance, caretaking and cleaning	Cleaning, catering and school crossing patrol
Financial model	Department receives funding from the LA council.	Trading department responsible for its own income. No funding from the LA. Surpluses are given to the LA.
Current org model since	2000, approx.	2007
Management structure	Traditional municipal unit with three management levels: 1) Strategic manager 2) Cleaning manager 3) Service supervisor	Arms-length trading arm with three management levels: 1) Strategic manager 2) Operation manager 3) Service supervisors
Team management	Cleaning teams with rotating team leader.	Cleaning teams can be guided by a service supervisor or a lead cleaner.
Change in organisation	2011 — The organisational FM model was simplified, but the cleaning service unit remained unchanged.	2011 — The organisational model was not changed, but the cleaning services were significantly reduced after a tendering process.

Figure 3 Comparison of FM organisations of UK and Norwegian LAs

In the UK case, the influence of market ideas is understood in the way the soft FM department views itself—more as a corporate business than a traditional department. Another indication of the influence

of market ideas, apart from the fact that the UK case is financially independent, is the department's contact with the staff. Twice annually, the UK soft FM department meets with the entire staff to update them on the department's performance and financial results. A third indication is the participation of the UK case in a national and public benchmarking group.

As a result of differences in service organisations, there is a vast economic difference between the two cases; for example, the budget-to-employee ratio for the entire FM department is 14 times higher in Norway than in the UK. This difference can be explained by the two FM departments' individual service responsibilities—being responsible for both hard and soft services (the Norwegian case) or only for soft services (the UK case). Hard services are in all likelihood more costly than cleaning services, particularly with respect to necessary equipment and material; for example, as labour is the predominant cost driver in cleaning, replacing a building's roof or windows would drive costs considerably more than investments in mops, cloths and other cleaning equipment. The difference, wherein the Norwegian case is responsible for both hard and soft services, might seem to be the main cause for the disparity in employee-to-operation budget ratios identified in Figure 3. Other influencing factors may relate to the span of control (Figure 4) and how individual organisations manage their cleaning staffs.

6.3 Span of control and cleaning services' relative size to FM organisations

Regarding the span of control, there are notable differences between the two cases on strategic, tactical and operational levels. The SM in Norway is responsible for twice as many managers as the UK SM (seven managers in Norway versus three managers in the UK) and has a greater span of services to follow up on. In addition to cleaning, the Norwegian SM also oversees caretaking, accounting, new construction and three specialised units of maintenance (housing, schools and health). However, the UK case has a greater variety of soft services. In addition to cleaning, the SM in the UK oversees catering and school crossing patrols. These additional responsibilities make the total span of control at a strategic level quite different in the two cases (1:7 in Norway and 1:3 in the UK). Likewise, the span of control for the cleaning services is also different on a tactical level (1:11 in Norway and 1:3 in the UK). There is a notable difference between the two cases regarding the span of control at an operational level (number of cleaners overseen by one service supervisor), which is 1:25-30 in Norway and 1:150 in the UK. Such a difference might in itself be a contributor to the difference in the budget-to-employee ratio. However, such a difference also enables the two organisations to follow up with their staff in different ways; for example, there seems to be a greater emphasis on management and training of staff in Norway than in the UK. As indicated by Campbell (1990, 2005), such differences might lead to different cleaning services, lower staff turnover and fewer occupational injuries.

It may be reasonable to suggest that a particular department's cleaning management contributes to the disparity in budget-to-employee ratios. Related contributors include the number of cleaners in relation to the FM department's total workforce: 54.5% of the Norwegian workforce were cleaners (of 550 employees, 300 were cleaners) as opposed to 37.5% in the UK (of 1 200 employees, 450 were cleaners). However, this composition does not make it possible to ascertain, only to estimate, the value of the contribution, because the Norwegian case does not indicate how much their cleaning service is worth on its own (in terms of money), whereas the UK case indicates that cleaning represents about half of their business (i.e., approximately £ 5 M). In any case, it is worth noting that cleaners' level of pay is

approximately twice as high in Norway as in the UK[v]. Thus, cleaners' levels of pay might explain some of the differences in the budget-to-employee ratios.

The Cleaning Unit	Norway	UK
Exposed to competition	No	Yes
Number of service supervisors (SS)	11	3
Number of cleaners, approx.	300	450
Span of control (cleaners per service supervisor)	25-30	150
Management (SM/OM) and cleaning staff meetings	Minimum once a year	Twice a year
SS and cleaner face-to-face meetings (at minimum)	Once a month	Every third month
Quality control system (for cleaning)	Indoor environmental standard	Lead cleaner checklist Building user checklist
Cleaners' connection to LA	One contract with multiple sites to ensure FTE (e.g., cleaning at a school, a kindergarten and a nursing home)	Multiple contracts to ensure FTE (e.g., one contract for cleaning and another for catering)
Cleaners' working hours	Tailored to family life, but limited to 0600-1800	Tailored to family life, e.g., before and after school business hours
Cleaners' pay	Incremental pay increase each year; standardised throughout the country through the tariff agreement. Education brings increased salary.	Incremental pay increase each year; varies from LA to LA because pay is based on job evaluations. Education does not affect salary.
Cleaners' education	Offer education leading to a certificate of apprenticeship	National Vocational Qualification (NVQ) level 2
Cleaning contract includes	Daily cleaning, including periodical cleaning that should eliminate the need for deep cleaning.	Daily cleaning up to hand held height and deep cleaning during school holidays
Additional services offered	No specific services mentioned	Litter picking Specialist cleaning, such as PC screens and keyboards

Figure 4 Comparison of cleaning units of UK and Norwegian LAs

Figure 4 shows that the span of control at an operational level is smaller in Norway than in the UK and that Norwegian cleaners meet with their supervisors more frequently. Moreover, both cases use a quality control system for their cleaning; however, neither uses a national quality control standard. Additionally, both cases offer education and incremental pay and allow their cleaners to tailor their working hours to fit their family lives. However, these policies are implemented in slightly different ways. The Norwegian cleaners can obtain a certificate of apprenticeship, resulting in an increased salary, and they are encouraged to work primarily between 0600 and 1800. UK cleaners receive none of these benefits.

Both cases measure performance in a variety of ways; for example, both cases use monitors such as cleaning quality and cleaners' absence due to illness. The reports for annual (including short- and long-term) absence were 6.7% in the UK and 18.6% in Norway. The UK case also measures the cleaning service annual rate of turnover (15%), in addition to annual measures (across their services of cleaning, school crossing patrol and catering) such as the percentage of staff that had undertaken NVQ education (9%) and the percentage of accidents (5.05%). (These UK figures are for 2009-2010. All figures for the Norwegian case are for 2010, with the exception of the figures regarding absence, which are accumulated accounts for 2009.) The Norwegian case did not report regularly measuring turnover rates. However, the Norwegian case did provide an anonymised overview of their cleaners, categorised according to service area. This overview[vi] showed the following characteristics (average across the cleaning service): cleaners' average age (55), gender (10% male), average FTE (89%), percentage with a 100% FTE (64%) and education (35% had a certificate of apprenticeship). A similar overview of cleaners' age, gender and FTE was not available from the UK case.

6.4 Division of labour and service provision

There are similarities between the organisations relating to management structure. Specifically, both cases have three tiers of managers and cleaning teams (see Figure 3). Regarding the cleaning teams, there are also differences; for example, not all UK teams have a team leader or, as they describe it, a lead cleaner. However, all Norwegian cleaning teams have self-managed leadership with a rotating team leader role (cleaners can take turns as team leader). Other differences between the two cases are revealed more clearly in Figure 4 (e.g., how cleaning services are provided).

Regarding service provision, the major difference between the UK and Norwegian services is that the Norwegian cleaning service is managed to avoid the need for deep cleaning—in other words, they clean all surfaces, including ceilings, walls, windows, inventory and floors, on a regular basis—whereas the UK cleaning service divides their services into daily and deep cleaning.

Other differences between the two cases can be observed with respect to the division of labour and the methods by which they address horizontal specialisation and Gulick's principles. In the Norwegian case, cleaners have only one task—cleaning—whereas in the UK case, cleaners have several tasks, including cleaning, catering and/or school-crossing patrol (the process principle). The UK way of dealing with the cleaners' contracts ensures that the soft FM department has greater workforce flexibility. The Norwegian case solves the same issue by assigning cleaners to several buildings (the purpose principle). However, in both cases, the responsibilities of the service supervisors are divided based on geography. Yet another

difference between the two cases relates to the cleaners' freedom to decide when to work. In the UK, cleaners are able to organise their working hours more freely, as long as their primary work is *not* performed during business hours. By comparison, cleaners in the Norwegian case are encouraged to do their work *during* business hours.

6.5 Are the cases trendsetting FM organisations?

Both cases consist of large LAs that are viewed as leaders among the LAs in their respective countries. How do these cases compare with Jensen *et al.*'s (2008) trendsetting municipalities and other relevant aspects of sited FM theory?

To some extent, both cases are trendsetting FM organisations. Both the UK and Norwegian cases have implemented some type of development ladder for their cleaners; for example, they offer education. To some extent, they also have development ladders for their organisations; for example, the UK case is focused on reducing its carbon footprint, and the Norwegian case is focused on improving its benchmarking possibilities. However, no clear development ladder appeared to be in place when the studies were conducted. Both SMs seemed to be knowledgeable and eager to develop their respective organisations. Both cases are also customer oriented and use a type of SLA to regulate relationships with at least some customers. However, neither has implemented SLAs for all of their customers, and the SLAs that were in place did not appear to have been developed according to any national standard. Additionally, the UK case monitored their customer satisfaction. Generally, both cases focus on KPIs and benchmarking, but the Norwegian case did not benchmark their services to any particular extent at the time of this study. Conversely, the UK case participated in an established public benchmarking group.

7. Conclusion

This article aimed to describe and discuss how in-house public cleaning services are structured and managed because there has been limited knowledge regarding individual FM services. Cleaning services are known for being cost-intensive and labour-dominant manual services that are commonly outsourced, yet these services have been little-researched. In FM in general, there seems to be little focus on the internal environment of organisations. Thus, this article aims to provide a better understanding of current in-house cleaning organisations by using two descriptive case studies as examples of how such services are structured and managed in public FM organisations. The studies show that cleaning services are a dominant part of the respective FM organisations, representing 37.5-54.5% of their workforces. The descriptive case studies illustrate several differences and similarities between the cases, some related to the following:

Hierarchy. Both cases demonstrate rather flat organisations. The cases are similar with regard to the three levels of management, but they differ in hierarchy among the operational staff.

Routines. The routines differ with regard to training and supervising, as well as contact with supervisors and management.

Division of labour. Cleaners in the Norwegian case perform only one task, whereas in the UK cleaners may have additional tasks. In Norway, the cleaning teams decide among themselves how to distribute work and authority.

Differentiation, chain of command and reporting line. The cases are structured differently in regard to the line of reporting. One case integrates all FM services and reports to urban development. In the other case, hard FM is separated from soft FM, and the soft FM department reports to the People Directorate.

Span of control. The span of control is different in the two cases. Compared to the Norwegian case, the UK case has a smaller span of control at a strategic level but a larger span of control on the operational level.

The cases also illustrate that services can be structured and managed differently, for example with respect to the use of self-managed leadership and preferences regarding whether services should be performed during business hours or not. Similarly, the respective splits in services, approaches to workforce flexibility and management of staff contracts and customer contracts are different. Other contrasts relate to the use of outsourcing and cooperation between the cleaning service and its customers.

What do these case studies add to the overall field of FM? To the best of our knowledge, they seem to represent the first detailed description of cleaning departments, including descriptions of how public FM organisations link to their respective organisational context and how a cleaning service is managed at the strategic, tactical and operational levels. These descriptions illustrate that varied elements may have a great influence on indicators such as the budget-to-employee ratio. Those elements might include differences in the number and type of services supplied (e.g., combinations of both hard and soft services), general cleaning management and span of control, cleaners' job training and contact with superiors, and cleaners' levels of pay.

The cases addressed herein illustrate that cleaning services can be structured and managed differently in different LAs and countries. However, the two case studies also illustrate that some attributes seem to be similar across the contexts studied, such as the three levels of management. Further research is required to more fully describe the range of FM services' structures and management. Both quantitative studies and additional case studies are required to further evaluate the present environment. A mapping of the variances in cleaning services' structure, management and service supply can add to a better understanding of cleaning services. This mapping might lead to an identification of the relevant indicators regarding structure and management—including areas of potential development and improvement—which might lead to improved benchmarking opportunities. For example, further cross-context studies within the private and/or public sectors in various countries might be conducted to highlight subjects such as how cleaners are trained, how cleaning quality and cleaning costs are determined and measured, how cleaning services are managed (as in management-to-frontline-staff ratios), how cleaning services are specified, to what extent contracts are used and how these contracts are actually managed. Future cross-context studies might map such knowledge 'as is' worldwide. Thus, cleaning services might be analysed and discussed beyond a particular national or sectorial context,

expanding the common debate over whether these services should be outsourced based on cost and service quality. A better understanding of the structure, management and operation of cleaning services can enhance the understanding of the variety of cleaning services and enable future like-for-like benchmarks both within and across different sectors and national contexts.

References

Alexander, K. (2003a), "A strategy for facilities management", Facilities, Vol. 21, Iss. 11/12, pp. 269-274.

Alexander, K. (2003b), "The United Kingdom: local authority FM in the UK". *Nordic Journal of surveying and real estate,* Vol 1 , pp.71-88.

Alexander, K. and Marshall, S. (1987), "Analysis: managing life cycle cost by design", *Facilities*, Vol. 5 Iss. 4, pp. 6-12.

Atkin, B. and Brooks, A. (2009), *Total Facilities Management*. 3rd ed., Wiley-Blackwell Publishing Ltd, Chichester.

Barley, S.R. and Kunda, G. (2001), "Bringing work back in", *Organisational Science*, Vol. 12 No. 1, pp. 76-95.

Bjørberg, S., Larsen, A. and Øiseth, H. (2005*), Livssykluskonstader for bygninger. Innføring og prinsipper.* The Norwegian Standards Association, (2000) NS 3454 "Life Cycle Costs for Building and Engineering Work, Principles and Classification".

Blakstad, S.H., Kjølle, K.H. and Arge, A. (2010), "KPIs for space management. Barriers for benchmarking in Norwegian municipalities", paper presented at 12th International FM and REM-Congress, January 2010, Kufstein, Austria.

Busch, T and Vanbebo, JO (2003) *Organisasjon og ledelse. Et integrert perspektiv.* 5th ed., Universitetsforlaget, Oslo, Norway.

Bywater, L. (1990), "Costs and methods to improve expenditure in cleaning", *Facilities*, Vol. 8 No. 1, pp. 8-11.

Campbell, F. (1990), "Cleaning and maintenance workers", *Facilities*, Vol. 8 No. 3, pp. 20-23.

Campbell, J.L. (2005), "Significantly reducing facility maintenance costs through innovative custodial safety", *Journal of Facilities Management*, Vol. 3 No. 3, pp. 203-214.

Christensen, T., Lægreid, P., Roness, P.G. and Røvik, K.A. (2007*), Organization Theory and the Public Sector. Instrument, culture and myth.* Routledge, Tylor & Francis Group, London and New York.

Christensen, T, Lægreid P, Roness P.G and Røvik, K.A. (2009), *Organisasjonsteori for offentlig sektor.* Universitetsforlaget, Oslo, Norway.

Cigolini, R., Miragliotta, G. and Pero, M. (2011), "A road-map for outsourcing facilities-related services in SMEs: overcome criticalities and build trust", *Facilities*, Vol. 29 Iss. 11/12, pp. 445-458.

Clark, L. and Rees, D. (2000), "Professional facilities management in public organisations*", Facilities*, Vol. 18, No. 10/11/12, 2000, pp. 435-443.

Cotts, D.G. (1990), "Organising the department". *Conference Papers of Facilities Management International*, Glasgow.

Cotts, D.G. (1999), *The Facility Management Handbook*, 2nd ed., AMACOM, New York.

De Toni, A., Ferri, A. and Montagner, M. (2009), *Open facility management: a successful implementation in public administration*, International Facility Management Association, Milano, Italy, available at: http://www.scuolanazionaleservizi.it/eng/pubblicazioni.asp (accessed 10 October 2014).

Eldring, L. and Alsos, K. (2012), "Lovfestet minsteløn: Norden og Europa*"*, Fafo-rapport 2012:07, available at: http://www.fafo.no/pub/rapp/20234/20234.pdf (accessed 10 October 2014).

EN 15221-1 (2006). *Facility management. Part 1: Terms and definitions*. CEN – European Committee for standardization, Brussels, Belgium.

EN 15221-7 (2012) Facility Management. Part 7: Guidelines for Performance Benchmarking. CEN – European Committee for standardization, Brussels, Belgium.

Facilities (1984a), "Analysis: floor maintenance and cleaning", Vol. 2 No. 3, pp. 10-14.

Facilities (1984b), "Economic review: cleaning: achieving substantial cost reductions", Vol. 2 No. 8, pp. 4-6.

Fellows, R. and Liu, A. (2008), *Research Methods for Construction*, 3rd ed., Wiley-Blackwell, Chichester, UK.

Friday, S. (2012), *Tracing the DNA of FM organisations. Organization Development for Facility Managers*. Dog Ear Publishing, Indianapolis, USA.

Halligan, J. (2013), "NPM in Anglo-Saxon countries", in Christensen, T. and Lægreid, P. (Eds.), *The Ashgate research companion to New Public Management*, Ashgate Publishing Limited, UK, pp. 83-96.

Hansen, H.F. (2013), "NPM in Scandinavia", in Christensen, T. and Lægreid, P. (Eds.), *The Ashgate research companion to New Public Management*. Ashgate Publishing Limited, UK, pp. 113-129.

Haugen, T. (2003), "Norway: Contracting out Property and Facility Services in Norwegian Municipalities". *Nordic Journal of surveying and real estate*, Vol .1, pp.52-70.

Horjen, F. (1995), *Temahefte nr. 2. Overordnet styring og utvikling av eiendomsforvaltningen*. NKF – Norsk Kommunalteknisk forening, Forum for offentlige bygg og eiendommer, Oslo, Norway.

Hui, E.Y.Y. (2005), "Key success factors of building management in large and dense residential estates", *Facilities*, Vol. 23 Iss. 1/2, pp. 47-62.

IFMA Foundation (2001), *Designing the Facility Management Organisation.* IFMA, USA

Jensen, P.A. (2008), *Facilities Management. For students and practitioners*. Centre for Facilities Management – Realdania Research. DTU Management Engineering, Technical University of Denmark, Copenhagen, Denmark.

Jensen, P.A. (2010), "The facilities management market in Denmark", *Facilities*, Vol. 28 Iss. 7/8, pp. 383-394.

Jensen, P.A. and Balselv Nielsen, S. (Eds.) (2012), *Facilities Management research in the Nordic Countries. Past, Present and Future.* Polyteknisk Forlag, Denmark.

Jensen P.A., Nielsen, K. and Balslev Nielsen, S. (2008), *Facilities Management Best Practice in The Nordic Countries - 36 cases*. Centre for Facilities Management – Realdania Research, DTU Management Engeneering, Technical University of Denmark, Copenhagen, Denmark.

Kaya, S. and Alexander, K. (2006a), "Classifying client side FM organisations in the United Kingdom: why my in-house FM organisation is dissimilar to competitors and others", *Journal of Facilities Management*, Vol. 4 Iss. 2, pp. 86-98.

Kaya, S. and Alexander, K. (2006b), "Classifying client side FM organisations in the United Kingdom – 2. How my in-house FM organisation compares to my competitors and others?", *Journal of Facilities Management*, Vol. 4 Iss. 3, pp. 181-191.

Klungseth, N.J. (2012), "Shadowing – a valuable approach to Facility Management research", in Junghans, A. and Jensen, P.A. (Eds.) *Proceeding of the 11th EuroFM Research Symposium 24-25 May 2012 in Copenhagen, Denmark,* Polytekisk Forlag, Lyngby, pp.52-63.

Klungseth, N.J. (2014), "Organising cleaning in Norwegian public FM", *Journal of Facilities Management*, Vol. 12 Iss. 4, pp. 382 – 410.

Klungseth, N.J. and Blakstad, S.H. (2012), "The silent army: a story from practice", in *Proceedings of the Joint CIB W070, W092 and TG72 International Conference on Facilities Management, Procurement Systems and Public Private Partnership, 23-25 January 2012 in Cape Town, South Africa, Department of Construction Economics and Management, University of Cape Town, 2012,* pp. 711-720.

Klungseth, N.J. and Olsson, N.O.E. (2013), "Norwegian cleaning research: an overview and categorization". *Facilities*, Vol. 31, No. 7/8, pp. 290-313.

Lai, J.H.K. (2014), "Influence of personal attributes on perception of residential facilities management services", *Facilities*, Vol. 32 Iss. 9/10, pp. 509-521.

Lam, T.Y.M. (2008), "Optimisation of performance management for housing services", *Journal of Facilities Management*, Vol. 6 Iss. 3, 2008, pp. 226-240.

Lam, T.Y.M. (2012), "Economic perspective on outsourcing of property management services", *Property Management*, Vol. 30 Iss. 4, pp. 318-332.

Lavy, S., Garcia, J.A. and Dixit, M.K. (2010), "Establishment of KPIs for facility performance measurement: review of literature", *Facilities*, Vol. 28 Iss. 9/10, pp. 440-464.

Lavy, S., Garcia, J.A. and Dixit, M.K. (2014a), "KPIs for facility's performance assessment, part 1: identification and categorization of core indicators", *Facilities*, Vol. 32 Iss. 5/6, pp. 256-274.

Lavy, S., Garcia, J.A. and Dixit, M.K. (2014b), "KPIs for facility's performance assessment, Part II: identification of variables and deriving expressions for core indicators", *Facilities*, Vol. 32 Iss. 5/6, pp. 275-294.

Linn, G. (1995), "Building design from the cleaning perspective", in Kujala, T. (Ed.), *Cleaning in Tomorrow's World: the First International Congress on Professional Cleaning 3-4 October, 1995, Tampere, Finland. Proceedings*, Finnish Association of Cleaning Technology, Helsinki, pp. 94-97.

Linn, G. (2002), "The building design process: when to consider cleaning requirements", *Cleaning in Tomorrow's World: Third International Congress on Professional Cleaning 30. September – 1. October 2002. Helsinki, Finland. Proceedings*. Finnish Association of Cleaning Technology, Helsinki, pp. 148-153.

Liyanage, C. and Egbu, C. (2005), "Controlling healthcare associated infections (HAI) and the role of facilities management in achieving 'quality' in healthcare: a three-dimensional view", *Facilities*, Vol. 23 Iss. 5/6, pp. 194-215.

Lo, K.K., Hui, E.C.M. and Ching, R.H.F. (2013), "Analytic hierarchy process approach for competitive property management attributes", *Facilities*, Vol. 31 Iss. 1/2, pp. 84-96.

MacSporran, C. and Tucker, S.N. (1996), "Target budget levels for building operating costs", *Construction Management and Economics*, Vol. 14 Iss. 2, pp. 103-119

Madritsch, T., Steixner, D., Ostermann, H. and Staudinger, R. (2008)., "Operating cost analyses of long-term care facilities". *Journal of Facilities Management*, Vol.6, No. 2, pp. 152-170.

May, D. and Pinder, J. (2008), "The impact of facilities management on patient outcomes", *Facilities*, Vol. 26 Iss. 5/6, pp. 213-228.

May, D. and Pitt, M. (2012), "Environmental cleaning in UK healthcare since the NHS Plan: a policy and evidence based context", *Facilities*, Vol. 30 Iss. 1/2, pp. 6-22.

NHO Service (2009), "Profesjonelt renhold. Suksessfaktorer for etablering og drift", National Federation of Service Industries, Oslo, Norway. Available at: http://www.nhoservice.no/getfile.php/Filer/Publikasjoner/Renholdsbrosjyre2009b.pdf

NOU 1993:10, *Om renhold*. Norwegian Public Report, Kommunal- og arbeidsdepartementet, Statens forvaltningstjeneste, Seksjon statens trykning, Oslo, Norway.

Nutt, B. (1999), "Linking FM practice and research". *Facilities*, Vol. 17, No. 1/2, 1999, pp.11-17.

Pitt, M. and Tucker, M. (2008), "Performance measurement in facilities management: driving innovation?" *Property Management*, Vol. 26 Iss. 4, pp. 241-254.

Ryan, S. and Herod, A. (2006), "Restructuring the architecture of state regulation in the Australian and Aotearoa/New Zealand cleaning industries and the growth of precarious employment", in Aguiar, L.L.F. and Herod, A. (Eds.) *The Dirty Work of Neoliberalism: Cleaners in the Global Economy*. Blackwell Publishing, Oxford. First published in *Antipode: A Radical Journal of Geography,* Vol. 38 No. 3, available at: http://onlinelibrary.wiley.com/doi/10.1111/anti.2006.38.issue-3/issuetoc

Spedding, A. (ed.) (1994), *CIOB Handbook of Facilities Management*, Longman Scientific and Technical, Longman Group Limited, Harlow.

Stoy, C. and Johrendt, R.(2008), "Cleaning management of owner-operated real estate". *Facilities*, Vol. 26, No. 3/4, pp. 131-143.

Stoy, C. and Kytzia, S. (2006), "Occupancy costs: a method for their estimation", *Facilities*, Vol. 24 Iss. 13/14, pp. 476-489.

Strand, J.A. (2000), *Nøkkeltall for kommunale bygninger*, Norwegian Association of Municipal engineers (NKF) Forum for Public Buildings and Properties (FOBE), Norway.

Toumela, A. and Salonen, A. (2005), "Network service organization: a multiple pilot study", *Facilities*, Vol. 23 Iss. 3/4, pp. 128-141.

Trygstad, S.C., Bråten, M., Nergaard, K. and Ødegård, A.M. (2012), "Vil tiltakene virke? Status i renholdsbransjen", Fafo-rapport 2012:59, Oslo, Norway. Available at: http://www.fafo.no/pub/rapp/20286/20286.pdf

Tucker, M. and Pitt, M. (2009a), "National standards of customer satisfaction in facilities management", *Facilities*, Vol. 27 Iss. 13/14, pp. 497-514.

Tucker, M. and Pitt, M. (2009b), "Customer performance measurement in facilities management. A strategic approach", *International Journal of Productivity and Performance Management*, Vol. 58 No. 5, pp. 407-422.

Tucker, M. and Pitt, M. (2010), "Improving service provision through better management and measurement of customer satisfaction in facilities management", *Journal of Corporate Real Estate*, Vol. 12 Iss. 4, pp. 220-233.

Ventovuori, T., Lethonen, T., Salonen, A. and Nenonen, S. (2007), "A review and classification of academic research in facilities management", *Facilities*, Vol. 25 No. 5/6, pp. 227-237.

Wauters, B. (2005), "The added value of facilities management: benchmarking work processes", *Facilities*, Vol. 23 Iss. 3/4, pp. 142-151.

Yin, R.K. (2009), *Case Study Research, Design and Methods.* 4th Ed. Applied social research methods series, Vol. 5. Sage Publications, Inc, California, USA.

[i] The Norwegian public sector manages its accounting according to the Commune-State-Registration system (KOSTRA). This system is known for its benchmarking challenges, e.g., cleaning services are not isolated and material costs are not separated from labour costs. Thus, Norwegian counties and municipalities have not been able to identify their exact costs. In this article, the Norwegian FM organisation was participating in a benchmarking group consisting of several larger municipalities that collectively aimed at resolving the issue. Until this work is completed, specific and detailed cost comparisons are challenging even between Norwegian local authorities. Furthermore, the methods of accounting for FM have also varied among various Norwegian bodies as the methods of accounting (NS 3454) developed by Standard Norge (the Norwegian standardisation organisation) have, to some extent, been interpreted differently. In addition, this standard method of accounting for facility management (often used within the private sector) and the KOSTRA system have not been coordinated. As such, it has not been possible to draw detailed information from KOSTRA into the standard methods of accounting. These issues have been addressed by various stakeholders, such as governmental agencies, public and private employers' organisations, the Norwegian standardization organisation and FM associations. As a consequence, revisions were initiated for the standard method of accounting for FM (including related standards) and for the KOSTRA system. Some of these were finalized in 2013, and cleaning is now isolated from other services in the KOSTRA system and in NS3454. However, efforts to align the systems continue. As local authorities implement the new systems, more accurate details are enabled, and coordination with NS 3454 has improved. Thus, specific research that aims to address issues as labour inputs and productivity outputs would be possible to some extent from 2014-2015 and onwards. Despite these efforts, several challenges remain regarding Norwegian authorities' benchmarking possibilities, e.g., the KOSTRA system does not register information regarding service quality, time or risk. In addition, the authorities still report little trustworthy information, e.g., certain labour costs are not included (such as illness benefits), and although all regional and local authorities are requested to submit such data in gross total area (GTA), there is uncertainty regarding the accuracy of the reported GTA. For example, GTA for health care buildings includes different types of health care services, and the parameters since 2013 are still not comparable and are at best indicative. The uncertainty regarding floor areas is closely related to Norwegian authorities' obligation (since 2008) to map and register their building portfolios. Studies undertaken by Blakstad, Kjølle and Arge (2010) illustrated the severity of the issue when they asked how 14 Norwegian municipalities (in 2009) collected data to manage their offices and town hall space and to what extent they used KPIs and benchmarking. They found that the majority of the municipalities *"had little or no knowledge of the number of buildings, gross area in the buildings, or the different functions and number of workplaces within the buildings. In one case, the representative for the FM function in the municipality had to estimate the gross area of their main office building by measuring on a map"* (p. 7). The challenges Norwegian regional and local authorities continue to experience with respect to benchmarking are highlighted by Wauters (2005). Of these aforementioned reasons, there are no detailed explanations of costs or m^2 in this article that address the situation as of 2010-2011. The information provided in this regard reflects the level of detail with which the local authorities studied herein work.

[ii] The CM gives the following reason: *"Deep cleans is an admission of failure. The purpose of deep cleans is to remove old dirt. We guarantee a building that is clean all year. There shall never be more than 5% dust build-up. We know dust build-up is about 1% each week. Our cleaners test the surfaces above 1 m 80 cm each month."*

[iii] The CM describes its cleaning service as follows: *"We conduct professional cleaning. We are not supposed to tidy up. That has nothing to do with the cleaning profession, but most people consider it as a part of cleaning. Let's say the children have played basket [ball] with their sandwich paper without hitting [the basket] and that the pupils have drawn on their desks. And the cleaners do not take it. The last pupil leaving should make sure that chairs are*

put up on the desks. It shall be tidy. You should leave your working place as you would like to see it the following day. If you have written on your desk, then you should remove it yourself. If not, then the parents will be contacted... They should know that this has nothing to do with school work. The pupil should be made aware of his/her responsibility. This you don't do. This you don't do at home either. … This is the concept of the Indoor environmental standard. Getting cleaners to know where the limit is and getting a good dialog with the unit and having collaboration between pupils, teachers and management. ... We have contributed greatly to a change of attitude. … We have achieved a lot on behalf of the local authority. It has been a saving [economically]."

[iv] The standard of indoor environmental cleaning states that dust levels should be checked by a dust detector and that general cleanliness should be visually estimated on a 6-point scale. The visual estimations for level 1 and level 6 should be assessed *subjectively* as follows: level 1 describes a surface having much visible soiling, whereas level 6 describes a surface having no visible soiling. Nordic countries (Norway, Sweden, Denmark, Finland and Iceland) also have an official standard, the INSTA 800, for the measurement of cleaning quality. This standard measures the cleaning quality *objectively* and is based on the general principles of EN 13549:2001.

[v] With respect to cleaners' levels of pay, there are a few main differences between Norway and the UK. For example, the UK has a national statutory minimum wage rate, whereas Norway does not (Eldring and Alsos, 2012). Generally, cleaners' levels of pay both in the UK and in Norway depend on their experience. The level of pay in Norway also depends on the cleaners' educational level (whether the cleaners hold a certificate of apprenticeship or not). In addition, night work performed between 21:00 and 06:00 would result in an increased wage in Norway. In any case, a UK cleaner's pay level is considerably lower than a Norwegian cleaner's. In general, UK cleaners have a pay level close to the UK minimum wage rate. Please note that calculation of approximate value of GBP (£) or NOK in this paper is calculated with an exchange rate of 9.4 NOK to 1 GBP. The national minimum wage rate per hour (for those 21 and older) in the UK was £5.93 in 2010 and £6.50 in 2014, which corresponds to approximately 56 NOK and 63 NOK. According to the webpage http://www.payscale.com/research/UK/Job=Cleaner/Hourly_Rate (last accessed 9 October 2014), a UK cleaner's level of pay per hour (in 2014) was £6.71 (equal to approximately 63 NOK), on average, and varied between £5.99 and £9.68 (equal to approximately 53-91 NOK). Please note that although these figures are for 2014, they correspond to what one of the shadowed UK cleaners indicated for 2010. For more information on the UK national minimum wage rate, see https://www.gov.uk/national-minimum-wage-rates (last accessed 9 October 2014). The wage for Norwegian *public* cleaners (in 2010) was 123 NOK for cleaners with no experience and no education and 172 NOK for cleaners with a minimum of 10 years of experience and a certificate of apprenticeship; this range equals approximately £13.1–£18.3. The following year, 2011, a *generalised minimum wage* came into effect for the Norwegian *private cleaning sector*. This generalised minimum wage per hour was considerably higher than the public sector cleaners' minimum wage. The generalised minimum wage for private sector cleaners in Norway in 2011 was 151.67 NOK (equal to approximately £16.1). To put these figures into perspective, and to provide an idea of the general level of cost of living in Norway and the UK in 2014, the following example is provided: one Garlic and Basil Bruschetta at a TGI Fridays restaurant in the UK would cost £4.99 (equal to approximately 50 NOK), whereas the same Garlic and Basil Bruschetta at a TGI Fridays restaurant in Norway would cost 79 NOK (equal to about £8.4).

[vi] In the Norwegian case, the managers interviewed spoke of more than 300 cleaners; the number 300 was used in Figure 4. After the interviews, the Norwegian case provided an anonymised overview of their cleaners. This list showed a total of 303 cleaners ranging in age from 23 to 67. The lowest FTE was 13.33%. A similar overview of the cleaning staff in the UK case could not be obtained.

Article 1

Article 2

Article 3

Paper 1

Paper 2

Klungseth NJ and Blakstad SH (2012)
The silent Army: A story from practice.
In Michell, K., Bowen, P. and Cattell, K. (Eds.), *Proceedings of the Joint CIB W070, W092 & TG72 International conference on facilities management, procurement systems and public private partnership: delivering value to the community, Cape Town, South Africa, 23-25 January 2012,* Department of Construction Economics and Management, Faculty of Engineering & the Built Environment, University of Cape Town, Cape Town, South Africa, pp. 711-720.

Article 1

Article 2

Article 3

Paper 1

Paper 2

THE SILENT ARMY: A STORY FROM PRACTICE

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The purpose of this paper is to develop a deeper understanding of the practices of cleaners. Cleaning can represent up to 45 % of a building's operating costs and is important for the comfort and well-being of a building's users. A lack of cleaning may result in uncomfortable and unhealthy environments for occupants in the building and, in extreme cases, the closure of a business to protect health and safety. The service providers' employees have been identified as a critical factor within service quality research. The quality and efficiency of cleaning depends on the work practices of the cleaners; thus, understanding these practices is important in order to create value to both the users and the owners of buildings. In the present study, a cleaning team was followed as they performed their daily activities. This qualitative case study of a UK local authority was performed to illustrate cleaning practices. This case is presented as a narrative describing cleaners' days at work. Data were obtained by shadowing the cleaners and are supported by interviews with their managers. The story of practice is discussed in relation to different aspects of the work, including the hours of duty; interactions with building users, managers and other service personnel; technology; routines; responsibilities; ergonomics and the building's impact on cleaning practice to identify aspects that enable or hinder the cleaning service with regard to the cleaning staff's efficiency and effectiveness. This work is part of a PhD project studying relationships between buildings, organisations, technology and cleaning practices. The results imply that the practice of cleaning can be improved and that the physical environments and technology as well as the organisational context can be optimised.

Keywords: operational research, shadowing, facility management, cleaning

INTRODUCTION

Cleaning is an essential service within facility management (FM). The longevity of buildings and the health and comfort of building users are dependent on this service. However, research on the practice of cleaning has been limited. Cleaning personnel can be seen as a "silent army," as described by an English operations manager interviewed in relation to this research. When asked about the importance of operational services, this manager responded:

"You need to know how it works. How the end user works. How the cleaner works. And understand the role they are doing, the challenges they face daily, to understand cleaning... So when you watch the cleaner working you see that people don't think twice about the cleaning. Cleaning is the silent army. Do you know what that means? I come to work at 8 o'clock in the morning and I leave at 4pm. Never see the cleaner. The cleaners. Millions of cleaners every morning and every evening go to work at 5 and 6 o'clock in the morning and then come back in the evening from 6 o'clock through to 9 o'clock in the evening. And we never see them. And there are millions of them. And they are silent to us because we never see them, but if they are not there – they don't come in – we notice straight away. So they are silent. They are the silent army. It is an army of people that just go out in the morning before people go to work or working in the evening when people have gone home. And they are working in the building when there is no one else around" (Interview Spring 2011).

The aim of this research is to describe the actual practice of cleaning. An English local authority was chosen for the case study and their army of cleaning personnel consists of more than 300 cleaners. In this case study two of these cleaners were shadowed. Their day at work is described through a narrative. The results are supplemented by interviews of their operations manager (OM) and service supervisor (SS).

The purpose of this study was to identify aspects that enable or hinder the cleaning service with regard to the cleaning staff's efficiency and effectiveness. The observations are structured to answer the following questions:

When do the cleaning personnel work?
Who do they interact with?
What kind of equipment do they use?
What are their responsibilities and routines?
What hindrances and enabling aspects do they encounter during their workday?

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Knowledge obtained by shadowing depends on the context. Thus, the case presented here is not necessarily representative of all cleaning teams in this local authority, for the United Kingdom in general or for practices in other countries. The real value lies in the richness of data that records what actually happens in the field. To understand the practice, it is important to record what the practitioners actually do and not simply what they say they do.

THEORY

Cleaning is a cost demanding service that has been estimated to represent from 20-45 % of the operations cost of buildings, depending on contextual changes such as the country of location and the building type (Strand, 2000; Bjørberg, Larsen and Øiseth, 2005; Stoy and Johrendt, 2008; Madritsch, Steixner, Ostermann and Staudinger, 2008). Mascoporran and Tucker (1996) found that the median cost for the cleaning of Australian office buildings was 19 % of the total operating cost. This fraction is supported by Stoy and Johrendt (2008), who state that "costs of cleaning owner-operated office buildings amount to an approximate 20 per cent share of the operating costs." The cost of cleaning in Norwegian office buildings has been estimated by Bjørberg et al. (2005) to represent 33 % of the total operating cost, whereas Madritsch et al. (2008) estimated that cleaning represented as much as 39.1 % of the operating cost in Austrian long-term-care facilities. This finding is supported by Strand (2000), who found that cleaning costs represent as much as 35-45 % of the total operations cost for buildings in 114 Norwegian local authorities. These results illustrate that the cost of cleaning should not be underestimated as it is likely to represent a large portion of the total operations cost.

In Norway, the majority of the cleaning cost is accounted for by labour. It is estimated that salary, including salary-related costs, represents as much as 85 % of the cost of cleaning (NHO Service, 2011). Therefore, the use of time is important for the efficiency of cleaning; mapping of the enabling and hindering aspects of cleaning activities is important to provide a clearer picture of how this service can become more efficient. The ease with which a physical environment can be cleaned, the equipment used and the method and frequency of cleaning all affect cleaning efficiency, effectiveness and quality (Hellstrøm et al., 1969; Schneider, Nilsen and Dahl, 1994 and Nilsen et al., 2008).

Cleaning is not only a matter of cost but also a service that helps to ensure the health of building users. Nilsen et al. (2001 and 2002) investigated the relationship between indoor-climate-related health complaints, productivity and cleaning quality over a period of one year and found that the short-term absence (up to 16 days) of workers as a result of sickness was reduced by 12.5 % until 39 % in the office floors receiving the intervention and increased by 3.9 % in the control group. These authors also concluded that there was a need to investigate the relationship between dust on surfaces, dust in the air and indoor-climate-related health complaints. This study was followed up by Skulberg et al. (2004) and Skulberg (2006), among others, who conducted intervention studies while investigating the relationship between dust levels and the health of office workers (mucosal symptoms). It was found that "infrequent cleaning was associated with an increased risk of a high general symptom score (Skulberg 2004 and 2006)." These results are supported by the findings of Frankie et al. (1997), among others, who investigated whether deep cleaning could improve indoor air quality. A decrease was found in all parameters measured, which "included fungi (61%), airborne bacteria (40%), nonfloor surface fungi (25%), nonfloor surface bacteria (29%), carpet dust fungi (40%), and carpet dust bacteria (84%)."

Cleaning not only represents a matter of health and cost but also adds value to the core business. According to Jensen, Nielsen and Balslev Nielsen (2008), the concept of adding value has an element of surprise, as it should go beyond expectations, demands and instructions. These authors describe added value as "spontaneous" and emphasise that added value does not need to be expensive, which indicates the mutual cooperation and support of humans, things and machines is insufficient for a service to add value. Cleaning is a practice; according to Czarniawska (2007), a practice is "usually performed in cooperation among humans, things, and machines." For a service to add value, it can be argued that three aspects, i.e., humans, things, and machines, need to support each other. The addition of value at an operational level may be challenging if these three aspects are not properly coordinated.

The cleaning personnel may influence the building users' experiences of service quality. Stershic (1990) states that employees (such as front-line staff) are "the critical link in delivering service quality and customer satisfaction." This statement is supported by Yusoff et al. (2010), who state that understanding the perspective of the service provider is "absolutely vital" to ensure service quality. As such, the importance of front-line staff (such as cleaners) should not be underestimated.

METHODS: SHADOWING AND INTERVIEWS

This is a case study that involves an empirical investigation of a particular contemporary phenomenon within its real-life context (Yin, 2009). The study relies on several sources of evidence and focuses on understanding processes. The case presented here is from the in-house service within one of the larger local authorities in the UK. Only one part of the case study, the shadowing, is presented here. This case provides valuable insight into the ways in which cleaning services are performed and the hindering and enabling aspects encountered by the cleaners.

Shadowing is an approach that is used within management research, but it has seldom been applied when studying front-line staff such as cleaners (Czarniawska, 2007). Shadowing records what actually happens (Gillham, 2008). It is a way of observing people without participating in their work; it involves following all of their movements and asking them about their actions to understand why they do as they do (McDonald, 2005). However, the presence of a researcher may influence the actual behaviour of the person being observed (Mintzberg, 1973; Cazarniawska, 2007). McDonald (2005) conducted a literature review of studies that used shadowing as a method and described two main types of shadowing: quantitative and qualitative. The studies were categorised according to three forms: 1) experimental learning, 2) recording behaviour (quantitative shadowing) and 3) understanding roles or perspectives (qualitative shadowing). This paper deals with understanding the roles of the cleaners, and the results of the shadowing are presented as a narrative that provides insight about the workdays of the cleaners.

Researchers in the social sciences occasionally use stories to provide insight into actors' circumstances and the context surrounding them (Johannessen, Tufte and Christoffersen, 2010). A narrative approach allows different aspects to be highlighted that may otherwise be difficult for the researchers to convey. As such, narratives were chosen for the present study because they more clearly illustrate the aspects of the cleaners' workdays.

New insights can be gained through observations because an observer "can see different things than actors and natives can" (Czarniawska, 2007). Some of the observations may seem obvious to the native while seeming case-specific to the observer; other observations may only truly be understood by the actor. Nevertheless, observations can only provide a snap shot of the reality and "even when extended over time it can only incorporate a narrow section..." (Gillham, 2008).

The cleaners were shadowed for one morning and one evening; together, this evaluation provides a picture of the cleaners' workday in one office building. The data from the shadowing were recorded through field notes and digital photographs, which provided a vast amount of information when combined. When possible, the cleaners were also asked questions during the shadowing. The following narrative provides a brief summary of this collected material. During the shadowing, the following topics were studied in particular:

- Interactions between persons and the core business (types of contact and types of person)
- Cleaning methods/equipment/technology and performance
- Tasks, the sequence of tasks and the division of tasks among peers
- Hindering and enabling aspects
- The time of day
- Rewards for work and feedback on work
- The handling of events

The shadowing was agreed to by the operations manager (OM) and the service supervisor (SS), who asked the cleaners if they would like to be shadowed. Prior to the shadowing, the SS was also interviewed. In this interview, the SS said that she was responsible for 150 cleaners and that she tried to meet the cleaners face-to-face at least once during a three month period, which was a goal that was not always easy to achieve. Annie was the first cleaner to be shadowed. She met the researcher (R) for the first time in the evening together with her SS, who introduced R to her. The following morning, Annie was shadowed for another hour until Frank arrived. Frank was then shadowed from the time he signed in until he left the building.

"BRICK" AND THE CLEANING TEAM

The shadowing of the two English cleaners was conducted in an old English administration building, here referred to as "Brick". The building is open from 0700 until 1900 for office workers. In the evening and at night, a security guard patrols the building until the cleaners arrive in the morning. The building has a total area of 2,406 internal m^2, and its age is unknown, but the cleaners and their

SS estimate the building to be over 100 years old. The building is made of brick and mortar, and it has begun to crumble. Five months after the shadowing, the building was scheduled to be demolished, and the building users had already started to move to their new location.

The building's ground floor is used as offices. The basement consists of a few rooms that are used as storage, and the first-floor areas are used as a lunch room, computer training room and meeting room. The former cleaner at "Brick" retired, and the two current cleaners are temporarily employed at the building. The area to be cleaned in the building is split between the two cleaners (see Figure 1).

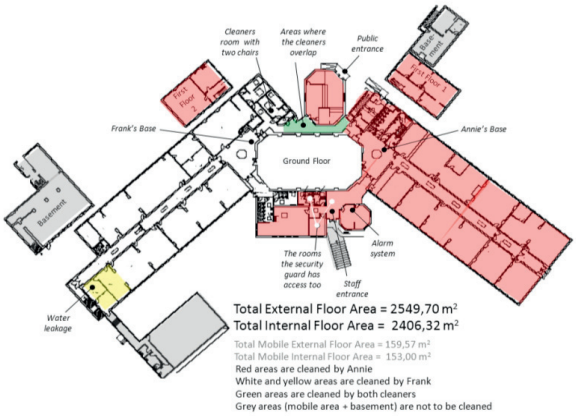

Figure 1: The floor plan of "Brick" and the cleaners' different areas

THE CLEANING TEAM AND THEIR HOURS OF DUTY

The two cleaners, Annie and Frank, have different relationships with the council's soft FM department which is responsible for cleaning, catering and school patrols. Frank, who is a semi-retired automotive engineer, is part of the council's mobile caretaking team and works (by choice) for only 3 hours in the morning from 0600 until 0900; Annie, who has been employed as a cleaner for many years within the FM department, works full-time. Annie normally arrives and leaves earlier in the morning than Frank, and she works alone in the evenings, as her job is divided into three parts. She begins by cleaning at "Brick" from 0510 until 0840 and continues to work as a caterer from 1100 until approximately 1315 after a few hours off, which enables her to eat lunch and perform chores or errands, such as ironing, at home before going to the school canteen. Finally, after a couple of hours off again, this time for a shower and dinner at home, she returns to clean at "Brick" in the evening from 1510 until 1900.

RESPONSIBILITIES

Annie's and Frank's responsibilities are divided within "Brick". Frank is responsible for one of the corridors, the large oval room and the nearby toilets. Annie has responsibility for the other corridor, the public entrance, the medium oval room, the staff entrance area, and all toilets in this area in addition to the areas at the first floor.

Annie has responsibility for the keys at "Brick". At night, a security guard is on site, but he has access only to the entrance, the toilets by the entrance hall, his own security booth and the property's external areas. Annie locks all other areas inside the building, engages the alarm system and locks the door to the room where the alarm system can be accessed when she leaves in the evenings. The security guard closes the gate in the 2-metre-tall fence surrounding the property when Annie leaves in her car. At this point, the security guard is alone on the premises, and he does not leave until Annie arrives again in the morning and disengages the alarm system.

In the morning, Annie first disengages the alarm system and then briefly greets the security guard (who seems to be ready to leave as soon as she arrives) before she begins patrolling the building to open the locked doors and turn on the lights. In the evening, Annie pays attention to who is still at work when she cleans. She tries not to bother those who are still working for as long as possible. When most of the cleaning is complete, she walks around the building and closes open windows, turns off the lights, closes or locks the doors and checks whether any office workers are still present. At the end of her shift, she sits down with a cup of coffee by the entrance and waits for the last office workers to leave the premises so that she can complete her work and lock the building up. The

office workers, the security guard, Frank, and the SS all do not have keys to the building; thus, Annie has to ensure that everything is in order before she leaves.

ROUTINES AND PACE

Annie's responsibility for the building's keys influences her routine because she has to work from early in the morning, when no one is present, until a few hours after the office workers have arrived. She also has to work from late in the afternoon, from the time when the office workers begin to leave, until the building is empty. In contrast, Frank can choose when to work, but he prefers to work early in the morning and to achieve as much as possible before the workers arrive.

The first and the last activity when arriving at or leaving "Brick" is to sign a book located at the staff entrance hall. This unsupervised book keeps a record of who is in the building at any given time. Both cleaners seem to work according to a system which can be categorized as a routine that consists of sequences of the various tasks. They begin at a specific place and work their way down their corridor and up the other side. In general, the cleaners perform one task at a time, e.g., emptying rubbish, cleaning/polishing desks, vacuuming, cleaning toilets. The cleaners do not change tasks before they are finished unless they are interrupted.

Frank seems to work task-by-task, finishing one task in all of the spaces before continuing with the next task. Annie seems to have two sets of routines: the same routine as Frank in "her" corridor but a different routine in the other areas. In the areas of the public entrance and the staff entrance and on first floor in the lunch room, Annie seems to finish all of the tasks within the different areas/rooms before she continues to the next area/room. In this routine, the sequence of the tasks seems to be the same as that for the aforementioned routine: emptying rubbish first and then cleaning/polishing desks before vacuuming the floor and cleaning areas with hard floors.

Frank, who works only during the mornings, begins with the offices and works as quickly as he can until most of the office workers have arrived. His pace slows as the building fills up. Frank expresses it as such:

"I only work in the morning from 6 o'clock till 9 o'clock. So, I tend to do the jobs I can do when there is nobody in. And a bit later on, because they tend to come in at different times. Some come in for 7, some for 8 and by 9 o'clock it is full. So, it is only certain things you can do after, cause then everybody is messing out and about."

Annie also works quickly, but because she was not shadowed while the office workers were arriving, there is no record of whether their presence had any effect on her pace. The cleaners' do not seem to have an obvious common understanding of practice. The most apparent difference between Frank's and Annie's toilet cleaning routines is that Annie uses gloves when cleaning, whereas Frank uses his bare hands. Another difference is that Annie distinguishes between the types of cloths and the types of buckets that are used for the toilets (the blue cloths and the blue bucket) and for the vanity counters and the dispensers (the pink cloths and the red bucket), whereas Frank only distinguishes between the colours of the cloths. Annie also cleans outside the toilet bowls, whereas Frank does not (this may be because of R's presence). Both Annie and Frank use a blue toilet cleaner and descaler inside the toilet/urinal bowl. Annie uses her glove-covered hand and the blue viscose cloth to clean inside the toilet bowl, whereas Frank seems to use a toilet brush (this may be a matter of personal preference).

Other differences between the routines of the two cleaners are that Frank seems to move fewer objects when he vacuums compared with Annie and that Frank vacuums and wipes the desks every other day, whereas Annie wipes half of the desks and vacuums the floors every day. Annie also changes her wiping routine every other day - one day she wipes with water and chemical while she uses a flannel cloth and wood wax spray to polish the desks the following day.

This day Annie's evening routine was interrupted by a rainwater leakage in Frank's corridor which includes that Annie and SS had to collaborate in order to provide a wet vacuum and vacuums the water. Annie's evening routine was in addition interrupted by a member of the public visiting the public entrance - consequently Annie had to change task and area to clean as she is not allowed to be at the public entrance when members of the public enquire assistance.

Listing the cleaners' routines reveals differences (see Table 1) that may be a result of personal choice, of differences in training or a natural consequence of the time of day when the tasks are conducted.

Table 1: The cleaners' routines

	ANNIE'S MORNING ROUTINE	ANNIE'S EVENING ROUTINE	FRANK'S MORNING ROUTINE
1	Opening the building	Unknown + rainwater leakage	Emptying the rubbish
2	Cleaning the desks (half of the desks)	Cleaning the toilets	Cleaning the toilets – first the furniture and then the floor
3	Vacuuming the "corridor offices"	Cleaning up the pooled rainwater with a wet vacuum	Vacuuming the floor or wiping desks (on alternate days)
4	Dusting/cleaning the glass/doors (based on observations obtained while shadowing Frank)	Cleaning the public entrance area; first rubbish, then polishing the desks before vacuuming	Refilling the paper hand towels and toilet paper in the toilets
5		Mail room; first rubbish, then polishing before vacuuming	Dusting/cleaning glass
6		Vacuuming the staff entrance and toilets	Scrubbing the urinals
7		Emptying the rubbish in "corridor offices"	Discarding the refuse bags
8		Finishing the vacuuming of the public entrance	
9		Cleaning the kitchen on the first floor	
10		Coffee break	
11		Closing the building	
12		Discarding the refuse bags	

INTERACTIONS

Annie and Frank interact with each other every day in various ways (see Image 1). They drink water together, and it seems that Annie regularly helps Frank by checking that ladies are not in the lavatory before Frank enters (because it appeared natural for her to do this, it seems likely that this is one of their routines).

The ways in which the office workers react towards the cleaners differs. Some workers do not seem to notice the cleaners, even a researcher following their movements. Others seem to give the cleaners more attention because there is someone shadowing them. The "good morning" greeting seems to be common for the cleaners and the office workers. The OM's statement that "people don't think twice about the cleaning" became apparent when the users in one of the offices turned off the light as they left a room that both Annie and R were still in. This may be a typical behaviour when there is no researcher present, but it may also have been a mistake.

Image 1: Annie and Frank interact in various ways with each other, SS and the building users

During the shadowing period, no negative comments regarding the cleaners were observed. The comments from the building users were that 1) dusting (in this building) is pointless and 2) these cleaners do a good job (indicating they perform better than the previous cleaner). Frank seems to meet more people during his three hours then Annie does during her hours at "Brick", although it seems as Annie has more varied interactions than Frank. In addition to meeting building users she also interacts with other service personnel as the security guard and SS. In the evening, there was a rainwater leak at "Brick", Annie and the SS had interactions with several building users: first with the 2-3 ladies who reported the flooding and then with 5 users of the flooded area of the building. Annie and the SS also collaborated with one of the building users when vacuuming the water from the floor. They took turns with the wet vacuum machine. This event also showed that Annie was most likely more experienced with this machine than the SS because the SS was unsure of how to empty it.

The most surprising information gained through Annie's interaction with the building users and her SS was that neither the building users nor the service supervisor seemed to be aware that Annie had keys to the building. The SS seemed shocked when Annie noted

that she had the keys to the building and that she was also the one who had the responsibility for opening and closing the building, including all accompanying tasks, such as checking the windows, lights and doors and that the building was empty.

BUILDINGS IMPACT AND ERGONOMIC

The cleaners' equipment is located in different places around the building (see Image 2). The cleaners' storage space seems to be insufficient because it is located in several places. This aspect, combined with the time that the cleaners spend to change or find equipment, seems unnecessarily time-consuming.

The cleaners have two rooms that may be defined as theirs: the room (with the cleaners' two chairs) that is also used for storing envelopes and office supplies for the core business and a large toilet room by Annie's base, which is used as an equipment room. Aside from these areas, the cleaning equipment is stored in the spaces dedicated for the core business, including the gentlemen's room, a corner by the staircase leading to the kitchen, a kitchen sink in the ladies' room, and a corner in one of the meeting/training rooms on the first floor. The toilet room where Annie stores her equipment does not have any shelves. Therefore, her equipment is spread out on the floor, and when she begins her duties, she chooses the things that she needs and organises them on and by the edge of the plant-island (the circle at the floor plan) at her base. This practice may indicate a need for a more dedicated storage room.

The storage of equipment on the first floor seems convenient because the building does not have an elevator. Thus, it is not necessarily a direct disadvantage to have the equipment distributed throughout the building. However, such a broad distribution of the equipment may make it challenging to keep an overview of the equipment and supplies. It can also be argued that this placement of the equipment inconveniences the building users.

Image 2: Frank's and Annies's bases, storage rooms and water refilling possibilities

The lack of door sills and the presence of swinging doors made it easy for the cleaners to pull their tub vacuums. Power outlets high on the walls (above hip height) were also useful because the cleaners could stand upright when plugging in their tub vacuums. In the toilets each lavatory was separated with an interior partition having a 5 - 10 centimetres gap from the floors allowing the cleaners' string mop to manoeuvre easily without also mopping the wall. However, the cleaners had difficulties accessing the floor area around the back of the toilet as the space left between the wall and the lavatory was too narrow to allow appropriate access. The cleaners also experience difficulties reaching windowsills when dusting and had to use the tub vacuum to reach the sills.

The distance between the power outlets in this building seems to be appropriate for the length of the power cords; in the only observed incident in which a tub vacuum's electrical wire was stretched taut, the cleaner was able to change to another power outlet.

TECHNOLOGY AND COLOUR CODES

The cleaners' equipment can be categorised as follows: a) Cloths and string mops, b) Buckets and mop handles, c) Fluid and spray chemicals, d) Vacuum cleaner, e) Refuse bags and paper refills.

The cleaners' equipment (see Image 2) is listed according to its location (see Table 2), and it is apparent that colour coding is important in cleaning. Some colour codes seem to have a purpose (mops, cloths and buckets), whereas others seem to be random (spray bottles and tub vacuums):

- Yellow: cloths for tables, mops for food service areas such as dining areas
- Pink/red: cloths for sinks, buckets for tables, mops for unknown
- Blue: cloths for lavatories, string mops for toilets and buckets for toilets

Frank was the one who indicated that colour had a meaning through telling the soft FM department had a saying for remembering which cloth to use: "The rime is: Pink for sinks. Blue for loos."

Table 2: The cleaners' equipment according to storage space

STORAGE ROOM	EQUIPMENT
By Frank's base	Two chairs, primary stores of toilet paper rolls and paper towels, two yellow tub vacuums, yellow flannel cloths, wood wax sprays, air freshener, black refuse bags and refill bags for the tub vacuums, among other items.
Gentlemen's room	A blue string mop bucket with a blue string mop in it, a green vinyl pad, some used and dried cloths of various colours on top of 5-litre chemical containers, a black bucket (used to catch the rain water leaking through the roof above the urinal), some unmarked spray bottles (marked with coloured plastic parts: green; blue, containing the blue glass-cleaning chemical; white, containing the red toilet-cleaning solution; and yellow, containing a blue solution), a 1-litre bottle of blue toilet cleaner and descaler and two different chemical containers (one with a green chemical and a green label and one with pink chemicals and a red label), which can be attached to a flexible tube connected to the utility sink's mixing battery
By Annie's' base	A complete toilet room containing a ladder, a trolley (which she does not use), a cardboard box containing twelve 1-litre chemical bottles, a red and a blue string mop bucket (both containing a yellow string mop), a red and a blue (approx. 10-litre) bucket with a handle (and Annie's name written on with permanent ink), two yellow caution-wet-floor signs, a red tub vacuum and two 5-liter containers on the floor. The trolley itself contained a great amount of equipment: refuse bags, wood wax sprays, air freshener sprays, two porcelain coffee cups (most likely her private cups), two transparent spray bottles containing solutions, new unused and unpacked viscose cloths of various colours (yellow, blue and pink) and some hand towel paper refills inside a red, square bucket hanging where a refuse bag is supposed to be.
First floor 1	One yellow tub vacuum
First floor 2	One yellow tub vacuum, one blue string mop bucket and one yellow string mop

DISCUSSION

The aim of this research was to describe the actual practice of cleaning with the purpose of identifying enabling and hindering aspects for cleaning services with regard to efficiency and effectiveness.

The results illustrate that the cleaners interact with various people; building users, persons visiting the building, security guard, SS and other cleaners. The majority of the cleaners' work is performed outside of core business hours; thus, there is not necessarily any loss of efficiency from interruptions by building users. However, mingling with building users might increase the effectiveness of cleaners because their work would automatically receive feedback, such as when a building user commented that they were more satisfied with Annie's and Frank's work than with the previous cleaners' work.

The results show that the cleaners perform differently within the same organisation: the sequence of tasks, the types of equipment used and some aspects of the performance are similar, still the tasks seem to be performed differently. One of the cleaners seems to be more thorough (or experienced) than the other. Despite this the available trolley remains unused. The use of a trolley may have saved time and made the service more efficient without reducing its effectiveness. Increased efficiency may generate additional time to ensure the effectiveness of cleaning tasks.

The narrative illustrated two different cleaning routines; 1) one-task-in-all-spaces and 2) all-tasks-in-one-space-at-the-time. The first routine seem effective when no one else are around as it demands less thinking and as it possibly is more efficient as the cleaner don't use time on changing equipment. On contrary, if this routine is conducted when building users are present the users will be disturbed repeatedly. Such a routine would then be rather disturbing and not add value to the core business. The second routine

where all tasks are performed in the specific space before moving to the next may reduce the efficiency as time is spent on changing equipment. However, this routine might increase the effectiveness as the cleaner can concentrate on a smaller area at the time which gives more time to (unconsciously) check the already conducted work before leaving the room. This is also a routine which seems to be less disturbing for the core business, a routine which may increase the building users satisfaction as they see the work being done (thereby knows it is performed) and a routine that would be easier to coordinate with the routine of the core business, especially if conducted at the same time on a daily basis.

The results also indicate that it may be challenging for one manager to keep track of the responsibilities for 150 frontline staff as SS in this case did not know the complete responsibility for the cleaners'. The results show that the cleaners mostly use manual equipment in their daily work and that the only used machine is tub vacuums. The efficiency and the effectiveness may be increase by using trolley allowing all necessary equipment to be transported at once. A cordless vacuum could add to the efficiency, if the battery could manage minimum one hour vacuum before the battery discharges.

The building supports the cleaners through swinging doors, a lack of door sills, power outlets high on the wall (above waist height) and interior partitions with 5 - 10 centimetre gaps above hard floor (allowing string mop access underneath it), but it hinders the cleaners because it lacks adequate storage rooms or a common base with a suitable storage system. Ensuring effectiveness and efficiency seems also to be challenging for the cleaners in the toilets as the available space between lavatories and walls seems to hinder the cleaners in their work since the space beside and behind lavatories is difficult to access.

The lack of an elevator contributes to the inefficiency because of the time spent moving in stairs and corridors and because of the need to purchase extra equipment to be stored on the first floor. It can be argued that this extra equipment may have been unnecessary because the cleaners could have carried the equipment up and down the stairs. However, this practice would have cost the cleaners extra effort and time and most likely would have been disadvantageous to their health because some of the equipment is heavy.

CONCLUSION

This illustrate there may be a potential to improve efficiency and effectiveness in relation to building, technology and organisation when it comes to:

- ergonomic
- accessibility
- training of staff
- ease of cleaning
- adequate storage
- coordination with core business
- arrangements for effective operation
- keeping an overview of whom actually does what
- individual responsibility for defining routines with no obvious common understanding of practice

This research is part of a PhD project on cleaning services in local authorities. The aim of the project is to understand the work practices of these services and the impact that buildings, technology and organisation have on their work. A next step for this research could be to develop a framework which further explains the studied aspects in this paper and coming research on this particular topic.

REFERENCES

Bjørberg, Larsen and Øiseth (2005). Livssykluskonstader for bygninger. Innføring og prinsipper. ISBN 82-91510-64-4. The Norwegian Standards Association, (2000) NS 3454 "Life Cycle Costs for Building and Engineering Work, Principles and Classification"

Czarniawska, B. (2007). Shadowing and other techniques for doing fieldwork in modern societies (First ed.). Liber, Copenhagen Business School Press, Universitetsforlaget.

Frankie, Cole, Leese, Foarde and Berry (1997). Cleaning for Improved Inoor Air Quality: an Initial Assessment of Effectiveness. Indoor Air 1997:7:41-54.

Gillham, B. (2008). Observation techniques. Structured to unstructured. Real World Research. Continuum International Publishing Group, London.

Hellstrøm, Greger, Jansson and Jahr (1969). Gulvrengjøring. Arbeidsbelastning og rengjøringseffect ved bruk av våtvask og tørrmopp, Yrkeshygienisk Institutt, Argbeidsforskningsinstituttene, Oslo, Januar 1969. Available at: http://bilder.bibits.no/stami/Diverse/1969/Gulvrengjoring_69.pdf (Accessed 17th October 2011).

Jensen, Nielsen and Balslev Nielsen (2008) Facilities Management Best Practice in the nordic countires. 36 cases. Centre for Facilities Management - Realdania Research. DTU Management Engineering, Technical University of Danmark.

Johannessen, Tufte and Christoffersen (2010). Introduksjon til samfunnsvitenskapelig metode. 4. Utgave. Abstrakt forlag, Oslo.

Madritsch, Steixner, Ostermann and Staudinger (2008). Operating cost analyses of long-term care facilities. Journal of Facilities Management, Vol.6, No. 2, pp. 152-170.

Mascoporran and Tucker (1996). Target budget levels for building operating costs, Construction Management and Economics, 14:2, pp. 103-119

McDonald, S. (2005). Studying actions in context: a qualitative shadowing method for organizational research. Qualitative Research, 5 (4), 455-473. Mascporran and Tucker (1996, pg.110). Target budget levels for building operation costs. Construction Management and Economics, Vol. 14., No.2, pp.103-119.

Mintzberg (1973). The Nature of Managerial Work. Publishers: Harper & Row, New York.

Nilsen, Blom, Nersveen, Rydock and Fostervold (2001) Sammenhenger mellom innemiljørelaterte helseplager, produktivitet og rengjøringskvalitet. Oppdragsrapport O 9774. Byggforsk – Norges byggforskningsinstitutt, Oslo.

Nilsen, Blom, Rydock, Nersveen and Fostervold (2002) An intervention study of the relationship between indoor air-related health problems, productivity and cleanliness in an office setting. Indoor Air 2002, Proceedings 1, pp. 472-477.

Nilsen, Dahl, Kristiansen, Brønstad and Høstmark (2008) Best Practise Cleaning – Reducing cost, waste and use of chemicals by introducing a modern cleaning concept, Proceedings of Sustainable Buildings 2008, 21st-25th September 2008, Melbourne, pp. 110-117.

NHO Service (2011). http://www.renholdsportalen.no/1.0/ National Federation of Service Industries (last accessed: 31st October 2011)

Schneider, Nilsen and Dahl (1994). Cleaning methods, their effectiveness and airborne dust generation. Building and Enviroment, 1994, Vol.29 (3), pp.369-372.

Skulberg, Knut (2006). Intervention studies of indoor air dust exposures and health in office workers. Doctoral dissertation. Department of Occupational Medicine, National Institute of Occupational Health and Faculty of Medicine, Department of General Practice and Community Medicine, University of Oslo. ISBN 82-8072-405-2

Skulberg, Skyvberg, Kruse, Eduard, Djupesland, Levy and Kjuus (2004). The Effect of Cleaning on Dust and the Health of Office Workers. An Intervention Study. Epidemology, Vol.15, Nr.1, Januar 2004.

Stershic (1990). The flip side on customer satisfaction research. Marketing Research, Desember, pp.45-50.

Stoy, C. and Johrendt, R.(2008). Cleaning management of owner-operated real estate. Facilities, Vol. 26, No. 3/4, pp. 131-143.

Strand, JA (2000). Nøkkeltall for kommunale bygninger. Norwegian Association of Municipal engineers (NKF) -Forum for Public Buildings and Properties (FOBE).

Yin, RK (2009). Case study research. Design and Methods. Fourth edition. Sage Publications, Inc. California.

Yusoff, Ismail and Ali (2010). Understanding the service provider perspective towards better service quality in local authorities. Journal of Facilities Management, Vol. 8, No. 3, pp. 226-238.

Article 1

Article 2

Article 3

Paper 1

Paper 2

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Article 1

Article 2

Article 3

Paper 1

Paper 2

Shadowing – a valuable approach to Facility Management research

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ABSTRACT

This paper aims to add to the methodological discussions within FM research. To discover how FM can add value to core businesses and society, new and deeper knowledge regarding FM and the different services it manages is needed.

One method of data collection is shadowing - a technique that may be a useful approach to FM research, especially for those studying work practices in action. Shadowing is a non-participatory observational method in which all variations of the method give vast amounts of information regarding the studied object in its natural settings. One risk when gathering data through interviews and surveys is that the respondents may actually act differently than they report acting. Shadowing can eliminate this risk, as what the respondents actually do is observed. The other benefits include the first-hand indication, which may allow unexpected discoveries through the extensive information the method provides, and the valuable time saved by the persons participating in the research. However, shadowing has downsides, including the researcher's ability to interpret what (s)he observes and the influence of the researcher's presence on the studied object. The method is also exhausting for the researcher and the vast information it provides comes with a risk of drowning in the data.

Examples of shadowing results are used to reveal the different types of information that can be collected. The purpose of the examples is not to validate the shadowing method but to present the method, to illustrate the immense amount of information the method provides and to discuss whether shadowing may be a valuable approach for FM research. Different facets that need to be considered are highlighted, as are the various ways of collecting, analysing and conveying the information.

Shadowing seems to be a little known research method within FM, and the findings show that shadowing is a valuable method for developing knowledge and discovering un-noticed issues, especially when in-depth knowledge is needed.

Keywords

Facilities Management, Method, Shadowing, Cleaning.

1 INTRODUCTION

Shadowing is gaining increasing acceptance and has been used with success within management research studies (Czarniawska, 2007; Tengblad, 2012); thus, it could be interesting to further

investigate how this method may be beneficial to facility management (FM) research. FM research covers a wide array of approaches and topics. The existing FM research has mainly been related to realism and positivism (Alexander, 2010). An investigation into Norwegian cleaning research supported a similar conclusion that the majority of research contributions are related to realism and positivism (Klungseth and Olsson, 2011). Klungseth & Olsson (2011) showed that there is a need to broaden the research approaches used and indicated that shadowing is a method that may be unused. Other observation methods have been applied, but they are rare within Norwegian cleaning research. Shadowing also does not seem to be a known research method within FM research. However, different types of observations have been used, such as ethnographic observation, which Fruchter (1999) used when studying student team interactions in learning spaces and Silbey (2002) used when observing the facility manager meetings while studying the creation of a new EHS system for research laboratories.

This paper aims to add to the methodological discussion within FM research and investigates whether shadowing may be a suitable method for FM research. This paper discuss how shadowing can be used and applied as a potential technique. An example of shadowing data is provided to demonstrate the shadowing method. In the example, a cleaner from a Norwegian local authority was shadowed, and a small section of the cleaner's work day is described through two different narratives.

Shadowing is a type of observational method that has been successfully used within other research fields and proven to be suitable for complex and least understood issues. If this is the case, why not apply this method within FM research? This method may enable researchers to gain new and deeper knowledge of FM and the different services it manages. As such, the research questions in this paper are as follows:

- What is shadowing?
- What are the benefits and downsides of shadowing?
- What kind of data can one expect to gain from shadowing?
- How can shadowing results be conveyed to the research community?

To obtain a comprehensive understanding of shadowing, this paper begins by providing a theoretical introduction to the method, followed by a practical example of shadowing and how the information obtained can be conveyed to the research community. The benefits and downsides of shadowing are then discussed prior to the conclusion. While reading this paper, it is advisable to keep in mind that shadowing is context-dependent and that the researcher is part of the shadowing context. The data obtained will be influenced by the person observing, and the data will only provide a snapshot of reality. However, this snapshot will contribute to in-depth knowledge of the considered practice in action.

2 SHADOWING IN THEORY

Shadowing is one of many observation techniques that assist prevention of old-fashioned theories and outdated descriptions of practices. Barley & Kunda (2001) promote the rediscovery of in situ work studies and argue that (organisational) theorists and researchers must bring work (studies of actual practice through observation) back into their research; hence, the lack of such studies "*leaves us with increasingly anachronistic theories and outdated images of work and how it is organized* (p.90)".

Angrosino (2007:54) describes observation as *"the act of noting a phenomenon, often with instruments, and recording it for scientific purposes."* Observational methods address what people actually do and not what they say they do (Gillham, 2008; Corbin & Strauss, 2008), which gives observations one overpowering claim to validity (Gillham, 2008). An individual's self-reports are occasionally a modification of what they actually do (Barley & Kunda, 2001; Halvorsen, 2007). At other times, individuals may not be able to convey or be consciously aware of the interactions in which they participate (Corbin & Strauss, 2008).

One of the recommendations for using observational methods can be found in Mintzberg's (1973) criticisms of interviews and questionnaires. He regarded these methods as unsuitable for recording what managers actually did, as they turn the managers into the researcher through requiring translations of complex reality into meaningful abstractions. He underlined this view by stating that "*managers are poor estimators* o*f their own activities*" (Mintzberg, 1973:222) and dismissed interviews and questionnaires as useful only for studying managers' perceptions of their work.

Observations can be conducted in various ways, including direct, indirect, structured, unstructured, participatory and non-participatory observations. Czarniawska (2007) indicates that variations on shadowing have previously been described as either structured observation or direct observation. During direct observations, the researcher is present in the field and observes the actions as they occur. This form of observation can be conducted in various ways, from more formal (as in structured observations) to more casual (as in unstructured observations) (Yin, 2009).

The only real difference between structured observations and the diary method, which was popular during the 1950s and 60s, was that the researchers' recorded what the managers' used to do (Mintzberg, 1973). Mintzberg criticised the diary method for making the managers become the researcher (as the managers was the one to register their own use of time on a predefined sheet) and for only recording the time used on already known job factors (which made it unsuitable for studying actual job content and the time spent on unknown job factors). The advantage of using structured observations was, according to Mintzberg (1973), that it could benefit from *"the chief strength of unstructured observations, namely, the development of categorization schemes during and after observation"* (p. 227) (as the researcher is present in the field when these unknown factors occur). He defined unstructured observation as enabling the *"researcher to understand new dimensions and to probe"* (p.229). Structuring the observations

gave the method yet another strength - the ability to be systematic. Mintzberg (1973:228) recommended unstructured observations when studying *"the most complex, least understood aspect of manager's job (content)"* and stated that structured observations may be the only method that *"enables us to study systematically and comprehensively those parts of managerial work that are not well understood."*

This paper addresses Yin's direct observation and the observation role Creswell (2009) defines as "complete observer". Yin (2009) defines two types of observation, direct observation and participant observation, while Creswell (2009) defines four types of observation roles, complete observer and three types of participant-observations roles:

1. **Complete participant,** in which the researcher has a hidden and secrete role
2. **Observer as participant,** in which the role of the researcher is known
3. **Participant as observer,** in which the role of the observer is secondary to a participatory role
4. **Complete observer,** in which the researcher observes without participating

When shadowing, the researcher becomes a complete observer and attempts to be involved as little as possible. However, this goal is not always easy to achieve. Czarniawska (2007) advocates that all types of direct observation are participatory and divides non-participatory observations into shadowing and stationary observation. She draws attention to the difficulties of applying strict classifications to field observations in the following statement:

"You cannot say 'Sorry, I am not doing a participant observation' when somebody asks you for help with a falling shelf, and neither can you say 'You forget I am doing shadowing' when the person you shadows instructs you to stay in the office and not to follow her. One glides into another; in that sense, all direct observation is indeed participatory – one's mere physical presence and human decency requires participation." (Czarniawska, 2007:54-55).

2.1 What is shadowing and how can it be conducted?

McDonald (2005:456) defines shadowing as a *"research technique which involves a researcher closely following a member of an organisation over an extended period of time."* This period of time can vary from just a few hours of one person's shift to several weeks or even months (McDonald, 2005; Patton, 2002). According to McDonald (2005), the shadowing experience may include stationary observation if the shadowed person sits to write on a computer or in a book. Although the researcher attempts to be involved as little as possible when shadowing, the researcher often needs to (in order to understand what is going on) ask questions to clarify or understand the purpose of actions or statements. This necessity is supported by Gillham (2008:101), who states that *"'Interviewing' of one kind or another is often concurrent with observation even if the questions asked are limited and fragmentary."*

Shadowing can be conducted in various ways depending on the purpose of the shadowing. McDonald (2005) categorises shadowing into three types: 1) experimental learning, 2) recording behaviour (quantitative shadowing), and 3) understanding roles or perspectives (qualitative shadowing). The structure of the recoded data will differ depending on the type of shadowing.

During shadowing, observations can be recorded in field notes, drawings, photographs, sound and video (Mintzberg, 1973; Barley and Kunda, 2001; McDonald, 2005; Czarniawska, 2007; Yin, 2009; Creswell, 2009; Arman, Vie and Åsvoll, 2012). Shadowing has seldom used (and researchers have seldom discussed the use of) combined data collection methods, and Arman, Vie and Åsvoll (2012) encourage researchers to explore different combinations of data collection methods. Field notes (the method most commonly used) can record different aspects, such as time, place, activity, body language, descriptive notes of surroundings, demographical notes, moods of and running commentaries from the shadowed person and the researchers' reflective notes, ideas and hunches (McDonald, 2005; Creswell, 2009; Arman, Vie and Åsvoll, 2012).

2.2 Benefits of Shadowing

Shadowing gathers information that can be analysed with the same methods as any other qualitative data. However, shadowing can provide even more extensive information than many other qualitative methods. Shadowing results in *"a rich, dense and comprehensive data set which gives a detailed, first-hand and multidimensional picture of the role, approach, philosophy and tasks of the person being studied*" (McDonald, 2005:457). Images can assist the researcher when conveying the obtained information because they can make it easier for outsiders to understand the situation (Yin, 2009). Photographs also add information to the field notes and allow the researcher to mentally revisit the site during their analyses.

Shadowing may allow the researcher to discover new and unexpected factors that they did not anticipate to observe. McDonald (2005:457) claims that shadowing enables the exploration of the aspects of organisational life that are difficult to research, such as *"the mundane and the difficult to articulate."* This claim is supported by Czarniawska (2007), who argues that those observing (the researchers) may not see the same world as those who are observed (the actors) and that the observers are able to see and distinguish between different alternatives, while the actors only can do so upon reflection. Czarniawska clarifies this benefit: *"An observer can never know* better *than an actor; a stranger cannot say* more *about any culture than a native, but observers and strangers can see* different *things than actors and natives can"* (Czarniawska, 2007:21).

Shadowing aims to record what actually happens (Gillham, 2008). It is a method for observing people without participating in their work and a way of recording on-going practice. It involves following all of the participants' movements and asking them about their actions to understand why they do as they do (McDonald, 2005). Observations can be invaluable aids for understanding (Yin, 2009). According to Creswell (2009), the benefits of observation are the first-hand experience the researcher can achieve, the possibility of recording information as it occurs, and the unusual aspects that can be noticed during the observation. Creswell (2009) also mentions that it is a useful method for exploring topics that may otherwise be uncomfortable for the participants to share.

Shadowing may also make it easier for researchers to gain access to the field, as it does not require anything of the individual being studied other than to allow a researcher to follow them at work. This consideration means that the studied person does not need to set aside valuable time, as they would for an interview.

2.3 Downsides of Shadowing

There are several downsides to shadowing that should be understood to help avoid pitfalls. One downside is actually gaining access to the field; another downside is that *"Observation cannot tell the whole story; and even when extended over time it can only incorporate a narrow section of the evaluation of a group, a culture, or an individual*" (Gillham, 2008:100).

There is also a risk of misinterpretation in shadowing. Corbin & Strauss (2008:30) draws awareness to the researcher's abilities during and after fieldwork, as the researcher "*may give meaning to action/interaction based on observation without checking out the meaning with participants*" and pinpoints that there is a risk of misinterpreting actions as nonverbal behaviours that are difficult to understand, particularly across cultures (Corbin & Strauss, 2008; Patton, 2002). A possible solution is combining observations with interviews or to at least confirm that the researcher's interpretation is correct by asking the participants. McDonald (2005:456) recommends *"Throughout the shadowing period the researcher asks questions which will prompt running commentary from the person being shadowed."*

The presence of a researcher may alter the actual behaviour of the person being observed (Mintzberg, 1973; Patton, 2002; Cazarniawska, 2007). According to McDonald (2005), the Hawthorne effect is one of the obvious risks of shadowing. This effect refers to the participants' awareness of being observed and possibility that this awareness may alter the research findings (Jones, 1992). McDonald notes that this risk *"can be neither ruled out nor measured"* (2005:459*)*. According to Creswell (2009), the disadvantages of observations are related to both the researcher (as good attending and observation skills) and related to the presence of the researcher (hence the researcher can be seen as an intrusive object). This aspect is highlighted by Czarniawska, who states that *"Shadowing can be awkward for the shadowed person*" (2007:33). McDonald notes that the changed relationship between the observer and actor is not long-lasting. The relationship begins as awkward, and both must adjust to reach a state where they are both ignored and continually informed (McDonald, 2005). In addition, McDonald notes that the outside observers whom the shadowed person meets infrequently do not have the same potential to grow accustomed to the situation. Another downsides mentioned by Creswell (2009) concern the information obtained which may be private and, therefore, not reportable.

Such large quantities of information are collected during shadowing that there is a risk of drowning in it. Even just a few hours of shadowing provides huge amounts of information. This quantity of information is both valuable and challenging. Extensive information provides the opportunity to discover unexpected relations. McDonald (2005) indicates that just one day of shadowing typically produces a transcript containing 8000 to 10000 words. It is useful to remember that it is *"impossible to capture every bit of what is going on in a setting"* (Corbin &

Strauss, 2008:30) but with good preparation and the right approach, it is possible to capture quite a lot of information.

The process of collecting and documenting shadowing data is challenging for any researcher (McDonald, 2005; Cazarniawska, 2007; Arman, Vie and Åsvoll, 2012). Shadowing is easier to conduct than participant observation, as the researcher does not have to perform specific (and possibly unfamiliar) tasks simultaneously as observing (Cazarniawska, 2007). Still, shadowing has challenges. It is quite demanding for a researcher to shadow. First, it requires observing everything that occurs, both verbal and non-verbal. Second, it requires writing down all these observations, which can include the actions, moods, conversations, timing, and surroundings. Third, shadowing often requires significant movement. Walking and observing (unfamiliar) actions and surroundings while writing these observations down is generally challenging (Czarniawska, 2007; Vie, 2009). Performing these tasks concurrently can be quite exhausting, as it requires remaining alert at all times – even going to the toilet or having a drink may result in losing valuable information. Therefore, spending a day shadowing is tiring. Yet the day is not over for the researcher when the shadowing experience is finished as the result has to be written nicely down.

3 SHADOWING IN PRACTISE

3.1 Shadowing Example

The in-house cleaning services within a Norwegian local authority have been studied. Only limited parts of the Norwegian case study, namely selected parts of the shadowing, are presented here as an example of the type of data that can be expected. This example of shadowing data provides valuable insight into the information that can be obtained through shadowing and also indicates how cleaning services can add value.

The shadowing data were recorded through field notes and digital photographs, which provide substantial information. When possible, the cleaner was asked questions during the shadowing. The following narratives provide a brief summary of a selected part of this material.

3.2 Conveying results: Example of text and image narrative

Shadowing results can be conveyed in various ways depending on the chosen data collection method. In this example, the results are conveyed through a written narrative (WN) and an image narrative (IN).

The shadowing data are structured chronologically by shadowed person, weekday, and time of day. In the following example, the data are presented through a narrative based on field notes only and a narrative based on photographs only.

Summer prepares for her duties at "Pebble" (an institution for the elderly) by unloading clean and damp microfiber cloths from the washing machine. At 09:35, she is finished with folding the clean cloths and counts 5 blue cloths and some green and red cloths, which she places in her trolley. She now puts on disposable gloves before refilling the machine with dirty mops. As her trolley is prepared, she is ready to start on her first task at "Pebble", cleaning the kitchen. She brings her trolley with her into the elevator in the basement. On the first floor, the elevator opens into the living room, and Summer greets an elderly woman sitting there. On her way to the kitchen, she greets an elderly man in a wheelchair. Summer does not walk as if she is in a hurry. She takes the time to explain the routines for the floor. The hall is cleaned three times a week, while the toilets in the residents' rooms are cleaned twice a week. In the background, the whining voice of the elderly woman by the elevator is heard; the elderly woman wants attention and cries for help with such extended cry that sounds like "eeeeeee". Summer explains that the woman would like a nurse to come and help her. Before Summer reaches the kitchen, she greets and also hugs yet another elderly woman. Summer seems to know all of the residents by their first names, which surprises me, and I ask how it is that she knows everyone's name. She looks at me with her head slightly tilted and replies, while smiling, still paying partial attention to the elderly woman she has just hugged and pointing towards the door of the woman's room (where a plate spelling out the residents' names can be seen), "*Their names are written by the door*."

Table 1 Example of a written narrative (WN)

Figure 1 Example of an image narrative (IN)

The WN gives a good understanding of what the cleaner does over a few minutes. She starts her day by ensuring she has clean textiles, finds the needed equipment for completing her duties and takes time to acknowledge the users she meets on her way. Although the IN misses some of the information provided by the WN, the IN tells a similar story. The cleaner is a woman. Cloths are taken out of a washing machine, and repetitive actions are needed to empty the machine. The cloths are folded and sorted according to their colour. Something is placed in or removed from the trolley and containers on the floor. The cleaner has a trolley with equipment and brings it with her into an elevator. The elevator opens towards a room. The building user in the picture of the cleaner leaving the elevator and the picture of the cleaner talking to this user indicates that the cleaner has entered directly into the living room. The cleaner hugs an elderly woman. Please note that if the WN had not been presented prior to the IN, the sex of the building user by the elevator would have been uncertain, as the images do not reveal enough information. However, the IN provides a lot of information that was not conveyed in the WN, and the real value of shadowing is particularly evident when the two narratives are combined.

The images confirm and add to the information that was not described in the WN, such as colours, surroundings, equipment and details of the procedure. This information could be part of

the WN. However, the images allow the researcher to mentally revisit and analyse the situation further and discover additional aspects. The images also allow outsiders to obtain a better understanding of the situation and to discover information as what the room looked like (large, with white walls and no windows), what equipment the rooms had (storage systems and a washing machine), what type of washing machine they had (industrial, with an automatic chemical dosage system), what the handwritten instruction on the wall says (how to start the washing machine – visible when zooming in on the original photo), what equipment the cleaner's trolley held (a handle with a Velcro frame), that the containers beneath the shelves are marked "cleaning" with permanent ink (indicating that labelling is important), the need for repetitive movements when emptying the washing machine (conveying the details of the procedure), and that the folded cloths are stacked in colour-coded piles (indicating that colour has a meaning).

The IN and WN both provide deeper insight into the actual cleaning practice and the routines, tasks, interactions, use of technology, equipment, and cleaning methods of the cleaning practice, including the cleaner's working environment and the effectiveness and efficiency of the practice. Such information may generate new knowledge about the factors influencing the cleaning practice, which may enable researchers to develop knowledge on how to improve the efficiency and/or effectiveness. This opportunity for deeper knowledge and/or new discoveries is not only related to cleaning, as in the example presented here, but to any studied practice – operational or not.

4 CONCLUDING DISCUSSION

The aim of this paper was to add to the methodological discussions within FM research and to present what shadowing is, how it can be conducted, including the benefits and downsides involved, and to illustrate how the results can be conveyed. The paper show that shadowing is a non-participatory observation method that has certain benefits and downsides. It can record data through several means and convey it through at least three different forms of narratives: text, images, and a combination of the two.

It is a method in which the researcher follows a research subject everywhere (s)he goes over a certain period of time. The observations can be collected in an unstructured or structured manner. Various parameters can be recorded, from the appearance of the physical surroundings to the actions of the shadowed person and the researcher's reflections.

The type and volume of shadowing data will depend on how the shadowing is performed and the chosen data collection method. The data can be recorded through field notes, drawings, photographs, sounds and video. In any case, shadowing provides a rich, dense and comprehensive data set.

The benefits and downsides of shadowing described in the previous section can be seen in both the WN and IN and are summarised as follows.

Benefits of Shadowing:

- Benefit of Vastness - Extensive information
- Benefit of Discoveries - Allows the unexpected to be discovered
- Benefit of Reality - First-hand recording of what actually happens
- Benefit of Access - Observed person does not lose much valuable time

Downsides of Shadowing:

- Downside of Altering - Researcher's presence may influence the results
- Downside of Understanding - Researcher's ability to interpret
- Downside of Weariness - Exhausting process for the researcher
- Downside of Drowning - Immense amount of information

The *Benefit of Vastness* is illustrated in the WN's description of the three different building users the cleaner met on her way to the kitchen and the IN's photograph of the cleaner entering the elevator, which confirms that the cleaner entered in the basement (as can be seen from the light indicator at the side of elevator). In the WN, the *Benefit of Discoveries* is indicated through the description of how the cleaner greets the building users (by their first names). The information regarding the cleaner's interaction with the building users and the cry in the background adds to the understanding of the cleaner's working situation and illustrates the *Benefit of Reality,* as this is information the researcher would not have collected through (for example) an interview unless it was specifically mentioned. The IN photograph of the elderly woman being hugged exemplifies the *Benefit of Vastness* and *Discoveries*, as it shows the cleaner's care for the elderly.

The WN also demonstrates the *Downside of Drowning*. Shadowing allows the recording of "unnecessary information", such as the cry in the background. The images from the elevator illustrate the *Downside of Altering*, as they show the cleaner adjusting her actions to fit the researcher, as she holds the elevator door open (a few seconds longer) to allow the researcher to join her. These images also demonstrate the *Downside of Understanding*, as they correct the researcher's unwritten memories of exactly where the hug took place. The researcher's memory recalls this event as occurring in the middle of the hall with the elderly woman coming towards the cleaner, while the image describes a circumstance in which the elderly woman is about to enter the hall. This image may indicate that the cleaner deliberately walked towards her and hugged her because the researcher was present and that this action was not common. However, from the response from this particular elderly woman, it is hard to believe that this action was a show and not a common action for both the cleaner and the elderly woman. If the action is common, then the image is an illustration on how cleaners can add value.

The *Downside of Altering* was probably present in this research and may be seen in how the cleaner addresses the building users and her thoroughness. However, there are aspects that the

cleaner cannot change, such as the need to bend up to 90 degrees while emptying the washing machine, the need to bend more than once to empty the machine, and the multi-tasking technique of opening the elevator door at the same time as she pulls her trolley out of the elevator. These aspects will not be affected by the *Downside of Altering*, whereas aspects related to the cleaner's interaction with other building users may be very much affected. The *Downside of Altering* could have been the case when the cleaner showed great care for the elderly building users. She took the time to greet them and even hugged one of them. The indications that these caring actions may be normal and not a *Downside of Altering* or *Downside of Understanding* include the following: 1) the cleaner knew the names of each elderly person, 2) the elderly woman responded and hugged the cleaner back; and 3) when the cleaner was asked how she knew all of the names of the residents, she promptly pointed to the nameplate at each room's entrance. Thus, it may be concluded that the cleaner does not just clean; she is also a value-adding asset and appears to act as a sort of "milieu therapist".

4.5 Is shadowing a valuable approach to FM research?

This paper has illustrated what shadowing is, how it can be conducted, its benefits and downsides, what information can be expected to be collected, the possible methods for conveying the collected information and through this, indications on how the information can be analysed. It is evident that shadowing is a method that may be suitable for studying situations in which in-depth knowledge is needed, as it may enable researchers to understand previously un-noticed dimensions. It is a method that assists the prevention of old-fashioned theories and out-dated descriptions of practice. Shadowing corresponds well with "what", "why" and "how" questions and may well be a good supplement to other methods, as it adds information that cannot be collected through interviews and surveys. FM is a field that is still evolving, and shadowing is a method that can add value through providing deeper knowledge of FM as a value-adding practice and the latent potential of the profession.

REFERENCES

Alexander, K. (2010). "Integration of Core Business and Facility Management. Research Perspectives." *Plenary Session for Researchers presentation 1st June 2010. European Facility Management Conference (EFMC)*.

Angrosino, M. (2007). *Doing Ethnographic and Observational Research*. The SAGE Qualitative Research Kit. SAGE Publication Ltd., London UK.

Arman, R., Vie, OE and Åsvoll, H. (2012). "Refining shadowing methods for studying managerial work." Tengeblad, S. (Ed.) (2012). *The Work of Managers: Towards a Practice Theory of Management. Oxford University Press Inc.,USA, 352 pages.*

Barley, S.R. and Kunda, G. (2001). "Bringing work back in". *Organization Science, Vol. 12, No.1, January-February 2001.*

Creswell, JW (2009). *Research design. Qualitative, quantitative, and mixed methods approaches*. Third edition. Sage Publications Inc, California USA.

Corbin, J & Strauss, A (2008). *Basics of qualitative research. Techniques and procedures for developing grounded theory*. Third edition. Sage Publications Inc, California USA.

Czarniawska, B. (2007). *Shadowing and other techniques for doing fieldwork in modern societies*. Liber AB, Copenhagen Business School Press, Universitetsforlaget, Sweeden.

Fruchter, R. (1999). "A/E/C TEAMWORK: A COLLABORATIVE DESIGN AND LEARNING SPACE". *Journal of Computing in Civil Engineering*, Vol. 13, Is. 4, pp. 261-269.

Gillham, B (2008). *Observation Techniques. Structured to Unstructured*. Real World Research. Continuum International Publishing Group, London UK.

Halvorsen, K. (2007). *Å forske på samfunnet. En innføring i samfunsvitenskaplig metode.* Cappelen akademisk forlag, Oslo, Norway.

Jones, SRG (1992). "Was there a Hawthorne Effect?" *American Journal of Sociology*, Vol. 98, No. 3, November 1992, pp. 451-468.

Klungseth, NJ and Olsson, NOE (2011). "Norwegian cleaning research: An overview and categorization". Working paper [Revision 1], NTNU, Trondheim, Norway (13th November 2011)

McDonald, S. (2005). "Studying actions in context: a qualitative shadowing method for organizational research", *Qualitative Research*, 2005, vol. 5 (4) pp. 455-473.

Mintzberg, H. (1973). "*The Nature of Managerial Work*". Harper & Row Publishers Inc, New York, USA.

Vie, OE (2009). *Shadowing managers engaged in care: Discovering the emotional nature of managerial work.* Thesis for the degree of philosophiae doctor. Trondheim, Norway: Norwegian University of Science and Technology.

Patton, MQ. (2002). *Qualitative Research and evaluation methods*. Third edition. SAGE Publications Inc, California.

Silbey, S. (2002). *Designing Qualitative Research Projects*. In: Ragin, Nagel and White (ed.) Workshop on scientific foundation of qualitative research. July 11-12, 2003. National Science Foundation, 2004. USA: Arlington.

Tengblad, S. (ed) (2012). *The Work of Managers: Towards a Practice Theory of Management. Oxford University Press Inc.,USA.*

Yin, R. (2009). *Case study research. Design and methods*. Fourth edition. Applied social research methods series, volume 5. California: SAGE Publications, Inc.