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**Improving site flow through supervisory routines :
Developing process guidelines for supervisors in
surface treatment services**

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ABSTRACT :

The objective of this thesis is to improve supervisory routines of a target company that provides surface treatment services to increase workflow efficiency. The starting point is the observation that work site interruptions increase costs and undermine project profitability. Supervisors play a key role in managing the site flow, but their methods are inconsistent and often based on long-term experience in the field, which makes it difficult to train new supervisors. The central research question is: How can standardized supervision routines improve workflow, productivity, financial results, and customer satisfaction in surface treatment services?

The study was conducted in accordance with the Design Science Research Methodology (DSRM) approach, which aims to solve practical problems through the development of an artifact. The research process progressed from problem definition to solution design and development as well as to the demonstration and evaluation of the developed artifact. The empirical data was collected from the author's own observations and experiences, as well as from employee and customer satisfaction surveys at the case company. Additionally, the artifact was developed in collaboration with other key personnel at the company.

A key outcome of the study is a set of process guidelines for supervisors, in which the supervisor's tasks and routines are divided into different phases based on when they must be performed. The guidelines include defined tasks for pre-execution preparation, planning, work execution control and supervision, completion and post-execution activities, as well as the reporting methods associated with these tasks. In addition, a key component is the foreman's calendar planning part, which supports the practical application of the process chart.

The evaluation of the artefact was conducted as a subjective assessment by the author, in which the developed guidelines were compared to the objectives set at the beginning of the study, and their application was demonstrated in the context of a single project. The output has not yet been applied in a real-world work environment, and its effects have not been empirically validated in practical implementation. Consequently, the presented results are limited to a conceptual examination and a single demonstration.

This study offers a practical contribution by presenting a structured model for developing supervision practices in a service-oriented construction site environment. In the future, it is recommended to test the model in practical projects and systematically collect feedback on its use, for example through interviews, so that the functionality and effectiveness of the guidelines can be assessed more reliably in various operational environments.

Keywords: project management, renovation building, supervision of work, processes, productivity, quality management, customer satisfaction,

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TIIVISTELMÄ :

Tämän opinnäytetyön tavoitteena on parantaa pintakäsittelypalveluja tarjoavan kohdeyrityksen työnohtajarutiineja työnkulun tehostamiseksi. Lähtökohtana on havainto, että työmaan keskeytykset lisäävät kustannuksia ja heikentävät projektien kannattavuutta. Työnohtajilla on keskeinen rooli työmaan virtauksen hallinnassa, mutta heidän toimintatapansa ovat vaihtelevia ja perustuvat usein pitkäaikaiseen kokemukseen alalta, mikä vaikeuttaa uusien työnohtajien kouluttamista. Keskeinen tutkimuskysymys on: Miten standardoidut työnohtorutiinit voivat parantaa työnkulkua, tuottavuutta, kannattavuutta ja asiakastytyväisyyttä pintakäsittelypalveluissa?

Tutkimus toteutettiin Design Science Research Methodology (DSRM) -lähestymistavan mukaisesti, jonka tavoitteena on ratkaista käytännön ongelmia kehittämällä artefakti. Tutkimusprosessi eteni ongelman määrittelystä ratkaisun suunnitteluun ja kehittämiseen sekä kehitettyjen artefaktien esittelyyn ja arviointiin. Empiiriset tiedot kerättiin tekijän omien havaintojen ja kokemusten perusteella sekä kohdeyrityksessä toteutettujen työntekijä- ja asiakastytyväisyyskyselyjen avulla. Lisäksi artefakti kehitettiin yhteistyössä yrityksen muiden avainhenkilöiden kanssa.

Tutkimuksen keskeisenä tuloksena on työnohtajille tarkoitettu prosessiohjeisto, jossa työnohtajan tehtävät ja rutiinit on jaoteltu eri vaiheisiin sen mukaan, milloin ne on suoritettava. Ohjeisiin sisältyy määriteltyjä tehtäviä ennakkovalmisteluun, suunnitteluun, työn aikaiseen ohjaukseen ja valvontaan, valmistumiseen ja jälkitoimiin sekä näihin tehtäviin liittyvät raportointimenetelmät. Lisäksi keskeinen osa on työnohtajan kalenterisuunnitteluosa, joka tukee prosessikaavion käytännön soveltamista.

Artefaktin arviointi toteutettiin kirjoittajan subjektiivisena arviointina, jossa kehitettyjä ohjeita verrattiin tutkimuksen alussa asetettuihin tavoitteisiin ja niiden soveltamista havainnollistettiin yhden projektin yhteydessä. Tulosta ei ole vielä sovellettu todellisessa työympäristössä, eikä sen vaikutuksia ole empiirisesti vahvistettu käytännön toteutuksessa. Näin ollen esitetyt tulokset rajoittuvat käsitteelliseen tarkasteluun ja yhteen esimerkkiin.

Tämä tutkimus tarjoaa käytännönläheisen panoksen esittelemällä jäsennellyn mallin valvontakäytäntöjen kehittämiseksi palvelulähtöisessä rakennustyömaaympäristössä. Tulevaisuudessa on suositeltavaa testata mallia käytännön projekteissa ja kerätä järjestelmällisesti palautetta sen käytöstä, esimerkiksi haastattelujen avulla, jotta ohjeiden toimivuutta ja tehokkuutta voidaan arvioida luotettavammin erilaisissa toimintaympäristöissä.

Avainsanat: project management, renovation building, supervision of work, processes, productivity, quality management, customer satisfaction,

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1 Introduction

Building renovation projects suffer from a high degree of uncertainty and varying working conditions (Kemmer et al., 2013). They are often characterized by site-specific solutions and unlike new construction, renovation projects may involve incomplete initial data, unexpected structural issues and changing site conditions which increases production variability and exposes projects to delays and cost overruns. At the same time, companies specializing in renovation often carry out multiple different projects simultaneously (Machado et al., 2023), which highlights the importance of coordination and systematic work management practices.

The economic environment continues to increase pressure to improve production efficiency. Since the financial crisis of 2008-2009, profitability in the Finnish construction industry has declined, especially in renovation (Rajala et al., 2022). The EBITDA (earnings before interest, taxes, depreciation, and amortization) margins are significantly lower in renovation companies than in new building companies, partly due to the greater complexity, unpredictability, and implementation challenges of renovation projects. In addition, specialized renovation companies have proven to be more sensitive to economic fluctuations than companies with broader operations (Rajala et al., 2023). Under these circumstances, improving operational efficiency is not only a production goal but also a key strategic issue.

Supervisors play a key role in managing the workflow on a construction site. They are responsible for daily coordination, resource management, information flow, and coordination of work phases. Studies show that supervisors act as an important link between plans and practical implementation and that their practices have a direct impact on site performance (Chan et al., 2023; Chen et al., 2019). The ability of supervisors to plan, monitor, and integrate work phases is particularly important in complex and changing project environments.

The above highlights the need for clear, systematic, and standardized operating methods in a supervisor's daily work. If the daily and weekly routines of supervisors are inconsistent or depend on individuals, the site workflow will vary, and the effects of disruptions will be amplified. On the other hand, clearly defined routines and processes can stabilize the workflow, reduce variation, and improve productivity. Process optimization has been found to have a concrete impact on operational metrics such as lead time and error rate, as well as strategic indicators such as profitability and customer retention (Mmedo et al., 2025).

The starting point for this study is therefore the following causal chain shown in figure 1.

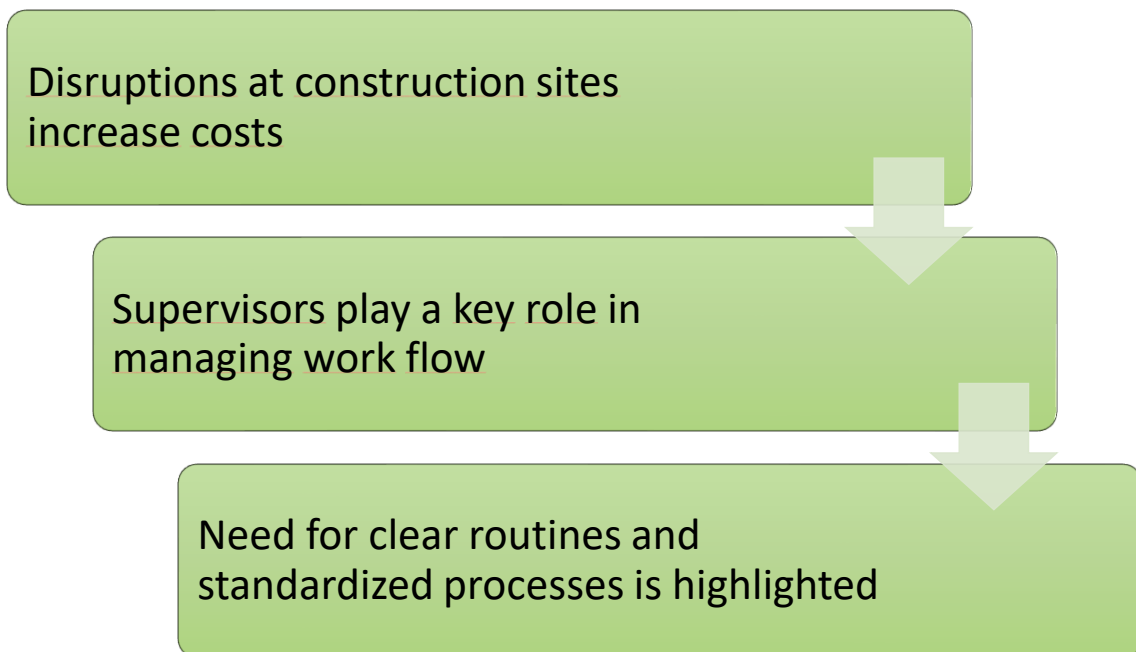


Figure 1. The causal chain underlying the study.

The aim of the study is to respond to this need by developing and evaluating process guidelines that systematize daily and weekly work management routines.

1.1 Company profile

Väriset Oy provides surface treatment services in whole Finland. The main products are painting wooden facades and roof maintenance and coating for both private consumers and housing companies. The company also offers other exterior maintenance services to a certain extent, such as gutter cleaning and carpentry work related to painting contracts, but interior painting services are not included in the company's services. As shown in figure 2, the company is growing and its goal is to be Finland's best-known and most trusted partner in the maintenance of external surfaces.



Figure 2. Väriset Group turnover, M €.

Väriset Oy operates as the parent company for four subsidiaries that are responsible for the actual business operations. Three of these subsidiaries, Väriset Uusimaa Oy, Väriset Pirkanmaa Oy and Väriset Varsinais-Suomi Oy, operate locally in their own areas of responsibility, as indicated by their names, and each of them has a local office from which they operate. Fourth and the newest subsidiary, Väriset Suomi Oy is responsible for the rest of Finland, and they have local painters and sales staff in different parts of Finland. However, they do not have a central office but instead operations are mainly managed remotely from Uusimaa.

Every subsidiary has a regional manager who is responsible for the operations of the regional company. Depending on the size of the subsidiary, the regional manager is assisted by one to six supervisors in managing production during the summer season, and the need for supervisors has grown every summer. For example, in the 2025 season, there were a total of 10 supervisors in addition to the regional managers, six of whom were employed by the Värisset Uusimaa Oy, as they were also responsible for 55% of the group's turnover. In the future, as the group grows, the number of supervisors in each regional company will increase.

Each supervisor is responsible for 15-20 painters and an average of around 100 projects during the summer. A typical project lasts 2-6 days and is carried out by 1-2 painters, which means that a supervisor may have as many as 10-20 projects under their supervision at the same time. If we add to this the projects that are in the pre-execution preparation and planning stages, as well as projects that are otherwise complete but have not yet been invoiced, the number of projects on the table can run into dozens. The ability to work under pressure and effective time management are therefore among the most important requirements for a foreman.

The work of a supervisor is very varied. The supervisor schedules the painters' work sites, orders paints and other necessary materials, and instructs the painters as needed. The supervisor monitors quality and safety, supports painters in problem situations, and handles any complaints. Managing painters may be challenging, as some of them may be painting for the first summer, while others may have over 10 years of experience in the field. Painters who have transferred from competing companies may also be accustomed to different practices and operating methods, in which case the supervisor's task is to train them in the company's operating methods and monitor their compliance. This highlights the importance of the supervisor's personnel management and communication skills, and it is important that supervisors have sufficient time for management tasks.

Figure 3 shows the distribution of the group's monthly turnover for 2025. The figure shows that the painting season lasts from April to October, with the busiest period being from May to August. During the winter months from November to March, there is practically no turnover. This type of seasonal industry is prone to high employee turnover, which means that effective employee training and clear operating procedures are extremely important (Rahimić et al., 2019). These also influence the likelihood that former seasonal workers will return for the next season.



Figure 3. Monthly turnover 2025, M €.

Seasonal outdoor work also poses many challenges in terms of predictability. Weather conditions can change plans overnight or even during the day, and supervisors must be able to react quickly to these changes. Especially towards the end of summer, operations often run with a very small buffer, and the painters' next site is not necessarily known. When a site is known, however, there must be workers available to carry out the job. This further emphasizes the importance of working under pressure and personnel management skills. Summary of the background of the company is shown in figure 4.

Background of the company: Väriset Oy



Figure 4. Background of the company: Väriset Oy.

1.2 Research question and key objectives

The theoretical and industry-specific analysis presented above shows that disruptions at construction sites reduce productivity and profitability and that supervisors play a key role in managing workflows. Renovation construction requires systematic and standardized operating methods that reduce variation and support smooth production and workflow on the construction site. Based on this premise, the main question of the study is formulated as follows:

- (1) How can standardized supervisory routines improve site flow, productivity, financial outcomes and customer satisfaction in surface treatment services?

The objectives of the study are:

- (1) To analyze current disruptions at the construction site and the practices of the work management
 - a. To identify key bottlenecks and sources of variation during the contract implementation phase.
 - b. To assess how current supervisor's routines support or hinder the smooth running of work.
- (2) Define critical daily and weekly tasks for supervisors
 - a. Identify the activities that have the greatest impact on workflow, costs, and customer satisfaction.
 - b. Combine findings with lean thinking, productivity research, and service quality theory.
- (3) Develop standardized process guidelines for supervisors in surface treatment services (artifact). As a result of the study, the following will be designed and documented according to the company's requirements:
 - a. A process chart of the contract implementation from the supervisor's perspective
 - b. A supervisor's checklist for the first phone contact with the customer
 - c. Video instructions for performing key tasks in the ERP environment
- (4) Evaluate the functionality of the developed model
 - a. Examine how the planned routines respond to identified disruptions
 - b. Evaluate the usability, clarity, and impact potential of the model
- (5) Produce a practical and implementable set of instructions for supervisors
 - a. Enable consistent practices within the organization
 - b. Support the development of productivity, profitability, and customer satisfaction

Figure 5 summarizes the main research question and the key objectives set by the company for the research.

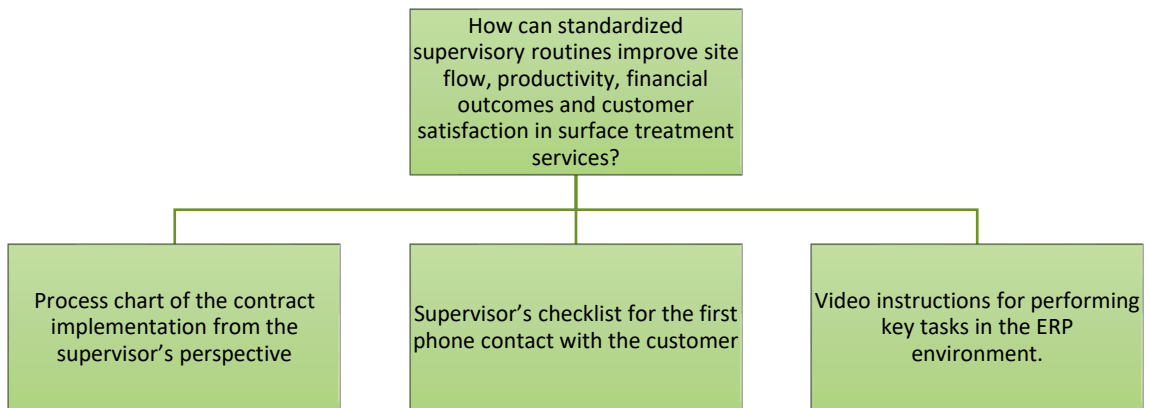


Figure 5. Summary of the main research question and the key objectives.

2 Theoretical framework

The theoretical framework of this study is built around four key themes: risk types, construction quality, best practices and tools and methods. These themes were selected because they play a central role in explaining the performance, efficiency and outcomes of renovation projects.

Renovation projects differ significantly from new construction because they involve greater uncertainty, complexity and interdependencies among stakeholders. As highlighted in previous studies, such projects carry a particularly high risk of cost overruns, delays and quality issues (Masrom et al., 2021). Therefore, understanding risk types is essential for identifying key sources of uncertainty that affect project success.

At the same time, by examining construction quality, we can assess the project performance. Quality is not limited to merely meeting technical requirements; it also encompasses process efficiency, stakeholder satisfaction and long-term functionality (Patel & Pitroda, 2021). Many of the challenges observed in renovation projects, such as rework, delays and waste, are closely related to deficiencies in quality management processes.

To address these challenges, the literature highlights various best practices, such as risk management processes (Masrom et al., 2021; Song et al., 2025), stakeholder engagement (Mo et al., 2023; Song et al., 2025) and lean-based working methods (Bryde & Schulmeister, 2012; Kemmer et al., 2013). These practices represent effective approaches to improving project outcomes and mitigating identified risks.

Finally, we examine the role of tools and methods, such as lean construction techniques, BIM and digital collaboration platforms, as enablers of these best practices. These tools support better coordination, information flow and decision making, which are critical in complex renovation environments. Together, these four themes form an integrated framework for understanding how risks, quality issues, management practices and technological tools interact in renovation projects.

2.1 Risk types

Renovation projects are more complex, uncertain and risky than new construction projects, which often leads to schedule and cost overruns. Despite this, formal risk management techniques are still relatively rarely used in practice (Masrom et al., 2021). Among the various risk categories, cost and financial risks are typically the most significant in renovation projects, followed by schedule, technical, administrative, and legal risks.

Recent study by Macek & Vitásek (2024) has identified 15 key types of risks related to building renovation projects. The study utilized qualitative analysis, expert interviews and quantitative risk assessment. Even though the study focuses on risks from an investor's point of view, it offers a comprehensive overview that can also be applied from a project management perspective. Risk types and their literal descriptions by Macek & Vitásek are presented in table 1.

In the study, a group of experts consisting of seasoned professionals such as architects, engineers, real estate developers, contractors and construction managers assessed the risks in terms of their probability and impact (Macek & Vitásek, 2024). Among all the risk types, financial, legal and economic risks were ranked catastrophic on their impact of the project while their probability occurrence was ranked occasional or frequent. On the other hand, regulatory, market and schedule risks were ranked very likely in terms of their probability while their impact was ranked high or very high. Therefore, based on the risk matrix assessment, these types of risks are the most critical to consider from the investor's point of view.

Table 1. Risk types in building renovation investments (Macek & Vitásek, 2024).

Risk type	Description
Regulatory risks	Changes in building codes, zoning regulations, and environmental standards can significantly impact renovation projects, potentially causing costly delays or fines
Financial risks	Building renovation projects often involve substantial financial investments, with risks of cost overruns, funding constraints, or fluctuations in construction costs.
Technical risks	Renovation projects may encounter technical challenges such as structural deficiencies, unforeseen complications, or issues with outdated building systems.
Market risks	Fluctuations in the real estate market, changes in demand for renovated properties, or shifts in economic conditions can impact the profitability of renovation projects.
Legal risks	Legal issues such as disputes with contractors, violations of building codes, or breaches of contract can arise during renovation projects.
Stakeholder risks	Renovation projects involve multiple stakeholders, including contractors, suppliers, tenants, and local communities, and conflicts among stakeholders can disrupt project timelines and increase costs.
Environmental risks	Renovation projects may have environmental impacts such as pollution, waste generation, or habitat disruption.
Schedule risks	Delays in obtaining permits, unexpected construction challenges, or changes in project scope can lead to schedule delays.
Economic risks	Economic downturns, inflation, or changes in interest rates can affect the financial feasibility of renovation projects.
Supply chain risks	Disruptions in the supply chain, such as material shortages, labor strikes, or transportation delays, can impact project timelines and costs.
Quality risks	Ensuring the quality of renovation work is crucial, as poor workmanship, substandard materials, or inadequate quality control can lead to defects, rework, or safety issues.
Reputation risks	Negative publicity, public backlash, or damage to the investor's reputation can result from renovation projects perceived as harmful to the community or environment.
Insurance risks	Renovation projects may be exposed to various insurance risks, including property damage, liability claims, or construction-related accidents.
Technology risks	Incorporating new technologies or innovative construction methods into renovation projects can introduce risks such as compatibility issues, system failures, or cybersecurity threats.
Operational risks	After completion, renovated buildings may face operational risks such as maintenance challenges, tenant turnover, or changes in market demand.

2.2 Construction quality

Construction quality is a multidimensional concept that encompasses a product or service's performance, fitness for purpose, and durability (Patel & Pitroda, 2021). It is important to note that quality is not entirely objective, but rather a subjective and context-dependent concept, meaning that different stakeholders may view it in different ways. From the producer's perspective, quality can be assessed based on compliance with requirements, whereas from the customer's perspective, it relates to consistency of performance and satisfaction. Other stakeholders may evaluate quality based on efficiency, feasibility, or sustainability.

In construction projects, quality is closely related to process performance. Workflow inefficiencies are often caused by the lack of structures and processes, which undermine both efficiency and adaptability (Mmedo et al., 2025). Common problems include overlapping work, poor communication, fragmented decision-making processes and limited access to information. These problems undermine process reliability and often lead to inconsistent results, delays and increased costs.

In numerous studies, factors related to design and planning have been identified as the primary causes of poor quality and waste. Design changes, design errors and lack of constructability are key causes of waste as early as the design phase (Bajjou & Chafi, 2022). Similarly, poor design and scheduling, weak coordination among stakeholders, inadequate material handling and storage and insufficient worker training all increase the likelihood of rework, material waste and quality deterioration. Communication problems between clients, contractors and subcontractors further increase these issues.

Quality-related deficiencies are also closely linked to schedule overruns and cost overruns. Alajmi's and Ahmed Memon's (2022) literature review identifies inadequate planning and scheduling, administrative and contract management issues, financing difficulties, and payment delays as the main causes of project delays. Furthermore, a lack of experienced personnel, labor shortages, poor supervision, and frequent design changes

significantly extend project durations. These delays can lead to cost overruns, increased overhead costs, damage to reputation, and, in extreme cases, even project termination.

Heravi and Mohammadian (2021) report similar findings and demonstrate that inadequate planning and scheduling, poor cost estimation, and frequent design changes are the primary causes of both schedule and cost overruns. Poor communication and coordination among clients, consultants, and contractors worsen these problems, while external factors, such as regulatory issues and unexpected site conditions, further increase uncertainty.

Generally speaking, the success of projects undertaken by project-based construction firms is typically evaluated based on several criteria, including profit, adherence to schedule, adherence to scope, quality, safety, regulatory compliance, and client satisfaction (Machado et al., 2023). In this sense, quality should not be understood merely as technical compliance, but as a broader project outcome shaped by both production results and stakeholder perceptions.

2.3 Best practices

Due to the complexity of renovation projects, effective project implementation depends not only on identifying problems but also on applying management practices that prevent errors, delays, waste, and conflicts among stakeholders. In the literature, these practices are particularly associated with risk management, stakeholder management, quality management, lean-based process development, and safety culture.

Risk management is one of the key areas of best practices in renovation projects. According to Masrom et al. (2021), key risk management processes include risk identification, analysis, mitigation, and monitoring and control. Effective risk management is also linked to sustainable project performance. Song et al. (2025) demonstrate that risk identification, assessment, and mitigation each have a significant positive impact on project

outcomes related to the environment, economy, and society. Their findings also suggest that stakeholder engagement strengthens the relationship between risk management practices and project performance.

Stakeholder management is another critical component of best practices, particularly in renovation projects, where work is often carried out in occupied buildings and involves users, tenants, contractors, and local communities. Liu et al. (2020) argue in their case study that insufficient stakeholder engagement can lead to conflicts, delays, and legal disputes. The study emphasizes the importance of early stakeholder analysis, proactive communication, and tailored engagement strategies in reducing opposition and improving project outcomes.

A systematic approach to quality management should also be considered as a best practice rather than merely a high-quality end result. Ghafiki et al. (2023) propose an integrated quality management process that combines planning, monitoring, feedback, and continuous improvement. Their findings show that structured quality management reduces errors and rework by clarifying responsibilities and standardizing key processes. Feedback mechanisms, such as deviation reports and lessons learned, further support continuous improvement. However, implementation can be hindered by poor communication, unclear procedures, and insufficient training.

Lean-based management practices are also widely recognized as effective means of improving performance in construction and renovation projects. Bryde and Schulmeister (2012) demonstrate that collaborative planning, visual communication, regular coordination meetings, and a focus on workflow can improve schedule and cost management in renovation projects. Their findings also indicate that the benefits of lean methods depend on the early and continuous involvement of stakeholders.

Waste reduction is another key area of best practices. Ajayi et al. (2017) categorize key site management practices into contract management, waste sorting, material reuse,

and logistics management. Their study emphasizes adherence to project drawings and minimizing design changes as particularly important for reducing waste and rework. Similarly, Meshref et al. (2023) argue that waste management during the design phase can significantly reduce waste generation throughout the project lifecycle.

Finally, people-related practices also influence project performance. Mo et al. (2023) demonstrate that a proactive personality has a significant positive impact on employees' safety behavior. This relationship is reinforced by safety-related self-efficacy, team interaction, and safety-related transformational leadership, suggesting that safety outcomes are shaped not only by formal control measures but also by organizational culture and leadership practices.

2.4 Tools and methods

While best practices describe what should be done, tools and methods provide practical means for implementing these practices. In renovation projects, such tools support coordination, planning, quality assurance, communication, workflow management and information sharing among various stakeholders.

Digital tools can improve renovation processes by enabling standardized data structures and interoperability. Daniotti et al. (2022) emphasize that toolkit-based solutions support efficient information exchange among stakeholders and improve coordination and decision-making by providing integrated and up-to-date project information.

A wide range of literature also highlights lean construction methods as important operational tools. A systematic review by Alnajjar et al. (2025) identifies the Last Planner System (LPS), Just-In-Time (JIT), visual management, takt planning, and methods such as 5S, VSM, Kanban, and Kaizen as the most commonly applied lean techniques in integrated lean-BIM environments. The same review shows that BIM dimensions such as 3D, 4D, and 5D are commonly used for visualization, scheduling, and cost management, while

more advanced technologies such as digital twins, IoT, AR/VR, AI/ML, robotics, and blockchain, are being increasingly explored despite their uneven maturity levels.

The literature on renovation projects also suggests that lean methods can be applied in this specific context, although their implementation is often partial and project specific. Fernando et al. (2024) note that tools such as 5S, JIT deliveries, LPS planning, and visual management improve workflow stability, reduce material waste, and enhance stakeholder coordination in renovation projects. However, they also identify barriers such as lack of lean expertise, a lack of management commitment, and resistance to change.

Among lean methods, the Last Planner System has received particular attention. Lappalainen et al. (2022) report that collaborative planning and reliable commitments can improve schedule adherence and productivity, although the simultaneous use of traditional scheduling tools may reduce the benefits of the LPS. Similarly, Liu et al. (2011) demonstrate that workflow reliability, measured by the Percent Plan Complete metric, positively correlates with labor productivity. Their findings highlight the importance of predictable workflow and the effective removal of constraints.

Quality management systems can also be considered practical management tools. Patel and Pitroda (2021) argue that quality management systems based on the ISO 9001 standard improve documentation, communication, work efficiency, and customer satisfaction in construction companies. However, they also note that implementation is often limited by a lack of information and organizational challenges.

In addition to general management systems, advanced scheduling methods support more detailed workflow management. Bragadin and Kahkonen (2020) propose that schedules should clearly model the movement of work teams between work areas by integrating both resource and space constraints. The approach they propose supports takt time planning, workflow continuity, and improved production quality.

More generally, the effectiveness of these tools depends on the organization's readiness. Moradi and Sormunen (2023) identify a lack of awareness, resistance to change, and insufficient support from top management as the most significant barriers to the adoption of the lean method, while a lean culture, systematic application, and management commitment are identified as key enablers.

2.5 Research gap

Although there is an extensive body of literature on the management of construction projects, there are still several gaps when it comes to renovation projects. First, while previous studies have identified a wide range of risk types and their impacts (e.g., Macek & Vitásek, 2024), the literature generally treats risks as separate categories rather than examining how different risk types actually affect issues related to process inefficiency and quality.

Second, although quality-related challenges, such as poor design, design changes, and communication problems, have been well documented (Alajmi & Ahmed Memon, 2022; Bajjou & Chafi, 2022), the integration between the literature on quality management and risk management is limited. In particular, the dynamic relationship between risk factors, workflow inefficiencies, and quality outcomes in renovation projects has not been sufficiently studied.

Third, although best practices such as lean management, stakeholder engagement, and structured quality management processes have been extensively studied, much of the existing research focuses on individual practices in isolation from one another. There is a lack of empirical understanding of how these practices are implemented and integrated simultaneously in real-world renovation project environments, particularly in complex and constrained settings such as occupied buildings.

Fourth, although various tools and methods, such as BIM, lean construction techniques, and digital platforms, have been developed and studied, their practical implementation remains uneven. Many proposed frameworks remain conceptual, and there is a lack of validated, context-specific approaches tailored to renovation projects (Alnajjar et al., 2025). Furthermore, barriers such as resistance to change, lack of information, and insufficient management support continue to limit effective implementation (Moradi & Sormunen, 2023).

Overall, literature highlights key challenges, practices, and tools, but it lacks a comprehensive understanding of how risk factors, quality issues, management practices, and tools interact in renovation projects. This study fills this gap by examining these elements holistically and focusing on their interdependencies within the context of real-world renovation projects.

3 Research method

This study applies a Design Science Research (DSR) methodology, which aims to develop a solution to a practical problem. The study focuses on the implementation process of renovation projects from the perspective of a supervisor, and its key outcome is a set of process guidelines developed for this purpose. For this reason, DSR is well-suited as a research method, as it focuses on the design and development of artifacts, such as models, methods and processes, to solve practical problems (Peffer et al., 2007).

The methodological framework used in this study is DSRM model proposed by Peffer et al. (2007). The model offers a systematic structure for conducting design research and consists of six phases as illustrated in figure 6. In this study, these phases are applied to the development of process guidelines from the perspective of a supervisor.

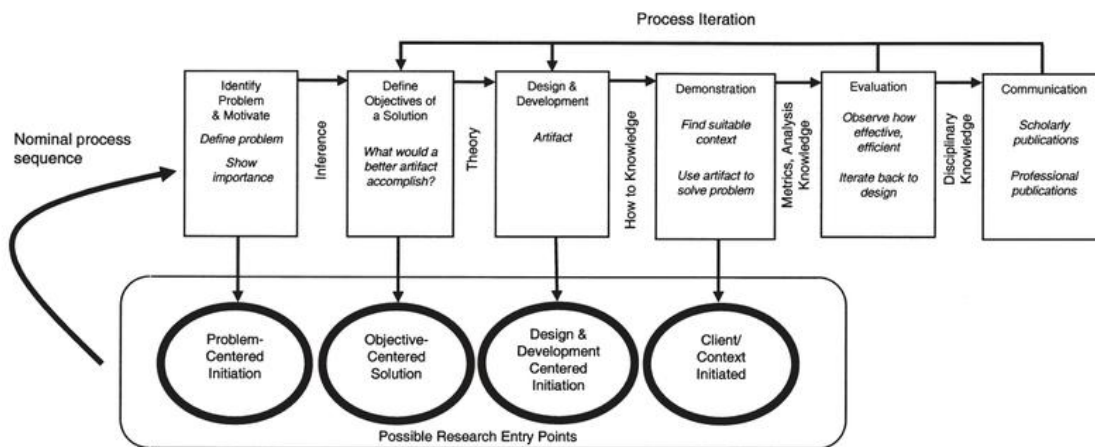


Figure 6. DSRM process model (Peffer et al., 2007).

First step is identifying the problem and justifying it (Peffer et al., 2007). At this stage, a concrete research problem is defined, meaning that the purpose and scope of the artifact to be developed are justified. Since the problem definition is used to develop the artifact, it may be helpful to break the problem down into parts so that the solution can better account for the problem's complexity. It is important to thoroughly justify the value of the solution, as this motivates both the researcher and the readers of the study

to seek a solution and understand the results obtained. Justifying the value of the solution requires providing information about the state of the problem and importance of solving it.

In the second phase, the objectives of the solution are defined based on the problems identified in the first phase (Peffer et al., 2007). Objectives can be quantitative, such as criteria by which the new solution would be better than the current one, or qualitative, such as a description of how the new product is expected to support the resolution of the problems. Since the objectives are generally based on identified problems, this phase should address detailed information about the state of the problem as well as existing solutions and their effectiveness.

The third phase involves the design and development of the solution (Peffer et al., 2007). During this phase, an artefact is created, which is typically a construct, model, method or instantiation. The design and development of the output require the definition of its functions and architecture, resulting in the final output. To carry out this phase and develop the solution, one must be familiar with the theory of the research field on which the artefact is largely based.

In the fourth phase, the demonstration phase, the product is presented as a solution to one or more problems (Peffer et al., 2007). At this stage, the product can be used in an experiment, simulation, case study, demonstration or other similar activity. Implementing this stage requires extensive knowledge of how the product can be used to solve a problem.

In the fifth phase, an evaluation is conducted. The evaluation examines and measures the artifact's validity, usability, quality and effectiveness in relation to the solution objectives defined in the second phase. The evaluation may include any empirical or logical evidence. Depending on the nature of the objectives defined in the second phase, evaluation metrics may include, for example, budgets, satisfaction survey results, customer

feedback or simulations. At the end of the evaluation phase, a decision can be made as to whether to return to the third phase to improve the artifact's effectiveness or to proceed to the next phase.

The sixth and final phase concerns communication (Peppers et al., 2007). In this stage, researchers and readers are informed about the identified problem and its significance, as well as the product developed based on it and its usefulness, accuracy and effectiveness. Other researchers can utilize the content of this stage in their own research to improve the solution or develop a new solution based on it.

3.1 Methodology and research framework

The implementation of renovation projects involves several practical challenges, such as gaps in information flow, unclear areas of responsibility, inconsistent quality control and difficulties related to schedule management. These challenges are particularly evident in the supervisor's work, which involves simultaneously coordinating various project stakeholders, work phases and resources. The aim of this study is not merely to describe these challenges, but also to develop structured and practically applicable process guidelines for resolving them. For this reason, the study is grounded in design science, which focuses on developing a new artifact to solve an identified problem (Peppers et al., 2007).

Using the framework of Gregor and Hevner (2013) shown in figure 7, this study falls into the "improvement" category. The problem addressed in the study is already known, but the proposed solution is based on organizing and improving existing knowledge by utilizing existing research data and the company's current operating practices. The aim of the study is to combine fragmented practices into systematic and practically applicable process guidelines.

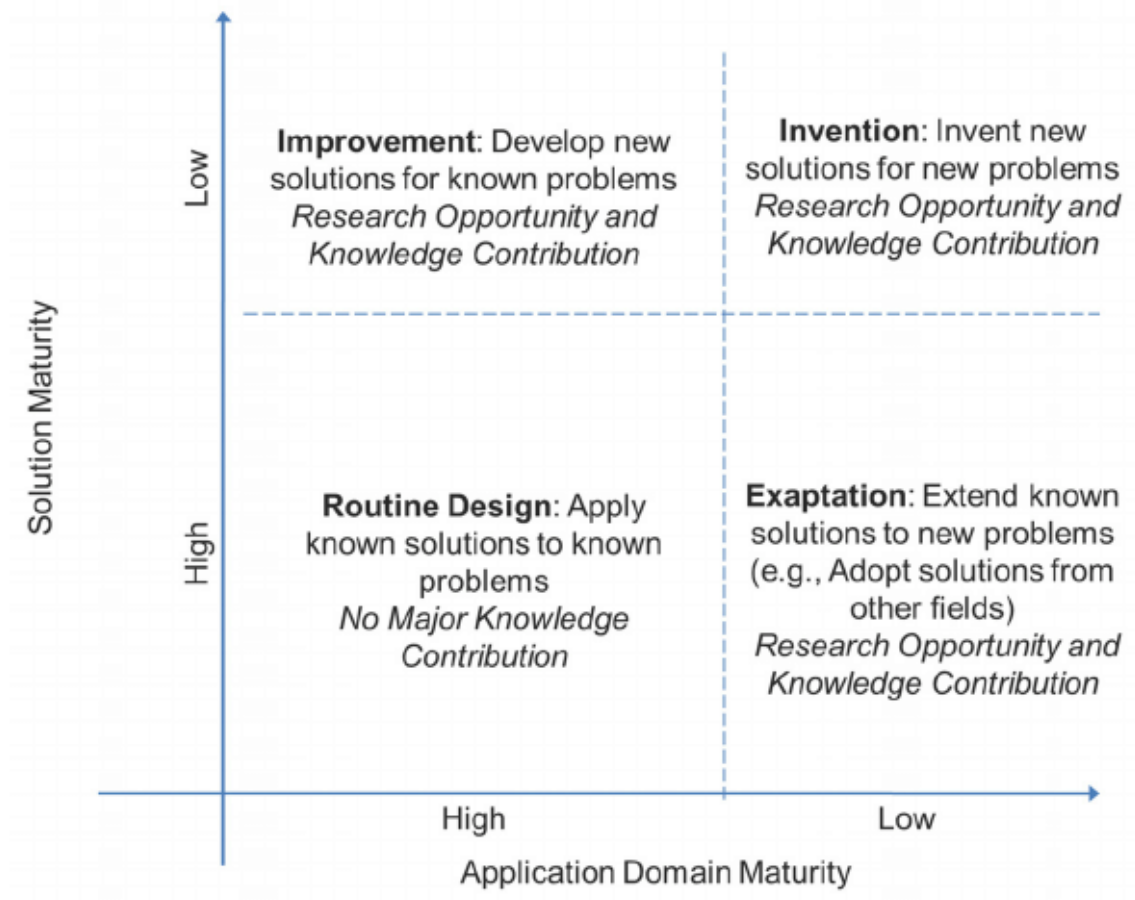


Figure 7. DSR knowledge contribution framework (Gregor & Hevner, 2013).

3.2 Application of the DSRM model in this study

In their article, Peffers et al. (2007) emphasize that the DSRM model can also be applied in other ways and that the model can be developed and adapted. The DSRM model consists of six stages that are generally considered effective, but the article notes that the model should not be used as a rigid research model that must be followed to the letter. In this study, the DSRM model is applied as follows.

The study begins by identifying the problems associated with the implementation of renovation projects from the supervisor's perspective. Key challenges include inconsistent practices, poor communication between different parties, and difficulties in ensuring

work quality and following schedules. This is particularly evident when new and inexperienced supervisors join the case company. The company has identified these problems, but they are also supported by the literature in the field and previous studies on the topic. This phase corresponds to the first phase of the DSRM model, in which the practical problem to be studied is identified and its significance is justified (Peffer et al., 2007).

The objectives of the solution are defined based on the identified problems. The goal is to develop clear and practical process guidelines that support the project manager during the various phases of the project and improve the systematic nature of operations. This corresponds to the second phase of the DSRM model (Peffer et al., 2007).

A key phase of the study is the design and development of process guidelines. At this stage, the research artifact is formed: the implementation process of the renovation project from the foreman's perspective, consisting of phases, tasks, and responsibilities. The process model covers the entire project lifecycle, from preliminary preparations to post-project activities. This corresponds to the design and development phase of the DSRM model (Peffer et al., 2007).

The developed process model is demonstrated by describing its use in the various phases of a renovation project from the perspective of a supervisor. The purpose of the demonstration is to show how the model can be applied in practical situations. This corresponds to the demonstration phase of the DSRM model (Peffer et al., 2007).

The process model is evaluated in relation to the identified problems and the set objectives. The evaluation focuses on the model's clarity, usability, and applicability in a supervisor's daily work, as well as the added value it provides compared to existing practices. The purpose of the evaluation is to demonstrate the usefulness and functionality of the artifact. This corresponds to the evaluation phase of the DSRM model (Peffer et al., 2007).

The results of the study are presented in this master's thesis. The process model, the background to its development, and its evaluation are described systematically, which enables the research results to be applied both in research and in practical settings. This corresponds to the communication phase of the DSRM model (Peffer et al., 2007).

3.3 Collection and use of empirical data

In this study, the development of the artifact is based on empirical data collected from a practical work environment. The author of the study serves as a regional leader at Värisset Varsinais-Suomi Oy and has a total of four years of experience in supervisory roles. In his current role, the researcher has been responsible for the supervisory work of foremen and has participated in their orientation and training, giving him a comprehensive understanding of the key challenges of a foreman's job.

The empirical data was collected from three main sources: (1) the researcher's own observations and experiences, (2) the organization's customer and employee surveys, and (3) collaboration with other regional managers. The observations focused particularly on project communication, schedule management, quality assurance, and differences in working styles among various supervisors. The survey data, in turn, has highlighted recurring areas for improvement that support the practical observations and help identify process-related issues more systematically.

The artifact has been developed iteratively in collaboration with other regional leaders. The process guidelines have been refined based on several rounds of feedback, which has improved their applicability and practical effectiveness. This development approach is consistent with design science research, in which artifacts are developed to solve identified practical problems and are refined during the development process (Peffer et al., 2007).

The study did not involve separate structured interviews; instead, data collection was based on observation, experience, and internal organizational feedback. This approach is justified from the perspective of the study's objectives, as the development of an artifact in a real-world usage environment and its ability to meet practical needs are central to design science research (Peffer et al., 2007).

Empirical data has been utilized particularly during the design and development phase of the DSRM model, where the identified challenges have been translated into concrete process steps, tasks, and operating procedures. This ensures that the developed process model does not remain merely a theoretical description but rather improves current practices and supports supervisors in their daily and weekly work.

It should be noted, however, that the strong connection between the data and the researcher's own role within the organization may influence the analysis of the results. Data based on experience and observation inevitably contain subjective elements that may limit the ability to generalize the results. On the other hand, this close connection to the practical operating environment enables a deep contextual understanding, which is essential for the practical significance of the solutions developed in design science research.

4 Developing process guidelines

This chapter presents the development of the process guidelines from supervisor's perspective in accordance with the Design Science Research Methodology (Peppers et al., 2007). The chapter discusses problem identification, definition of objectives, design and demonstration of the artifact and its evaluation.

4.1 Problem identification

As has already been noted, renovation projects are characterized by a high degree of complexity, uncertainty, and variability compared to new construction projects. These challenges result, for example, from incomplete or inaccurate initial data, unexpected structural conditions, and the need to coordinate work in occupied or confined spaces. As a result, the successful execution of renovation projects places significant demands on site management, particularly on the role of the supervisor, who is responsible for coordinating daily operations, managing stakeholders, and ensuring compliance with quality and schedule requirements.

Despite the supervisor's central role, many companies specializing in renovation lack a clearly defined and standardized process for project implementation from the supervisor's perspective. Current process descriptions are often general in nature, fragmented or otherwise incomplete. This can lead to inconsistencies in implementation practices, reliance on individual experience and difficulties in transferring knowledge between projects. As a result, common problems such as delays, rework, communication breakdowns and quality deviations may arise.

Furthermore, the inherently lower profitability of renovation projects, which is often reflected in lower EBITDA margins compared to new construction, highlights the need for more efficient and predictable implementation processes. Improving the clarity and

structure of the project execution process could help reduce inefficiencies, support better decision making and improve overall project performance.

From a research perspective, there is a lack of practical, supervisor-oriented process models that describe the execution of renovation projects from start to finish in a structured yet practical manner. Although previous studies have addressed individual aspects, such as stakeholder management, quality management, and project management competencies, the integration of these elements into a cohesive process framework tailored to the daily and weekly work of supervisors operating in a renovation context is limited.

Therefore, the problem addressed in this study is the lack of a clearly defined, systematic, and practically applicable project implementation process in renovation projects from the supervisor's perspective. Solving this problem requires both a thorough understanding of current practices and the development of an improved process model that supports effective project implementation in complex renovation environments.

4.2 Objectives of the solution

Based on the identified problem, the primary objective of this study is to develop structured and practical process guidelines for renovation projects from the perspective of a supervisor. The purpose of the solution is to address the lack of standardization and clarity in current practices by providing a coherent framework that supports supervisors' daily and weekly management, coordination, and decision-making tasks throughout the project lifecycle.

More specifically, the process guideline to be developed should meet several key requirements. First, it should provide a clear and comprehensive description of the project implementation process from start to finish, covering all relevant stages from project initiation to completion. Second, the guideline should clearly define the roles, responsibilities and key tasks of the supervisor at each stage, thereby reducing ambiguity and

reliance on individual experience. Third, it should include critical elements identified in previous research, such as stakeholder management, quality assurance, communication practices and feedback mechanisms, in a way that integrates them into the overall process.

Furthermore, the solution should be practical and adaptable to real-world restructuring contexts. This means that the process guideline must be detailed enough to support implementation, yet flexible enough to adapt to project-specific variations and the uncertainties typical of renovation projects. The guideline should also facilitate knowledge transfer within the organization by making tacit knowledge clearer and more standardized.

From a performance perspective, the goal is for the proposed process guideline to promote better project outcomes by streamlining operations, reducing errors and rework, and supporting better coordination among project stakeholders. Ultimately, the solution should help renovation companies improve the predictability and profitability of their projects.

In accordance with the Design Science Research Methodology, the result of this study is an artifact in the form of process guidelines that is both theoretically grounded and empirically supported and can be evaluated in terms of practical usefulness and applicability. The artifact is designed for the operating environment of the case company but is applicable to other companies in the renovation sector where the supervisor's role and tasks are similar to those at the case company.

4.3 Process design and demonstration

This section presents the design of the developed artifact as well as demonstrates its application in the context. The development of process guidelines begins with defining the process flowchart from the supervisor's perspective and grouping the related tasks.

The case company has not previously developed a process flowchart from the supervisor's perspective. Instead, specific deadlines have been set for some of the supervisor's tasks – some more precise, others more flexible – and adherence to them has fallen somewhere in between. For example, the schedule has been intended to be communicated to the customer no later than two weeks before the project's estimated start date, and paints has had to be ordered before the start of the project.

Based on experience, supervisors have often developed their own established practices and routines to meet minimum requirements. However, the problem has been training new and inexperienced supervisors, as taking on a massive workload and responsibility quickly has been challenging without prior experience. Their working hours have often been spent solely on handling their own tasks, rather than having time to help and develop the performance of their subordinates. This struggle to keep up inevitably leads to situations where something critical goes unnoticed: materials are not onsite on time, the client has not been notified early enough, employees do not have enough information to carry out the project, and so on.

The purpose of the process chart is to help both experienced and inexperienced supervisors remember when each task must be completed. Furthermore, when all supervisors follow the same process chart and record tasks in the same format, it is easier for someone else to step in if necessary, ensuring that the painters and customers can still trust that the work will get done. The process chart from the supervisor's perspective is illustrated in figure 8.

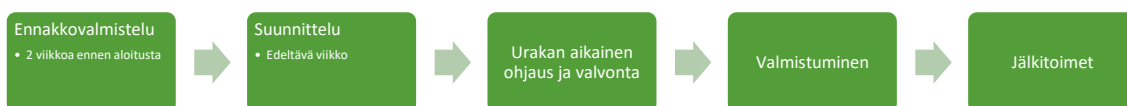


Figure 8. Process chart from the supervisor's perspective.

The process chart is divided into five phases. Pre-execution preparation includes tasks that should be done no longer than two weeks before the project's estimated start date. Planning stage includes tasks that should be done a week before the project starts. Work execution control and supervision is the most critical and important stage of the process, as it has a decisive impact on whether the project succeeds or fails, and it is precisely at this stage that the project's progress can still be most effectively influenced. That is why the supervisor should devote most time to this each week. Completion includes tasks that supervisor must do after the painters have done their job and post-execution activities include tasks that may come after the project is finished and billed.

In addition, at this stage, responsibilities related to project implementation and communication have been divided among supervisors and painters. The company featured in this case study previously described only the communication responsibilities applicable during the project, but the figure 9 now also shows other areas of responsibility related to project implementation. Responsibilities related to communication with the client are highlighted in bold.

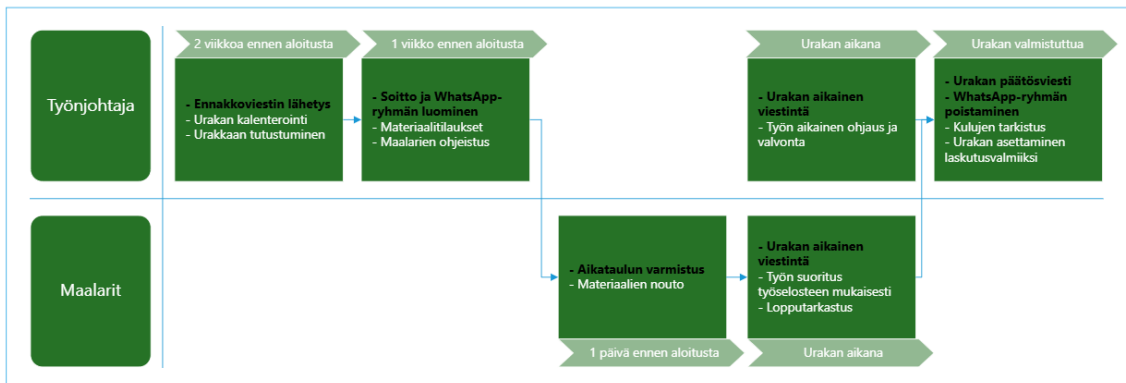


Figure 9. Areas of responsibility related to project implementation.

4.3.1 Pre-execution preparation

The primary goal of pre-execution planning is to inform the client of the project start date well in advance. During the sales phase, projects are scheduled on a monthly basis, and the client is promised a more precise estimate of the start week no later than two weeks before the project begins. It is the supervisor's responsibility to keep this promise, and it is important to do so in order to avoid problems right at the start of the project, before work has even begun.

The supervisor sends a preliminary message regarding the schedule via the ERP system. Example of a preliminary schedule estimate to be sent to a customer is shown in figure 10. At the same time, it is recommended to review the scope of the project and verify at least the things listed in table 2.

Hei! Olemme aloittaneet osoitteessa Esimerkkitie 1, Turku sijaitsevan ulkoverhouksen maalauksen suunnittelun. Arvion mukaan urakka päästään aloittamaan viikolla 20. Tarkennamme alkataulua vielä lähempänä urakan alkamista.

Mikäli maalien sävyjä ei vielä päätetty, ilmoittakaa sävyt mahdollisimman pian työnjohtajalle.

Huomioithan, että tästä numerosta tulevaan viestiin ei voi vastata.

Parhain terveisin,
 Urakan työnjohtaja Perttu Aunio
 +358406404032
 perttu.aunio@variset.fi
 Väriset Oy

Peruuta
✓ Lähetä

Figure 10. Example of a preliminary schedule estimate sent to a customer.

Table 2. Supervisor's checklist for pre-execution tasks.

Tehtävä	Tehty
Katso kuvat	<input type="checkbox"/>
Tarkista kohteen tiedot	<input type="checkbox"/>
Sävykoodit tiedossa	<input type="checkbox"/>
Henkilönostimen tarve	<input type="checkbox"/>
Timpuritarve	<input type="checkbox"/>

Varatiilet (kattotyömaat)	<input type="checkbox"/>
Ennakkoviesti aikataulusta	<input type="checkbox"/>
Alustava maalarivaraus	<input type="checkbox"/>

If everything listed is in order and no lift or carpenter is needed, this step will only take the supervisor a few minutes per job site. Therefore, it is a good routine to set aside 1-2 hours in your calendar and go over all the projects that will start in two weeks. If, on the other hand, color codes are missing, for example, ask the job site sales representative or the customer directly for the missing color codes. Also, if the contractor is responsible for supplying spare tiles to the roofing site, find out where the spare tiles are available. That way, you still have a week to fill in the missing information before the paints or tiles need to be ordered.

If a personnel lift is needed at the site, determine what type of lift is required and where it can be obtained. Similarly, if a carpenter is needed on-site, coordinate schedules with the carpenter. Procedures regarding lifts and carpenters vary by regional company, so check the correct procedures with your regional leader. Remember that in the end, as a supervisor, you are responsible for ensuring that the lift is on site on time and that the carpenter has time to complete the necessary work before the painters arrive.

Be sure to factor in delays caused by weather or illness when scheduling projects. Do not schedule projects too tightly. At this point, it is perfectly acceptable to leave plenty of breathing room between projects, as people generally do not mind if a project starts ahead of schedule. On the other hand, if a project's start is delayed beyond the estimated schedule, painters may find a customer already in a bad mood waiting for them at the job site.

Once you have sent the preliminary schedule estimate to the customer, copy the message or at least the necessary information about the starting week into the comment field of the order in the ERP system. Also include comments on any other relevant details.

For example, if color codes are missing or a carpenter is needed, mention it here; or if a personnel lift is required, specify what type of lift is needed, where it can be obtained, and the timeline for its delivery. An example of the order comment field is shown in figure 11.

Tilauksen kommentit

1.4.2026 11:50 leguan 135, nouto viikon 20 alussa Stark	Perttu Aunio ✕ ✉
1.4.2026 11:49 Timpuri käy vaihtaa otsalaudat ennen urakkaa	Perttu Aunio ✕ ✉
1.4.2026 11:48 av viikko 20	Perttu Aunio ✕ ✉

Uusi kommentti

Figure 11. An example of the order comment field.

Finally, change the order's delivery status to "preliminary reservation," which will turn the order's color in the delivery calendar to light blue, as shown in the figure 12.

Tilauksen toimitustila

- 1. Alustava varaus
- 2. Asennusaika sovittu ja maalit tilattu
- 3. Työt aloitettu
- 4. Pesu/pohjatyöt tehty
- 5. Maalaus aloitettu
- 6. Odottaa loppuraporttia
- 6.5. Lopputarkastus tehty, korjauksia vaille valmis

Figure 12. Order's delivery status.

4.3.2 Planning

Once you have taken care of the pre-execution preparations, the planning phase in the week leading up to the project's start will go more smoothly, and there should not be any more surprises, such as missing color codes. Figure 13 shows the tasks involved in the design phase for a single project.

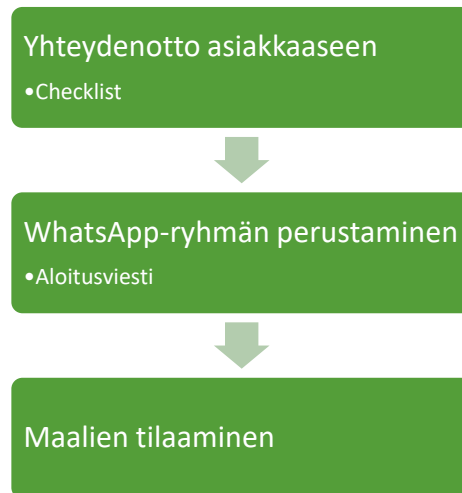


Figure 13. Process flowchart for the design phase.

The planning phase begins with a phone call to the customer. During the call, go through the questions on the form illustrated in table 3 and fill it out before attaching it to the order's comment field. Especially if the customer has specific requests related to the job that the painters should be aware of, this ensures that the message is conveyed to them as well. Don't try to remember all the requests in your head; instead, use the form and the order's comment field. If the customer does not answer the call, send them a message similar to the one shown in figure 14 and try to schedule a new call time.

Table 3. Supervisor's checklist for the first phone contact with the customer.

Muistiinpanot	Esim. vastaukset
Aikataulu:	Vko 20 alku
WhatsApp:n käyttö	Ok
Maali ja sävy:	Ultra F157 ja RR23

Vesi ja sähkö:	Vesiposti autokatoksessa, pistorasiat autokatoksessa ja etukuistilla
(Varatiilet:	Takaterassin alla)
Mahdolliset timpurin työt:	Ehkä etukuistin otsalauta, selviää paikan päällä
Muut huomioon otavat asiat:	Koira välillä pihalla, haastava katolta maalattava paikka etukuistin yläpuolella, valjaat!
Asiakkaan kysymykset/toiveet:	Ei aloitusta ennen klo 8

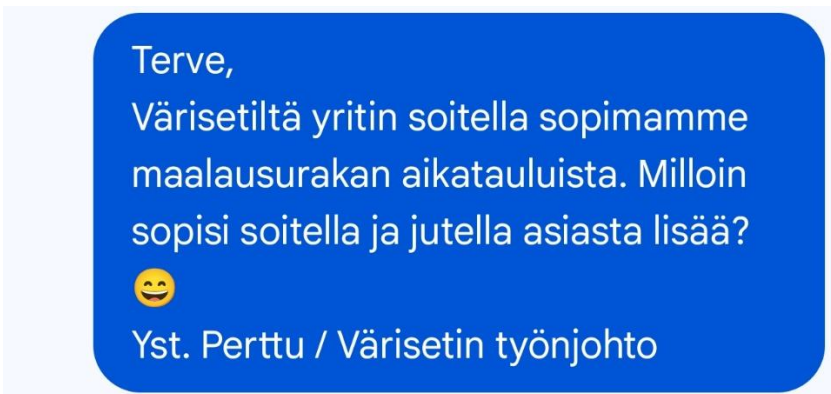


Figure 14. Sample message to a customer if they do not answer the call.

Once you have contacted the customer and confirmed the schedule, create a WhatsApp group and add yourself, the customer and the painters assigned to the job. Send a message similar to the one shown in figure 15 to the group.

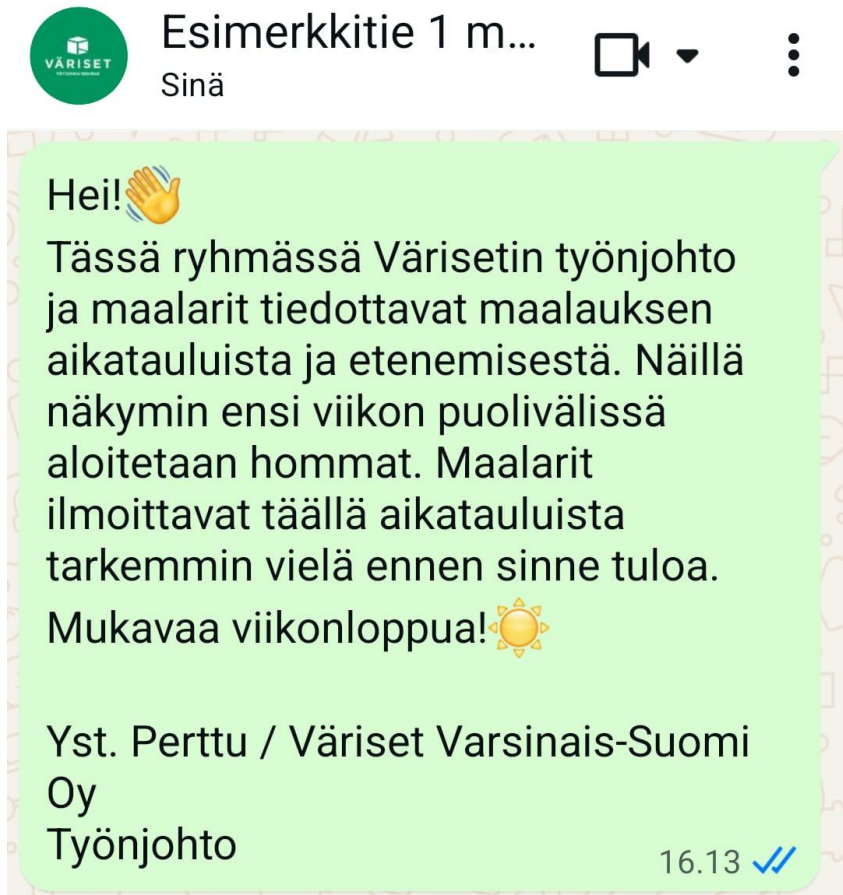


Figure 15. An example of an introductory message for a WhatsApp group.

After creating the WhatsApp group, order the paints and any other necessary supplies if needed. Check with your regional leader to confirm the policy for your regional company, but as a general rule, paint orders are placed through a shared WhatsApp group with the supplier. The paint order must include the following information:

- (1) Reference number: (Customer order number in the ERP system)
- (2) Product to be ordered, quantities and color codes
- (3) Information on when the goods are to be picked up (and where) or, alternatively, the delivery date and address where the goods are to be delivered.

An example of a paint order is shown in figure 15. Be sure to copy the paint order into the order's comment field as well. That way, the painters will know where to pick up the

paints and when, or whether they will be delivered directly to the job site. Financial administration also needs this information so they can verify that the contents of the invoice received match the order.

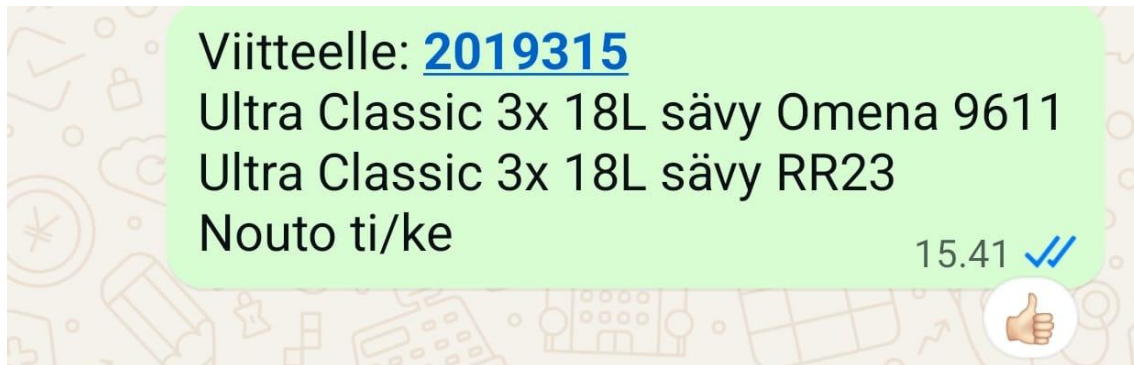


Figure 16. An example of a paint order.

Once the paints have been ordered, change the order status in the ERP system to “Installation time agreed and paints ordered”. At this stage, make sure that any carpenter work has also been scheduled and that a lift has been arranged if necessary.

Although, logically speaking, it might be easiest to handle this stage one project at a time and then repeat the same steps for the next project, from a time management perspective, it is by far the most efficient to handle similar tasks across all projects at once before moving on the next set of tasks. In other words, first call all clients for the coming week and record the content of the conversation in the comment field. After that, create WhatsApp groups for all starting projects, and finally, order the paints and other necessary materials for each project.

4.3.3 Work execution control and supervision

The supervisor should have the most time dedicated to work execution control and supervision. At this stage, once the project is underway, all sorts of unexpected factors arise, such as the impact of weather conditions, sick leave, running out of supplies or

other problems that arise on the job site. That is why it is important for the supervisor to have time to respond to unexpected situations, so that painters or customers are not left to deal with problems on their own. If the supervisor feels that he or she does not have time to visit the site when necessary, work procedures and the use of calendar must be adjusted.

Work execution control and supervision is illustrated in figure 17 as a loop diagram, which depicts the nature of the sub-process. It is continuous, daily and repeats from one project to the next. During this phase, to maintain a sense of control and stay on top of the situation, be sure to check the ERP system's delivery calendar and update the delivery status of orders as needed. Delivery statuses during the project, such as "work started," "cleaning/prep work completed," "painting started," "awaiting final inspection," "final inspection done, ready after minor repairs," and "completed" as shown in figure 12 are designed to assist the supervisor, so be sure to use them.

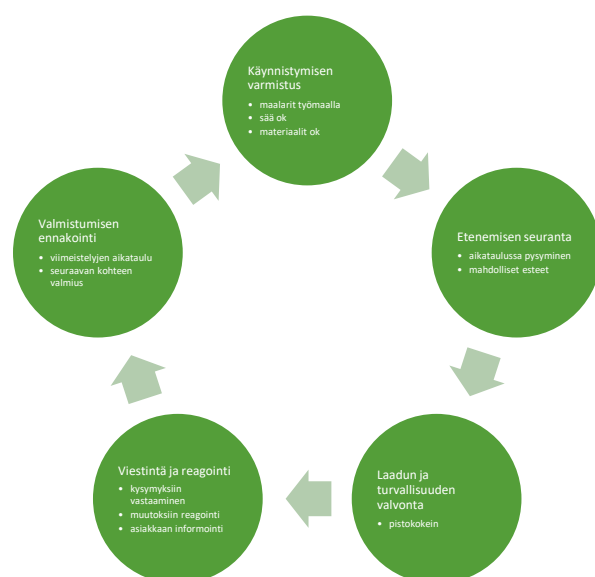


Figure 17. Loop diagram of work execution control and supervision.

First and foremost, the supervisor must ensure that work gets underway every day. This does not mean that the supervisor should call every painter in the morning to make sure they are on site; rather, the supervisor should agree on procedures with his own painters

to ensure that work continues despite any unexpected issues. If a painter is sick, they must notify both the client and the supervisor so that the supervisor can respond as needed. If work cannot be done at a site due to rain, the next site should already be scheduled in the calendar so that the team can go there to begin preparatory work. Painters should anticipate when paints or other supplies will run out so that the supervisor can respond to the situation early enough, etc.

The most important thing is to act proactively by staying in touch with the painters, so the supervisor is aware of the situation at the site, and by monitoring weather forecasts so that even if it rains, the plans for the next day are clear to the painters, the supervisor and the customers alike. Communication and foresight are key in everything.

Second, the supervisor must ensure that the project stays on schedule and react immediately if this is not the case. By maintaining regular contact with the painters, the supervisor can get a sense of the situation on site, and if the situation requires it, the best way to get a clear picture is to visit the site in person. If there are challenges or problems at the site that are slowing down progress, they rarely come to light in the supervisor's office. Problems are usually best resolved together with the painters during site visits.

One of the supervisor's most important duties is to oversee quality and workplace safety. It is understandable that a supervisor cannot personally visit every job site, nor is that practical. For this reason, various procedures have been implemented to assist the supervisor in monitoring quality and workplace safety. For example, checking harness and scaffolding cards from ERP system is the supervisor's responsibility, but an even greater responsibility lies with the supervisor to first train their own painters to fill out these documents regularly and correctly.

Quality control is easy when painters report on the progress of work at the site via project's WhatsApp group. The supervisor's job is to provide guidance and ensure that every painter follows reporting procedures and communication commitments to the client.

However, the best way to assess quality and ensure compliance with safety standards is to visit the job site in person, so regular site inspections must be conducted. In disputes regarding the quality of painting work, the work is inspected in accordance with the MaalausRYL 2012 standard (Rakennustieto, 2011).

As mentioned earlier, the supervisor must have time to respond to unexpected changes. In addition, the supervisor must answer questions from the painters and the client and ensure communication flows in both directions. The easiest way to communicate is through project-specific WhatsApp groups, but information sometimes comes through other channels as well, in which case the supervisor must relay the information to the relevant parties. No one has ever complained that there was too much communication, so in the role of a supervisor, it is generally more acceptable to double-check things and pass the information on than to keep it to yourself.

Finally, the supervisor must keep the situation under control and anticipate when projects will be completed so that the painters know what their next assignment is and can see it on their calendar. Also make sure that completed projects are inspected as soon as possible so that invoices can be sent out quickly once the work is finished. Good practice is to train painters to anticipate when a project is completed, schedule a final inspection with the client for that day and ensure the client is present at that time. Ultimately, however, the supervisor is responsible for the project and for ensuring that the customer has approved the work so that invoices can be sent.

4.3.4 Completion

Once the work at the site has been completed, it is the supervisor's responsibility to ensure that the site is ready for billing. It is important to do this as quickly as possible so that the company can receive payment for the work as soon as possible. From the supervisor's perspective, this step is also very straightforward as long as the process flowchart shown in figure 18 is followed.

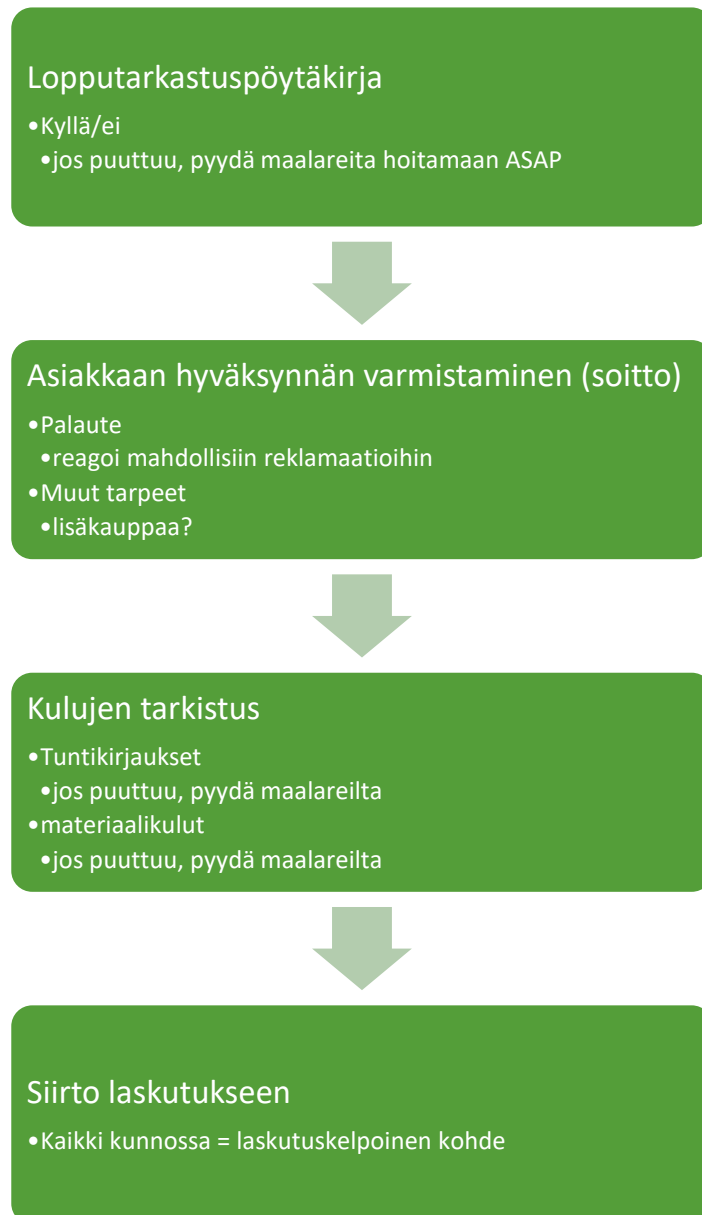


Figure 18. Process flowchart for completion.

The very first step is to confirm with the painters that the final inspection report has been completed and signed and that the work has been approved. If the final inspection report has not yet been completed, instruct the painters to take care of it as soon as possible. A signed final inspection report is required before the invoice can be sent, so it is important to be strict about this.

Once the final inspection report is ready, give the customer a call to make sure everything is in order and that they are satisfied with the service they received. This may seem like unnecessary extra step, but in the end, it does not take much time, and its impact on customer satisfaction can be truly significant. During the call, you will get confirmation that the customer is truly satisfied, or alternatively, if some small issue is still bothering them, you can still address it and make a difference. In this way, nearly all minor complaints can be resolved before they escalate, and passive as well as satisfied customers can be turned into highly satisfied ones.

A follow-up call is also a good opportunity to make additional sales. If the customer's roof has been serviced, it is a good time to ask about the condition of the façade, and vice versa. During the call, it is also worth gauging the need of neighbors or other acquaintances. The saying – a satisfied customer buys again and recommends you to others – is certainly true.

Once customer satisfaction has been confirmed, check the order cost details and employee time records in the ERP system. Time records must be checked carefully, as they form the basis for paying painters' wages and subcontractors' fees. Material costs for exterior cladding orders are automatically recorded based on the invoice reference number, but for roofing work, painters are responsible for recording paint consumption and other material costs. The supervisor is responsible for verifying cost data and adding other necessary expenses, such as lift rental costs. Always remember to use the reference number when ordering materials directly to the site and enter the order details in the comments field for that order.

Once the working hours and expenses have been reviewed, the order is marked as ready for invoicing in the ERP system as follows:

- (1) Select all work hours
- (2) Approve the work hours
- (3) Close all work phases

- (4) Close the contract (or contracts, if the order involves multiple subcontracts)
- (5) Change the order's delivery status to "Ready for invoicing"

Steps 1-4 are shown in figure 19. Changing the order's delivery status is shown in figure 12.

✓ Hyväksy työtunnit + Lisää työvaihe + Luo urakka - ✓ Sulje kaikki työvaiheet Siirrä laskutettavaksi Tuntiyhteenveto Näytä tuntikirjauksen kulut Työtunnit yhteensä 7,50 h

1.

Asennusurakatyö (Urakka : Maalausurakka)		150,00 €	Tunnit	Laskutettavat
Perttu Aunio				
✓	02.04.2026	08:00 - 16:00	7,50 h	7,50 h
	Yhteensä		7,50 h	7,50 h
Työvaihe		Työntekijä	Tunnit	Laskutettavat

- Sulje urakka 4.
- Lisää henkilö
- Muokkaa
- Poista

Figure 19. Marking an order as ready for invoicing.

Finally, close the WhatsApp group by sending a message similar to the one shown in figure 20 and removing all other members from the group. It is important to do this soon after the project is completed so that the project is effectively wrapped up for the painters as well, and they are not left with open WhatsApp groups on their phones for the entire summer. The message should at least thank the customer for their cooperation, provide contact information and instructions on how to proceed if any issues arise, and remind the customer to complete the customer satisfaction survey.

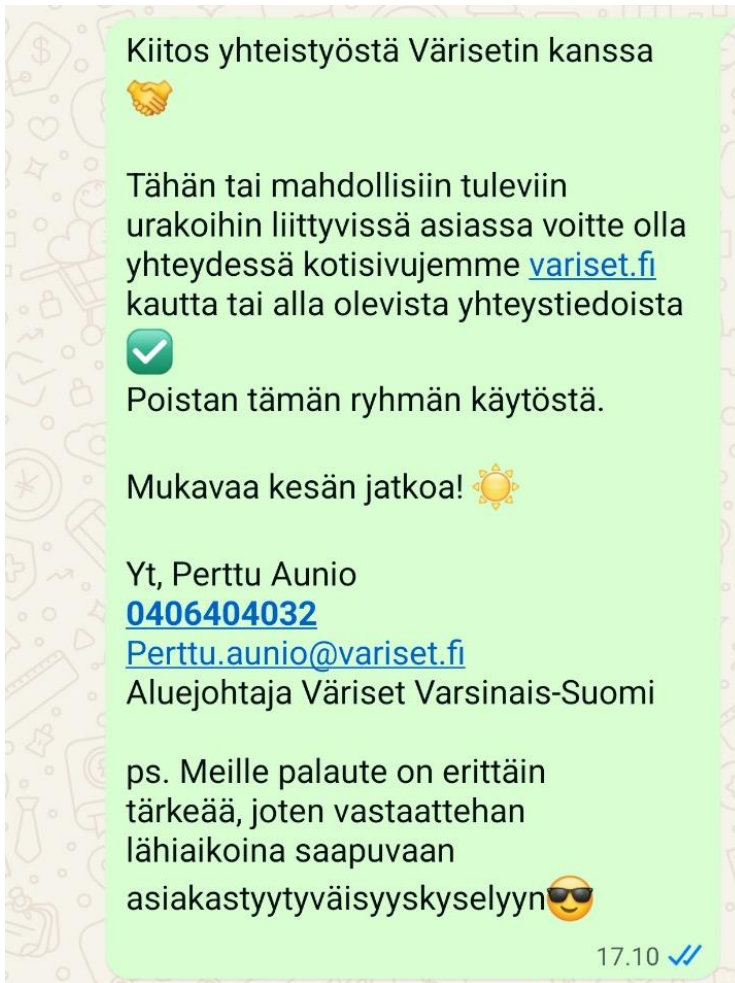


Figure 20. Sample message for closing the WhatsApp group.

Although this stage of the process should be completed as quickly as possible so that invoices can be sent out immediately, it can also be carried out in batches for multiple projects at once, which significantly improves the efficiency of the supervisor's time. It is advisable to call the customer as soon as information about the project's completion has been received and the final inspection report has been completed by the painters. Additionally, sending a completion message and closing the WhatsApp group is advisable to do immediately after the call if the customer was satisfied with the service received. These steps are easy to complete over the phone, even if the supervisor is not at a computer at that exact moment. However, other steps that require a computer can be scheduled in supervisor's calendar as a single task, allowing supervisor to efficiently handle the necessary actions for multiple projects at once.

4.3.5 Post-execution activities

Most important post-execution activity is to pass on customer feedback to the painters. Many customers offer praise and feedback during the phone call after the job is completed, so it is important to share this feedback directly with the employees involved. Additionally, when customers respond to a customer satisfaction survey, it is the supervisor's responsibility to review the responses, identify the feedback regarding their own painters and pass it on to the relevant individuals. Supervisors play a significant role in the well-being and development of painters, and providing feedback is an excellent tool for this. Furthermore, when they can share customer feedback to support their own feedback, the impact of the feedback is significantly greater.

In addition, post-execution activities include, among other things, the handling of complaints. Complaints may come directly from the customer to the supervisor, or they may go through various intermediaries. In any case, the most important thing is to respond to complaints immediately and handle them appropriately until they are fully resolved. Complaints, whether minor or major and whether arising during or after the project, are usually best resolved by arranging a visit to the job site with the client, listening to their concerns and going over the issues face-to-face. There is no need to fear complaints, and it is particularly unwise to delay addressing them. Complaints are always an opportunity to learn and improve the company's operations, and generally, the sooner they are addressed, the easier it is to resolve the situation.

4.4 Process support: Supervisor's calendar planning

Now that we have reviewed the process chart from the supervisor's perspective and familiarized ourselves with the supervisor's tasks and responsibilities in the context of a single project, we can focus on planning the supervisor's time management and considering how best to follow the process chart. It goes without saying that a supervisor can-

not perform all their tasks sequentially in any given project, as the timing of task execution depends on many other factors. Furthermore, at best or worse, a supervisor may have a dozen or more projects underway simultaneously. Therefore, it is extremely important that the supervisor masters the use of their own calendar and knows how to break down the stages of the process chart into to-do lists within their own calendar. Figure 21 illustrates an example of a supervisor's weekly calendar.

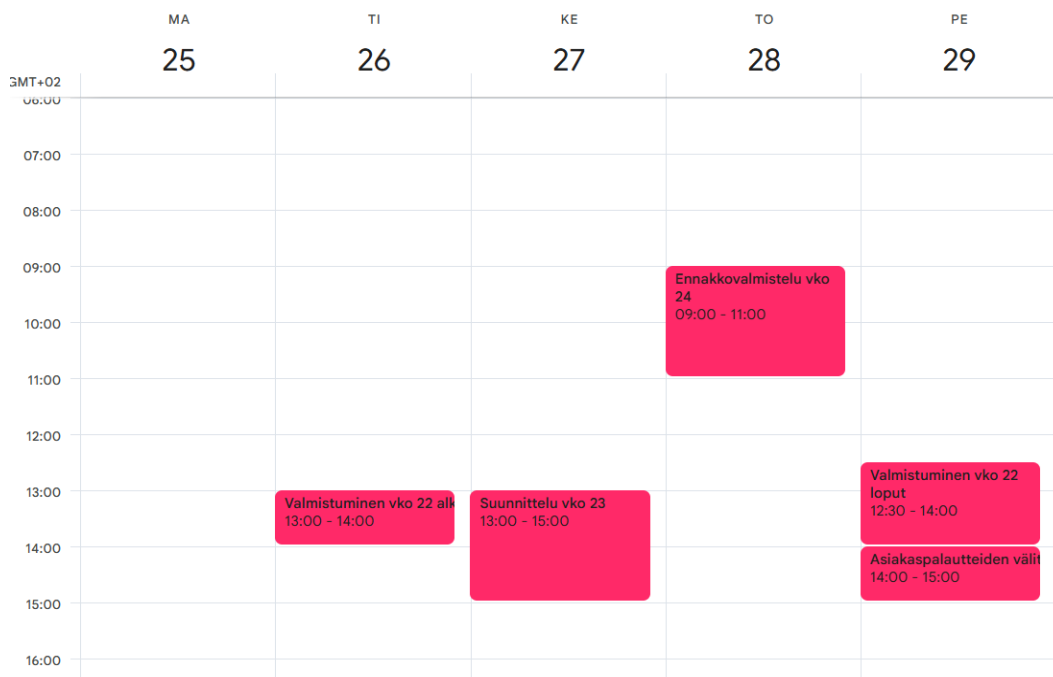


Figure 21. An example of a supervisor's weekly calendar.

As shown in the figure, the calendar includes one slot for planning projects for the following week, one slot for pre-execution preparation for the projects in the week after that, two slots for closing completed projects and one slot for forwarding customer feedbacks to the painters. In total, these slots take up to eight hours of the supervisor's weekly work time, meaning that 32 hours of work time remains for work execution control and supervision, as well as other tasks.

It is important to note that this calendar image is just one example of how a supervisor can manage their schedule. Every week is different, and different job sites require varying amounts of attention from the supervisor. The best time of the day and week to complete the tasks in the different sections of the process chart will certainly vary depending on the supervisor and the week. In some weeks, significantly more job sites may be completed than usual, in which case the supervisor will spend their time managing them. In weeks when the pace of work is a bit slower, it is perfectly acceptable to do pre-execution preparations for the next three or more weeks. The most important thing, however, is to understand that by optimizing their own schedule and working efficiently, the supervisor has time for more than just getting by. Ideally, most of the supervisor's time is freed up for work execution control and supervision, as well as for assisting and developing their own painters.

4.5 Evaluation of the process model

The developed process guidelines will be evaluated in relation to the problems identified in section 4.1 and the objectives defined in section 4.2. The purpose of this evaluation is to determine the extent to which the process model improves the management of renovation projects from the supervisor's perspective and what kind of added value it provides compared to current practices. Such an evaluation of an artifact in relation to set objectives is a central part of design science research (Peffer et al., 2007).

The first evaluation criterion is the clarity of the process. The developed model divides the supervisor's tasks in an individual project into five main phases, which makes it easier to understand the entire process. Compared to previous, somewhat informal and inconsistent practices, the process provides a framework that supports the systematic management of the project. It should be noted, however, that the clarity of the model is largely based on its presentation, and simply describing the process does not guarantee its smooth implementation in practice.

Another evaluation criterion is the model's practical applicability in a supervisor's daily and weekly work. The process model includes specific tasks and areas of responsibility, which makes it directly applicable in practice. This increases the model's practical usefulness compared to general guidelines. On the other hand, the model's usability has not been systematically tested among different users, so its effectiveness may vary depending on the supervisor's experience and working methods.

Third, we will examine improvements in communication and coordination. The process model highlights key communication points, methods, and responsibilities at different stages of the project, which can help reduce problems related to information flow. In particular, activities carried out in the early stages of the project support the development of common communication practices. However, the model's impact on the quality of communication also depends on organizational culture and individual commitment and cannot be fully guaranteed without practical implementation.

The fourth evaluation criterion concerns quality and schedule management. Breaking the process down into phases helps identify critical checkpoints where work progress and quality must be monitored. Furthermore, scheduling process phases so that similar tasks in multiple projects can be carried out simultaneously helps supervisors improve their own time management. This can reduce the risk of errors and delays compared to a situation where operations rely on the experience of individual employees. On the other hand, compliance with the process requires discipline, and its impact will be limited unless it is implemented systematically.

In addition, the process model supports the standardization of operations. A standardized operating model can reduce differences between projects and improve predictability. It can also reduce the number of errors and rework, as noted in the study by Ghafiki et al. (2023). At the same time, however, it should be noted that renovation projects vary in nature, which may limit the extent to which the process can be fully standardized.

In this study, the evaluation is based primarily on an analytical and subjective review, in which the developed process guidelines are compared with identified problems and established objectives. The model has not been extensively tested across multiple projects or with different user groups, which limits the generalizability of the conclusions. In design science research, the central task of evaluation is to demonstrate the product's usefulness and its ability to solve the identified problem, but evaluation methods can range from analytical examination to empirical testing (Peffer et al., 2007).

Overall, the process guidelines developed in this study effectively address the challenges identified in the research and improve operational structures as well as the systematic nature of a supervisor's work. The contribution of the study can thus be viewed as an improvement of existing practices, which is typical of improvement-oriented design research (Gregor & Hevner, 2013). However, the results should be considered preliminary, and the model's actual effectiveness can only be confirmed through practical applications.

5 Discussion

This chapter discusses the study's findings in relation to the research question and objectives. It also assesses the study's significance at both the theoretical and practical levels and examines its limitations.

5.1 Answer to the research question

The research question of this study was:

- (1) How can standardized supervisory routines improve site flow, productivity, financial outcomes and customer satisfaction in surface treatment services?

The results show that established supervision practices improve project performance by breaking down the supervisor's work into clearly defined phases, tasks, and areas of responsibility. The developed process guidelines reduce uncertainties in project implementation and support more consistent and systematic working methods. From a workflow perspective, process guidelines – and particularly the scheduling of process phases – improve the organization and coordination of operations, thereby reducing disruptions caused by unclear responsibilities or missing preparatory steps.

Productivity is improved by identifying, standardizing and scheduling key daily and weekly tasks, allowing supervisors to focus on the activities with the greatest impact. Financial performance is supported by improving planning, monitoring and prioritizing, which reduces inefficiencies such as rework and delays. Customer satisfaction is improved through more consistent communication and clearer expectations throughout the project life cycle. Thus, the results demonstrate that standardized supervisory routines offer a practical way to improve performance in surface treatment services across a wide range of areas.

5.2 Achievement of research objectives

The study set five main objectives, which were largely achieved. The first objective was to analyze current disruptions and supervisory routines. This was achieved by identifying key bottlenecks and sources of variation by identifying key bottlenecks and causes of variation during the implementation phase of the project. These were particularly related to communication, coordination and inconsistent practices. In addition, best practices already in use by various supervisors were identified and utilized in the design of the artifact.

The second objective was to define critical daily and weekly tasks for supervisors. This objective was achieved by identifying key activities that impact workflow, costs and customer satisfaction. These activities were then grouped into different stages of the process and integrated into a structured set of supervisory routines.

The third objective was to develop standardized process guidelines for supervisors in surface treatment services. This was achieved by designing and developing an artifact that includes a process chart for executing a single project and its associated tasks, a structured checklist for the first customer contact and video instructions for performing key tasks in the ERP system. In addition, a sample model was presented for breaking down and scheduling the phases of the process chart in the supervisor's calendar. Together, these components form a consistent and organization-specific set of guidelines for the case company.

The fourth objective was to evaluate the developed artifact in terms of its functionality. This was done through an analytical and subjective evaluation, which showed that the model takes into account the identified problems and is in line with the defined objectives. However, the evaluation is still preliminary, as large-scale empirical validation has not yet been conducted.

The fifth objective was to develop practical and implementable set of instructions for supervisors. This objective has been achieved, as mentioned before, because the developed artefact contains concrete, practical and applicable process guidelines that can be directly implemented within the case company. These guidelines also support productivity and, as a result, profitability and customer satisfaction, as supervisors are able to make more effective use of their time at work.

5.3 Theoretical contributions

From the perspective of design science research, this study represents an improvement-type contribution (Gregor & Hevner, 2013). The study addresses a known problem –inefficiencies and variability in supervisory routines – and proposes a targeted solution by structuring and standardizing existing practices. The significance of the study lies in its transformation of fragmented, experience-based practices into a unified process model that improves usability and practical relevance. In line with design science research, this study demonstrates how an artifact can be developed to solve real-world problems and generate benefits within a specific organizational context (Peppers et al., 2007).

The contribution of this study is closely linked to the research gaps identified in section 2.5. First, although previous research has examined various risks and their effects (e.g., Macek & Vitásek, 2024), they are often treated as separate categories. This study expands on this perspective by examining how different disruptions and sources of variation appear in the daily work of supervisor and how they can be managed through structured routines.

Second, although quality-related challenges, such as communication problems and design errors, have been extensively addressed (e.g., Alajmi & Ahmed Memon, 2022; Bajjou & Chafi, 2022), the integration between risk management and quality manage-

ment has remained limited. This study addresses this gap by combining these perspectives at the operational level and demonstrating how standardized supervisory routines can simultaneously improve both risk management and quality.

Third, although best practices such as lean thinking, stakeholder management, and quality management processes have been extensively studied, they are often examined in isolation from one another. As noted in section 2.5, there is insufficient understanding of how these practices are implemented and integrated simultaneously in real-world renovation projects. This study addresses this issue by combining these perspectives into a single process model and demonstrating how they can be applied in the daily work of a supervisor.

5.4 Practical implications

The developed process model provides a concrete tool for supervisors working in surface treatment services. It supports the standardization of supervisory routines, improves transparency, and ensures that critical tasks are handled systematically. From the perspective of the case company, the model enables more consistent practices across different projects, which reduces variation and improves predictability. This can lead to improvements in productivity, cost control, and customer satisfaction. Additionally, the model can be used as a training and onboarding tool that supports the onboarding and development of new supervisors and standardizes work methods across the entire organization.

5.5 Limitations and future research

This study has several limitations. The development and evaluation of the tool are based primarily on the researcher's own experience, organizational data, and collaboration with a limited group of professionals. While this ensures strong contextual relevance, it

may introduce subjectivity and limit the generalizability of the results. Furthermore, the evaluation is primarily analytical in nature and has not been validated through extensive empirical testing across multiple projects. For this reason, the model's actual impact on performance still needs to be confirmed.

Second, the developed artifact is designed for use by the case company, which limits its generalizability to other companies in the renovation sector. Companies operating in the same industry and a similar business environment can most easily utilize the designed artifact. For other renovation companies, such as those offering bathroom or roof renovations, the tool must be adapted more closely to the operating practices of those companies.

Future research should focus on the empirical validation of the artifact through pilot implementations and systematic data collection. More specifically, a quantitative analysis of performance indicators, such as productivity, cost-effectiveness, and customer satisfaction, would strengthen the evidence regarding the model's effectiveness. The model could also be adapted and tested in various organizational contexts across other industries.

6 Conclusions

The objective of this study was to develop standardized process guidelines for a company providing surface treatment services. The purpose of the guidelines was to improve workflow, productivity, financial performance, and customer satisfaction in renovation projects. By combining an analysis of current practices with the development of a structured process model, the study offers a practical solution to a well-known problem.

The results show that structuring supervision work into clearly defined phases, tasks, and responsibilities can significantly improve the consistency and efficiency of project implementation. The developed artifact provides a concrete and implementable framework that supports supervisors in their daily and weekly work and enables more predictable and controlled project outcomes.

From a theoretical perspective, the study draws on improvement-oriented design science research by refining and integrating existing practices into a consistent and practical model. From a practical perspective, it provides a foundation for standardizing supervision routines and improving organizational performance. Although further research is needed, the results suggest that standardized supervision routines have strong potential to improve site efficiency, productivity, financial performance, and customer satisfaction in surface treatment services.

7 Use of artificial intelligence in this study

The writing and structuring process for this study was supported by artificial intelligence. The AI applications used in this study were ChatGPT, Perplexity AI and DeepL translator. These tools were utilized to develop text structure, clarify the language, improve expression and support translations. In addition, AI was used to support the formulation of various sections of the study, such as research methods, evaluation and discussion, based on information and data provided by the researcher.

The use of AI was limited to supporting tasks and did not replace the researcher's own analysis, interpretation, or decision-making. The researcher carried out all key research steps, such as problem identification, artifact development, and evaluation of results. The content of the research is based on the researcher's own expertise, empirical observations, and analysis. Overall, AI was used to support the writing process, while the scientific content and conclusions of the research are entirely the responsibility of the researcher.

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