Niklas Bergström

Data-Driven Digitalization of Business Processes: Enhancing Efficiency in Project Management Systems

School of Technology and Innovations
Master of Science in Economics and Business Administration
Industrial Management

Vaasa 2026

UNIVERSITY OF VAASA
School of Technology and Innovations
Author: Niklas Bergström
Title of the thesis: Data-Driven Digitalization of Business Processes: Enhancing Efficiency in Project Management Systems
Degree: Master of Science in Economics and Business Administration
Degree Programme: Industrial Management
Supervisor: Khuram Shahzad
Year: 2026 **Pages:** 103

ABSTRACT:

Digital transformation has become a central strategic priority for organisations to remain competitive in an increasingly data-driven business environment. At the same time, research has identified a persistent gap between theoretical frameworks for process digitalization and the practical experiences of organisations implementing them. This thesis addresses that gap by examining how the digitalization of a document-based business process can enhance data utilization and efficiency in project delivery, and how a more data driven process can support an organisation long-term.

The study is conducted as a qualitative embedded case study within a multinational enterprise. The case investigated is the company's Order-to-Deliver process, a gate-and-milestone based project management framework that currently relies on document-based records for information storage. Data has been collected through semi-structured interviews with participants from Project Management unit, Project Management Office unit, Process Development Unit, and Organisational Management unit of the company. Secondary data in form of internal guides, process documentation, and video recording was also collected to supplement the primary data.

The theoretical foundation of the study draws on literature relating to digital transformation, business process management, and project portfolio management. A conceptual framework has been developed that positions BPM maturity and digital maturity as organisational preconditions for successful process digitalization and proposes that the transition from document-based to data-driven processes generates efficiency improvements at the operational level and enhanced effectiveness at the portfolio management level.

Three main themes have been identified through the analysis. The first is about process and data fragmentation, revealing that while responsibilities within the process are formally defined, their practical enactment is inconsistent. The second theme addresses decision-making, showing that data provides an important foundation but that experience and open dialogue between stakeholders remains essential. The third theme captures organisational expectations about digitalization, reflecting growing leadership support and a shift in employee mindset.

The findings suggest that effective digitalization of the process requires attention to socio-organisational factors, such as role clarity, data governance and cross-department collaboration. A data-driven process is anticipated to improve long-term value at project and portfolio level, improving predictability and supporting a more transparent and strategically aligned decisions.

KEYWORDS: Digital transformation, Business process management, Process digitalization, Project portfolio management, Data-driven decision making, BPM maturity, Digital Maturity

UNIVERSITY OF VAASA
School of Technology and Innovations
Author: Niklas Bergström
Title of the thesis: Data-Driven Digitalization of Business Processes: Enhancing Efficiency in Project Management Systems
Degree: Master of Science in Economics and Business Administration
Degree Programme: Industrial Management
Supervisor: Khuram Shahzad
Year: 2026 **Pages:** 103

ABSTRACT:

Digital omvandling har blivit en central strategisk prioritering för organisationer som vill behålla sin konkurrenskraft i en alltmer datadriven affärsmiljö. Samtidigt har forskning visat att det finns en tydlig skillnad mellan de teoretiska ramverken för digitalisering av processer och de praktiska erfarenheterna hos företag som implementerar dem. Denna magister-avhandling adresserar denna skillnad genom att undersöka hur digitaliseringen av en dokumentbaserad affärsprocess kan förbättra dataanvändningen och effektiviteten i projektleverans, samt hur en mer datadriven process kan stödja en organisation på lång sikt.

Studien genomförs som en kvalitativ inbäddad fallstudie inom ett multinationellt företag. Det fall som undersöks är företagets Order-to-Deliver-process, en gate- och milstone baserad projektledningsprocess som i nuläget förlitar sig på dokumentbaserade information. Data har samlats in genom semistrukturerade intervjuer med deltagare från företagets projektledningsenhet, projektledningskontor, processutvecklingsenhet och organisationsledningsenhet. Sekundärdata i form av interna riktlinjer, processdokumentation och videoinspelningar samlades också in för att komplettera primärdata.

Studiens teoretiska grund bygger på litteratur om digital transformation, hantering av affärsprocesser och projektportföljhantering. Ett ramverk har tagits fram som betraktar mognad inom BPM och digital mognad som förutsättningar för en framgångsrik digitalisering av processer, och som visar att övergången från dokumentbaserad till datadrivna processer leder till effektivitetsvinster på operativ nivå och ökad effektivitet på portföljhanteringsnivå.

Tre teman har identifierats genom analysen. Det första handlar om fragmentering av processer och data, vilket visar att även om ansvarsområdena inom processen är formellt definierade, är deras praktiska genomförande inkonsekvent. Det andra temat behandlar beslutsfattande och visar att data utgör en viktig grund, men att erfarenhet och öppen dialog mellan intressenterna fortfarande är avgörande. Det tredje temat fångar upp organisationens förväntningar på digitaliseringen, vilket återspeglar ett växande stöd från ledningen och en förändring i medarbetarnas inställning.

Resultaten tyder på att en effektiv digitalisering av processen kräver uppmärksamhet av socio-organisatoriska faktorer, såsom tydliga roller, datastyrning och samarbete mellan avdelningar. En datadriven process förväntas förbättra det långsiktiga värdet på projekt- och portföljnivå, öka förutsägbarheten och stödja mer transparenta och strategiskt anpassade beslut.

KEYWORDS: Digital transformation, Företagsprocesshantering, Processdigitalisering, Projektportföljshantering, Datadriven beslutsfattning, BPM mognad, Digital mognad

UNIVERSITY OF VAASA
School of Technology and Innovations

Author:	Niklas Bergström
Title of the thesis:	Data-Driven Digitalization of Business Processes: Enhancing Efficiency in Project Management Systems
Degree:	Master of Science in Economics and Business Administration
Degree Programme:	Industrial Management
Supervisor:	Khuram Shahzad
Year:	2026 **Pages:** 103

ABSTRACT:

Digitaalinen muutos on noussut organisaatioiden keskeiseksi strategiseksi painopisteeksi kilpailukyvyn säilyttämiseksi yhä dataan perustuvassa liiketoimintaympäristössä. Samalla tutkimuksissa on havaittu jatkuva kuilu prosessien digitalisoinnin teoreettisten viitekehysten ja organisaatioiden käytännön kokemusten välillä. Tässä opinnäytetyössä tarkastellaan, miten asiakirjapohjaisen liiketoimintaprosessin digitalisointi voi parantaa datan hyödyntämistä ja tehokkuutta projektien toteutuksessa, sekä miten datakeskeisempi prosessi voi tukea organisaatiota pitkällä aikavälillä.

Tutkimus toteutetaan kvalitatiivisena upotettuna tapaustutkimuksena monikansallisessa yrityksessä. Tutkittavana tapauksena on yrityksen Order-to-Delivery-prosessi, portti- ja välitavoitteisiin perustuva projektinhallintakehys, joka nojaa asiakirjapohjaisiin tietueisiin tiedon tallentamisessa. Aineisto on kerätty puolistrukturoiduilla haastatteluilla projektinhallintayksikön, projektinhallintatoimiston, prosessikehitysyksikön ja organisaation hallintayksikön edustajilta, sekä toissijaisena aineistona sisäisistä ohjeista, prosessidokumentaatiosta ja videotallenteista.

Tutkimuksen teoreettinen perusta pohjautuu digitaalista muutosta, liiketoimintaprosessien hallintaa ja projektisalkun hallintaa käsittelevään kirjallisuuteen. Tutkimuksessa on kehitetty käsitteellinen viitekehys, jossa BPM-kypsyys ja digitaalinen kypsyys nähdään onnistuneen prosessien digitalisoinnin organisatorisina ennakkoedellytyksinä. Viitekehyksessä esitetään, että siirtyminen asiakirjapohjaisista datavetoisiin prosesseihin tuottaa tehokkuusparannuksia operatiivisella tasolla sekä vaikuttavuuden kasvua salkunhallinnan tasolla.

Analyysissä tunnistettiin kolme pääteemaa. Ensimmäinen koskee prosessien ja datan pirstoutumista paljastaen, että vaikka vastuut on muodollisesti määritelty, niiden käytännön toteutus on epäjohdonmukaista. Toinen teema käsittelee päätöksentekoa osoittaen, että data tarjoaa tärkeän perustan, mutta kokemus ja avoin vuoropuhelu sidosryhmien välillä ovat edelleen olennaisia. Kolmas teema kuvaa organisaation odotuksia digitalisaatiosta heijastaen johtajien kasvavaa tukea ja muutosta työntekijöiden ajattelutavassa.

Tulokset osoittavat, että prosessin tehokas digitalisointi edellyttää huomiota sosiaalis-organisatorisiin tekijöihin, kuten roolien selkeyteen, tietohallintoon ja osastojen väliseen yhteistyöhön. Tietopohjaisen prosessin odotetaan tuottavan pitkän aikavälin lisäarvoa salkkutasolla parantamalla ennustettavuutta ja tukemalla läpinäkyvämpiä sekä strategisesti yhdenmukaisempia päätöksiä.

KEYWORDS: Digitaalinen muutos, Liiketoimintaprosessien hallinta, Prosessien digitalisointi, Projektisalkun hallinta, Tietopohjainen päätöksenteko, BPM-kypsyys, Digitaalinen kypsyys

Contents

List of Figures

List of Tables

Abbreviations

OtoD: Order-to-Delivery
PPM: Project Portfolio Management
BPM: Business Process Management
PMO: Project Management Office
PM: Portfolio Management
KPI: Key Performance Indicators
DT: Digital Transformation
MNE: Multinational Enterprise

1 Introduction

1.1 Background

The rapid advancement of digital technologies has transformed market dynamics, calling for a growth of innovative products, alternative technologies and new ways of communicating. To stay competitive, organisations are compelled to develop strategies that drive business model innovation and streamline their operation (Broccardo et al., 2024). Peter Trkman (2010), identifies that businesses actively must adapt to change in order to stay competitive yet ensure that these changes are strategically driven and consistent with the business core objective. Organisations are recognising that strategy is implemented through projects and programs, leading to a digital shift in project management. Where technology frees those who manage projects from tedious routines, opportunities to innovate arises (Langley, 2018).

The case company in this study is a Multinational Enterprise (MNE) in the energy sector. In the past few years, the company has noticeably placed more emphasis on driving operational excellence, innovation and continuous improvement. The company has focused on enhancing its efficiency by implementing sustainable and customer-centric solutions to its business processes. By focusing on streamlining business processes, the company has enabled its employees to operate with greater clarity and efficiency. Nevertheless, the implementation of these processes has created new ways of working for the employees, introducing certain elements that may be viewed as redundant or disruptive. The implementation of these processes has overall had a positive impact on the company, improving coordination between departments and enhancing the quality of the work produced. However, there is still room for improvement. Certain aspects of the processes could be further developed through increased digitalization, which would enable more effective data collection and lower the workload of repetitive tasks for employees. By leveraging digital tools and automation, the company would be able to generate deeper insight into its performance. Supported by data, decision-making and

evaluation would be improved. These enhancements would contribute to strengthening the company's long-term operational efficiency.

Research shows that an organisations innovativeness is positively linked to its performance (Calantone et al., 2001).Therefore, organisations should strive to implement digitalization into their business processes to promote innovative activities (Li et al., 2018). In a study conducted by Lin & Yi (2024), it is found that an organisations ability to innovate through digitalization comes from a combination of technological driven innovation, organisational led innovation and comprehensive collaborative innovation between business units. When an organisation can collaborate across these three functions it will directly impact their success in creating an innovative environment. According to research by Liu & Dong (2025), digital process innovations further amplify resource management in organisations, resulting in less wasted time on redundant and disruptive tasks. Digital process innovations also create transparency, giving better insight into an organisation's operations and finances. Enabling top management to gain more accurate information on how the organisation is performing.

To successfully improve business process models, the following six organisational cultural values have been identified; Commitment, Continuous improvement, Cross-functional teamwork, Customer centricity, Innovation and Process ownership. Higher management must be committed to drive the organisation to be process oriented. Cross-functional teamwork between business units to collaborate on process improvements while simultaneously emphasizing continuous improvement through innovation will enhance business processes. It is also crucial to establish process ownership, assigning clear roles and responsibilities to process owners. Ultimately, it is important to recognize how these improvements and changes will impact customer experience (Aljlayel, 2024).

Bharadwaj et al. (2013) noted that portfolio management (PM) is often divided between units and processes, and that organisations must reconceptualize PM with a more holistic approach to digitalize it. Therefore, it is crucial for organisations digitalizing

processes to recognizes how the processes are connected at the portfolio management level. Units working on improving processes must comprehend how that process affects the organisations portfolio management. Furthermore, portfolio management processes that have a defined agenda with clear rules will improve decision-making.

Research about digital transformation and digitalization within organisations is advancing rapidly and has become a highly relevant and widely discussed topic. Research is showing that a holistic approach is needed when digitalizing processes in organisations. Business process management (BPM) plays a pivotal role in digital transformation, enabling organisations to navigate the challenges and opportunities associated with implementing new processes (Gabryelczyk et al., 2024; Putra & Mahendrawathi 2024). The interconnection between digital innovation, digital transformation and BPM has been widely recognized and has led to frameworks being developed to guide organisations in integrating these elements effectively (Moreira & Dallavalle, 2025). Recent studies have also focused on methods and models to support the digitalization of business processes. For instance, Parviainen et al. (2017) emphasizes the need of adopting a holistic approach considering different impacts of the digitalization while Iden et al. (2025) notes how important it is to standardize and model processes to digitalize them.

Researchers are continuously working on methods and frameworks on how to navigate the challenges of digital transformation. A key issue identified in the literature is that there is little research on how the integration of these frameworks and theories can be applied on a practical case to digitalize a document-based process transforming them into data-driven processes. Furthermore, there is a lack of simultaneously evaluating the benefits of such digitalization efforts from a project portfolio management perspective. This study aims to address the identified gaps in the literature by exploring the practical possibilities of integrating theories and framework from existing literature and applying them in the context of transforming a document-based process into a data-driven process. By simultaneously examining the benefits of a more data-based process on a

project portfolio management level. These contributions will enhance the understanding of how theoretical approaches can be applied practically while also offering insights into the strategic advantages of digitalization in an organisation.

This background forms the foundation for this thesis. Which explores how digitalization of business processes can enhance utilization and efficiency in project delivery and assist an organisation long-term.

1.2 Objectives and Scope

The objective of this thesis is to analyse an organisations current document-based business process to identify bottlenecks or inefficiencies and to propose a digitalized process model that will improve information accessibility and project follow-up efficiency. The research aims to evaluate digital tools and technologies that can support the transformation of a document-based system to a data-driven process. Furthermore, this study investigates the potential benefits and challenges of implementing a more digitalized model for the case company.

The current Order-to-Delivery process within the case company has clearly defined gates and milestones for the people involved in the projects. This process has helped the organisation to streamline their work and create more transparency between business units. However, the current process demands a lot of manual labour with repetitive tasks, reducing efficiency for project members. The process currently lacks a way to strategically analyse the data collected at each gate and milestone. The reliance on document-based records creates a risk of crucial information being disregarded and lost. The resulting data deficiency creates inefficiencies in how project progression is monitored and creates difficulties in analysing projects after completion. Higher management would also benefit from a more data-driven process to easier be able to follow up on the progress of projects.

By systematic analysis of the current process this study will identify limitations and inefficiencies. Through analysis of existing documentation and relevant academic literature, this study proposes how the current Order-to-Delivery process framework

could be digitalized to better organize data collection for project follow up and minimize tedious work for project members. The research questions to be answered in the study are the following:

1. How can the digitalization of document-based processes enhance data utilization and efficiency in project delivery?
2. How will a more data-driven process assist the organisation long-term?

The scope of this study is limited to investigating the organisations current Order-to-Delivery (OtoD) process and suggesting solutions to how it could be digitalized. Due to the scope of a master thesis, improving and implementing a renewed process is not possible while simultaneously evaluating the current process. The research involves participants from various business units, including employees from Project management office (PMO), Process Development units, Project Management unit and Organisational management. The study adopts a qualitative approach to gain deeper contextual insight into the current Order-to-Delivery process and existing research on similar topics. Data will be collected through semi-structured interviews with key personnel and by examining existing documentation and literature. The findings for this study aim to provide suggestions on how the case company can implement a more digitalized process to improve data utilization in the Order-to-Delivery business process.

1.3 Research Gap

Digital transformation, business process management and process digitalization have been studied extensively in recent years. With regards to the rapid development in these fields, there is a lack of practical experiences that are not always captured in academic research. As noted by Baier et al. (2022), there is a need to document first-hand experiences about process digitalization. The literature presents the complexity of transitioning from a document-based process to a data-based processes and considers the multiple organisational factors intervened with such implementations (Kulikowska,A, & Wszendybyl-Skulska, 2025; Beerepoot et al., 2023; Denner et al., 2018). Although the

literature recognises these limitations, there is little empirical research on how organisations can redesign document-based processes into structured data-based processes while maintaining control and simultaneously assisting long-term development. In addition to this, the connection between process digitalization and its impacts on project portfolio management remains unexplored at a practical level.

1.4 Limitations

The aim of this study is to analyse the organisations OtoD process and to suggest how it could be digitalized to enhance efficiency and data utilization in project delivery. The study will also investigate how these improvements could assist the organisation long-term. Given the scope of a master thesis, limitations were set to only investigate the current process and suggest improvements rather than developing a new process and implementing it. The research is focusing on one single case company and is limited to one specific process. The study also aims to investigate how process improvements can assist the organisation long-term. Investigating the long-term effects is limited to data utilization within the process and how it can assist project delivery on both a single project level and a project portfolio level. It was deemed unfeasible to investigate all different ways of how digitalization could assist the organisation long-term.

1.5 Contributions

This study contributes to existing literature by providing empirical evidence on how digital transformation and business process management frameworks can assist the transition from a document-based process to data-based process. By conducting a qualitative case study, the organisations readiness for effective process digitalization has been determined. The study also connects process level digitalization and project portfolio management effectiveness. A framework on how a data-driven Order-to-Delivery process can enhance efficiency, transparency and predictable in project delivery is proposed. This study fills a gap in the literature by combining practical process digitalization experiences together with portfolio management. Furthermore, it presents

theoretical contributions and managerial implementations that organisations can use when trying to transform from document-based to data-driven ways of working.

1.6 Structure of Thesis

This thesis is divided into six chapters structured according to the flow of the research process. The first chapters introduce the background of the study and presents the objectives and scope of the research. Research gap and limitations are also presented in chapter one.

Chapter two present the literature review and covers literature related to digital transformation, business process management, digitalization of business processes and project portfolio management. It further explores literature related to these topics to provide a broad context for analysing the research questions.

Chapter three explains the methodological choices implemented in this study and describes how data was collected and analysed. A detailed description of the case is also presented in chapter three to justify the methodological choises.

The fourth chapter presents the empirical findings in this study and provides a detailed explanation of the results found in the research. The key themes created from the data analysis are presented.

The fifth chapter includes discussions and interpretations of the data from chapter four. Insights from both data and literature are integrated to examine how the OtoD process can be digitalized and how it will assist the organisation long-term.

The sixth and last chapter concludes the study and presents theoretical contributions and managerial implications. Suggestions for further research is also presented in this chapter.

2 Literature Review

2.1 Digital Transformation in Organisations

Digital transformation (DT) has become critical strategic priority that nearly all organisations are navigating. Organisations adopting digital technologies has become a key driving force behind economic growth and business improvement. By implementing successful DT an organisation can gain significant advantage over its competitors (Huang & Sun, 2025). According to Ghafoori et al. (2024) organisations must adapt data driven approaches in their operations to further develop business value.

Research has shown that a there is a common misunderstanding in organisations between digitization, digitalization and DT (Legner et al., 2017). While digitization focuses only on the technological perspective of converting analog information to digital data, digitalization focuses on an organisation's current digital development from a technological and sociological perspective. DT as a term describes the process of utilizing new Information and Communication Technology (ICT) innovations while simultaneously considering both technological and sociological structures (Bockshecker et al., 2018). Verhoef et al. (2021) identified these three terms as the phases of digital transformation.

DT is more than just technology implementation; it requires strategic transformation on an organisational level. A holistic approach considering organisational culture, leadership expertise and technological innovation is necessary (Gong & Ribiere, 2021;Ghafoori et al., 2024). The requirement of a holistic approach shows that non-technological factors present a great challenge. According to Suryati, (2025) employees are a key factor in driving successful implementations of new systems and processes. Because of this, organisation must foster a culture of innovation where leadership expertise is needed to execute the necessary implementations across business functions while simultaneously fostering employee engagement. Furthermore, DT demands continuous follow-up including regular evaluation to improve (Chrusciak et al., 2025).

Vial, (2019) presented an inductive framework where he conceptualizes DT as a dynamic and cyclical process were digital technologies cause disruptions, forcing organisation to respond. The organisational response leads to structural changes and new forms of value creation. Organisations capability to sense digital disruptions has an impact on their possibility to seize opportunities and utilize resources accordingly (Verhoef et al., 2021; Warner & Wäger, 2019). To further build on Vials framework, the term Digital Innovation and Transformation Process (DITP) presented by Wiβotzki et al. (2021) has been defined by Xing et al. (2026) as a system-level capability that enables firms to continuously align digital experimentation with strategic transformation. DITP highlights the interconnection between digital innovation and DT. The DITP framework recognizes that innovation alone do not guarantee success, instead organisations must also transform their internal processes, culture and strategy to gain value from innovation. Similarly, transformation without innovation can quickly lose relevance (Xing et al., 2026).

2.1.1 Data as a Driver for Digital Transformation

Zheng et al. (2025) highlights that data is a critical enabler to DT, and that data is necessary to connect technological advancements with organisational improvements. By utilizing data effectively, organisations can ensure that they implement the right technologies that aligns with their strategic goals. Medeiros et al. (2020) noted that organisations who strive to digitally transform and successfully utilized data as an enabler were able to develop competencies for the employees and do better investments in information technologies to drive business growth.

For data to support DT, it must be adequate, accurate and available when needed. (Rodrigues & Moreira, 2025). This requires strong data management practices, including data collection, storage and sharing to ensure that the data is reliable. Significant investments into data management, data strategy and data analytics are required to ensure that the data quality is sufficient (Corban, T. 2021). A framework by Möller et al. (2021) emphasized the importance of integrating data into existing or new processes to enable DT. It is also crucial that employees are aligned with the data driven strategies

and how data is implemented to facilitate DT. By integrating these data-driven approaches, it will assist organisations to optimise processes and create value through data drive decision making.

In large organisations, data is often created by many different employees, and often in unstandardized ways. If there are difficulties with storing the data properly, and low knowledge on how the data will be utilized from a broader perspective it can often lead to employees working in silos. This can then lead to important data being isolated or lost. One suggestion is to continuously hold meetings regarding the data utilization and how it affects different functions within the organisation. This can help employees understand the importance of data and how to handle it correctly. (Merriman et al., 2025).

2.1.2 Document-based and Data-based Information

Wiggins, (2016) describes information that is document-based as unstructured and information that is data-based as structured. Unstructured data do not necessarily follow any defined format, and can be information in the form of documents, emails or videos. It is often a direct product of human communication. Conversely, structured data is information that are collected in a defined and structured format. Usually consisting of numbers or defined constructs of words. Structured data cannot be vague; it either is right or wrong.

Most of the organisational information consists of unstructured data such as text documents, images and videos. The problem with collecting this data is that it demands specific analytic methods such as natural language processing for text documents. The documents might also contain pictures, tables and charts, which demands advanced object recognition methods. Due to the high diversity of different documents and their contents, it is difficult to develop a method that consequently and correctly extracts structured data from documents (M. Hansen et al., 2019).

Recent studies have focused on developing systems that are able to create structured data from unstructured information and collect it in databases. These systems aim to address the challenges with increased volume of unstructured data from different sources. To achieve this, researchers employ mathematical modelling of algorithms, complex software solutions and machine learning techniques to extract meaningful information from unstructured sources (Bouaziz et al., 2019; Peretiatko et al., 2022). However, implementing system like these often demands a complete overhaul of current organisational IT systems and databases, and will be very costly.

Searching and retrieving information from documents require manual work and interpretation is subject to the reader. It requires the user to evaluate, compare and decide what kind of data is useful. Schacht et al. (2015) noted that employees tend to perceive searching for information in databases as a waste of time, and if it is to difficult to find the necessary information, they often dismiss doing the work to find it. Million et al. (2025) propose a more data-centric approach where information should be defined by variables and context. By emphasizing structured data over documentation, their framework suggest that data-based systems provide greater transparency and clearer access to information than a document-based system. By collecting and storing information in the form of data instead of documents, organisations can easier enhance their data utilization without implementing advanced technological solutions.

2.1.3 Digital Innovation

Nambisan et al. (2017) defined digital innovation as the development of and resulting transformation of business process and models driven by the use of digital technologies. Digital innovation involves digital technologies combined with digitalizing processes to create, develop, and adopt new ideas. With the help of digital tools and infrastructure, such as data analytics, artificial intelligence and cloud computing, new innovative outcomes can be made. New innovative products, processes and services are developed through these tools. (Nambisan et al., 2017).

Digital innovation is viewed as a key aspect of continuous improvement and is critical for organisations to stay competitive. To manage digital innovation, there are four interrelated concerns that organisations must account for: Capability, focus, collaboration and governance. Organisations must evaluate their current capabilities and build new ways of working that help them innovate. Organisations should focus more on the process of innovation, rather than only the outcomes the innovation creates. This leads to a culture of innovation in the organisation and a focus on continuously improving processes and system rather than just focusing on the end goal. Organisations should also improve collaboration and reach out to external partners to stimulate the development of new processes. Organisations must also govern digital innovation, to ensure that innovation is controlled but still flexible. Digital innovations are dynamic and continuously evolving, and if there are too many constrains within an organisation it can be difficult to innovate if current processes must strictly be followed. (Svahn et al., 2017).

Digital innovation extends beyond the adaption of new technologies and requires a holistic approach. Digital innovation outcomes depend on how well digital strategy, organisational capabilities and technology deployments are aligned. Organisations must utilize new knowledge together with digital tools to develop existing processes. Furthermore, trying to innovate without a clear strategy can create issues and more complex problems. Organisations must evaluate their capabilities and needs to ensure that their digital initiatives translate into meaningful innovations. (Cao et al., 2025).

2.2 Business Processes Management and Digital Transformation

Business process management (BPM) as a concept consists of identifying, discovering, analysing, designing, implementing and monitoring data and patterns to adjust and improve business processes (Flechsig et al., 2022). As noted by Rosemann and vom Brocke, (2015) BPM is not only about improving business processes but also developing the business process management competence in the organisation. A well implemented business process significantly improves overall efficiency and work quality, which are key

factors for organisational success (Houy et al., 2010). BPM helps organisations to streamline processes, reduce redundancy and ensure better resource allocation.

According to Gabryelczyk et al. (2024) BPM is dynamically evolving and is directly intervened with process innovation and digital transformation. Their study found that one key factor for BPM initiatives is the desire to automate processes with technology to eliminate manual labour. Putra & Mahendrawathi (2024), emphasizes that BPM is a critical enabler for DT and digital innovation, and that business processes should be viewed as a tool to help organisations transform digitally. This is strengthened by Heberle et al. (2017) who identified that for an organisation to successfully transform digitally, new business process models relying on data and automation must be created.

Despite the growing emphasis on DT in BPM, organisations continue to face significant challenges. Beerepoot et al. (2023) identified nine problems in the field of BPM, highlighting issues about creating value from data and unclear definitions in process descriptions. Even though data is available, organisations struggle to extract value from it due to socio-technical barriers. Another issue identified is that process models often lack a clear definition resulting in an ambiguous description. Without a clear definition of what the process starts with, what it ends with and whose viewpoints it reflects, the user insert different information depending on their knowledge of the subject. This results in inconsistent interpretations and can create misunderstandings (figure 1). Furthermore, Beerepoot et al. (2023) identified that business processes often consist of tools that demands the user to fill in data already existing in other documents, resulting in duplicated work. These challenges underline the importance of implementing business processes that are data-driven and adaptive to changes while at the same time minimizes additional work for employees.**Click or tap here to enter text.**

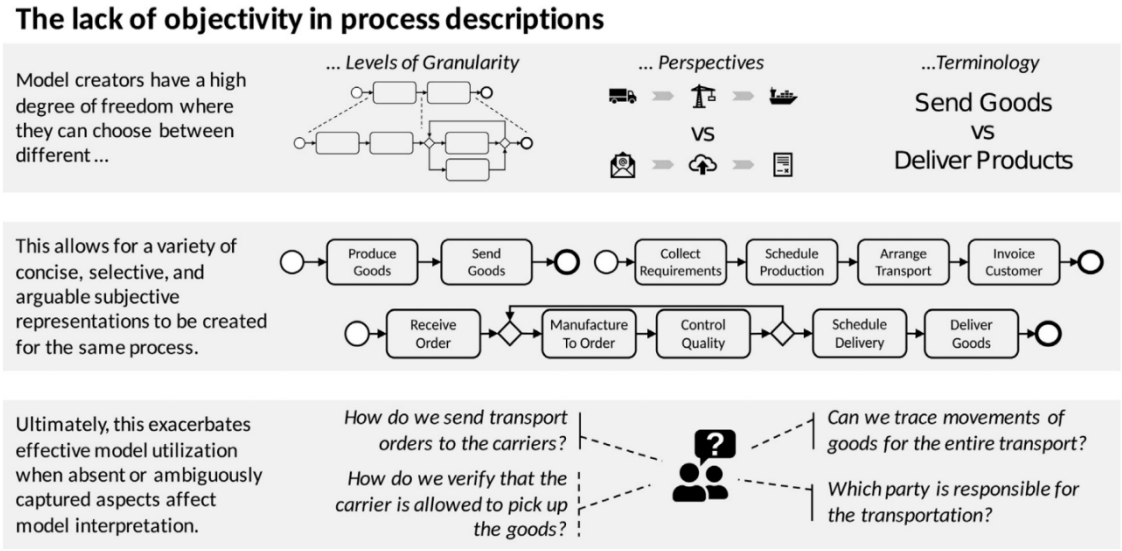

Figure 1. The lack of objectivity in process descriptions (Beerepoot et al., 2023)

Recent research by Moreira & Dallavalle (2025), strengthen this need, showing that BPM and digital innovation together complement each other and are the foundation for successful DT. Their framework for aligning BPM with digital innovation shows that DT is not merely automating existing processes and that organisations must reevaluate their capabilities to create value through technologies such as AI, Internet of Things (IoT) and data analytics.

In a study by Biernikowicz et al. (2025), it is noted that BPM initiatives and data-driven initiatives are often not aligned. BPM not being integrated with data analytics tools is leading to gaps in data flow resulting in a significant lack of business insight. They suggest that organisations must create cross-functional teams that combines BPM and IT knowledge to foster a culture of data driven decision making. As noted by Hannila et al. (2022) organisations often struggle to integrate data and IT tools on a portfolio management level, this further shows the importance of integrating data on BPM level to be able to scale it and utilize it in a broader portfolio perspective within the organisation.

As organisations strive to digitally transform their processes, it is essential for them to assess their current levels of BPM maturity and digital maturity. This must be done to assess where they currently are in their maturity levels and what steps they must take to implement the right strategies for improving their business processes. In a study conducted by Denner et al. (2018) participants also highlighted the importance of assessing the organisations digital maturity to avoid implementing digital processes that are to advance in their current organisational structure.

2.2.1 BPM Maturity

According to Szelągowski & Berniak-Woźny (2022), an organisations BPM maturity can be measured by looking at how an organisation can respond to its environment and act accordingly through management practices. There is a vast amount of different BPM maturity models that organisations can implement (Van Looy et al., 2011). Biernikowicz et al. (2025) noted that the business process maturity model, process and enterprise maturity model and capability maturity model are the most common. These models all identify 5 maturity levels of an organisation, ranging from the lowest stage (initial) to the highest (Innovating/Optimizing) (figure 2). As organisations rise in maturity level, their processes improve and becomes better managed throughout the whole organisation (Biernikowicz et al., 2025;Röglinger et al., 2012).

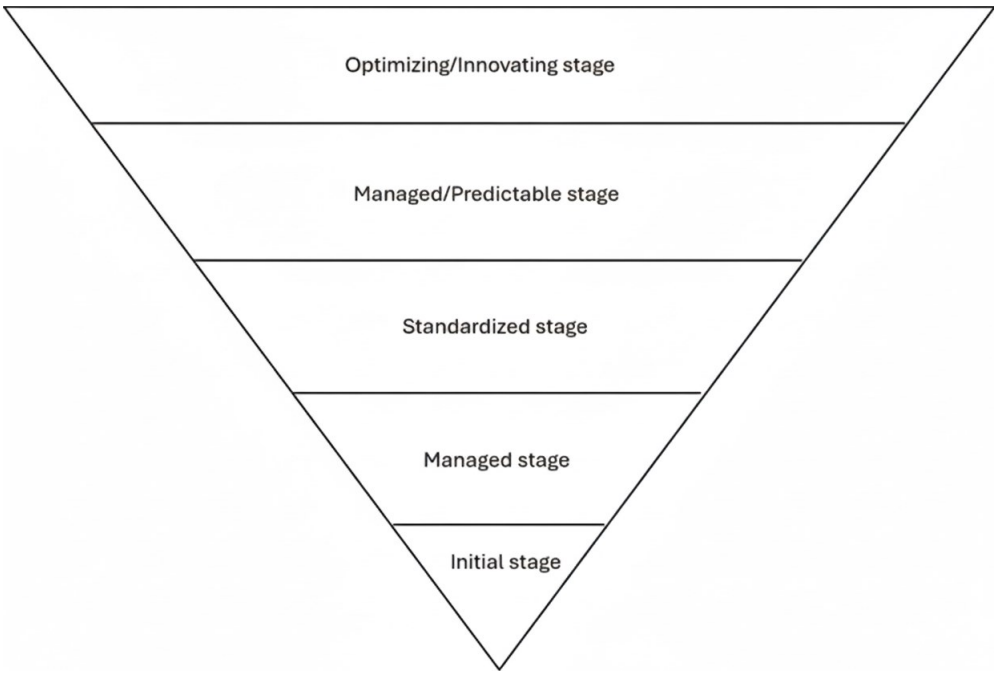

Figure 2. 5 stages of BPM maturity (author)

During the initial stage, the processes are not defined, and task are performed based on the experience of the employee. The managed stage is where processes are repeated based on experiences. During the standardized stage, processes are documented and the persons working with them are educated on how to follow them. The Managed/Predictable stage is when the outcomes and influence of the process outcomes have been measured and defined. In the last stage, processes are optimized and developed according to needs based on the measured data. (Szelągowski & Sliż, 2024).

A systematic literature review conducted by Tarhan et al. (2016) found that there is little evidence that directly links a high level of BPM maturity to improved business performance, and that further research is needed to see how BPM maturity impacts business performance. However, Özkan et al. (2023) noted in their research that organisations that have clear and defined processes often leads to improved BPM capabilities improving process design. This aligns with Biernikowicz et al. (2025) findings that higher BPM maturity correlates with change management capabilities and shows

that organisations with higher BPM maturity level have better possibilities to change and improve their processes.

2.2.2 Digital Maturity

Digital maturity, similar to BPM maturity, is a combination of how an organisation can through its employees, culture and structure effectively utilize technological advancements to seize opportunities (Senna et al., 2023). Organisations with higher digital maturity adapt to new technologies faster, allowing them to transform business and operational processes and gain a competitive advantage (Biernikowicz et al., 2025). Digital maturity is closely linked with digital transformation, and as organisations strive to transform digitally, they often reach a higher level of digital maturity (Chen et al., 2025). Therefore, an understanding of digital maturity is crucial for organisations to digitalize their processes.

Digital maturity models are constantly developed by researchers to further assist organisations in assessing their digital maturity. Berghaus & Back's, (2016) introduced a digital maturity model that offers guidance for organisations on how to adopt and implement DT. Their model identifies key dimensions such as innovation, digitalization of processes and organisational and strategical commitment to digitalization. In addition to this, Aras & Büyüközkan, (2023) argue that previous models are sector oriented and that an organisational-oriented model considering the DT journey from a more holistic perspective is needed. Their model does not only consider dimensions on how to assess an organisations maturity but also introduces sub dimensions that assists organisations to continuously assess their digital maturity in parallel with their stages of DT. However, what these two and other digital maturity models have in common is that they try to translate the idea of DT into measurable and manageable stages so that organisations can assess their digital maturity. Emphasis is placed on development, multidimensional assessment, human and organisational factors and strategic guidance to assess digital maturity.

Despite the many digital maturity models, organisations still encounter challenges with assessing their digital maturity. Organisations often believe they are at a higher level in digital maturity because of the digital tools and system they implement and use. These tools might be used but the skills, governance and readiness to fully utilize the technologies are often missing. Resistance to change and insufficient training of employees often lead to workarounds or other processes being used, preventing organisations to transform digitally. Furthermore, digital initiatives that are not guided by a strategic plan result in inconsistent maturity levels in different departments in the organisation. (Siddiqui et al., 2023). This highlights the importance of viewing digital maturity as a holistic and dynamic process, that requires continuous evaluation.

2.3 Improving Business Processes

Each organisation has its own methods of working and they all follow different processes to accomplish tasks. Dumas et al. (2018, P. 6) identifies a business process as "a collection of inter-related events, activities, and decision points that involve a number of actors and objects, which collectively lead to an outcome that is of value to at least one customer". Zeising et al. (2015) noted that the traditional way of business processes demands that every part of the process is know from the beginning of the project. However, this is not always the case in today's environment. They introduced a rule-based business process model as an alternative. Where organisations are encouraged to consider all alternative paths of the process, and from there add constrains to identify which steps are mandatory, recommended and prohibited.

Organisations looking to improve current or implement new business processes must therefore account for all the different perspectives of the process. It shall not be viewed as a straight process flow, agile alternatives must also be considered when designing new processes (Denner et al., 2018). Existing literature have identified different tools used for improving business processes, such as Business Process Modelling Notation (BPMN) and Case Management Model and Notation (CMMN) (G. Aagesen & J. Krogstie 2015;

Breitenmoser & Thomas Keller, 2015). Depending on the business process, these different tools can be applied to find the best way to redesign the process.

When implementing changes to business processes, a 5-step model can be followed (figure 3). It begins with process modelling, which involves developing a detailed model of the current process to establish a baseline for improvement. Key challenges to be identified are data availability and the dynamic and evolving nature of the process. The second step involves identifying redesign patterns. For this step, a list is developed of what needs to be improve in the process and how it will help the initiatives behind the process improvement. This list can include inefficiencies, bottlenecks and quality issues that hinder the performance. It should also include suggestions on how to address these issues, and how it will support the initiatives behind the process. Reijers & Liman Mansar, (2005) Identifies 29 redesign patters that involves the best practices. When developing the list these practices should be accounted for and evaluated how they will impact the process. The third step involves selecting change options. During this phase, the identified patterns in step two are evaluated and selected based their feasibility and the impact they will have on the new process. The fourth step entails creating and evaluating alternatives. The selected options are applied to the process and evaluated their effectiveness in achieving the desired performance. Usually this is done through simulation studies. The fifth step is about finalizing and validating the design. At this stake the best alternative is chosen and implemented in the process (Fehrer et al., 2022).

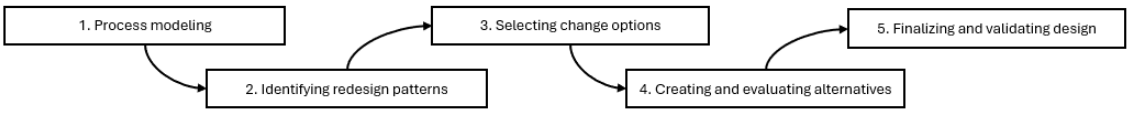

Figure 3. Five-step method for business process improvement (adopted from Fehrer et al., 2022)

2.4 Digitalization of Business Processes

Digitalization has been and is continuing to drive organisations to transform their business operations, leading to development of new business processes models (Matt et al., 2015). Research by Obikhod et al. (2023), highlights that the digitalization of business processes is most evident through the adoption of tools and systems that enables communication, data sharing and connectivity within organisations. Additionally, they identified big data analysis, advanced processing techniques and specialized software products designed to meet specific business needs as key driven initiatives when digitalizing business processes.

Iden et al. (2025) emphasized the importance of standardizing processes to digitalize them. They also highlighted that how the process is modelled plays a crucial role in the success of digitalization. A standardized, well-structured and accurate process model ensures that digitalization is implemented correctly and efficiently. Parviainen et al. (2017) noted that digitalizing business processes is not only about adjusting the existing process to their digital equivalent. It requires a fundamental transformation, accounting for different perspectives of the digital opportunities available. This highlights the need for taking an holistic and agile approach from the beginning when digitalizing a process and later narrowing it down to a structured and standardized model on how to approach the digitalization of the process. It is crucial to consider a wide range of perspectives and correctly mapping out what is important for the specific process being digitalized.

In a case study conducted by Kulikowska,A, & Wszendybyl-Skulska (2025) ten factors impeding the digitalization of business processes where identified (table 1). The four main categories affecting change are organisational, human, financial and technological. A comprehensive understanding of these factors and the reason behind them is important when digitalizing business processes. With knowledge of what is hindering digitalization it is easier to navigate the challenges of digitalization.

Table 1. Main factors impeding digitalization of business processes (Kulikowska,A, & Wszendybyl-Skulska, 2025)

1.	Human resistance to change
2.	Lack of budget
3.	Time and human resoruce constraints
4.	Lack of digital leadership
5.	Data-related barriers
6.	Excessive bureaucracy and control mechanisms
7.	Lack of digital compentencies
8.	No clear vision for digitalisation
9.	Limited understanding of the purchasing process by decision-makers
10.	Technical and cybersecurity barriers specific to the sector

However, Kulikowska,A, & Wszendybyl-Skulska (2025) also suggested five mechanisms that will help with overcoming the challenges with digitalizing a business process (table 2). These mechanisms emphasis focus on leadership, culture, skills, data maturity and security and not just technology alone. Organisations must focus on educating managers in leading digitalization by setting clear priorities and translating digital opportunities into business values. The managers must also strive to fostering a digital culture in the organisation and invest in educating the employees with digital competencies. Furthermore, organisations must focus on improving data quality, integration and accessibility when digitalizing processes.

Table 2. Mechanisms for overcoming challenges with digitalization of business processes. (Kulikowska,A, & Wszendybyl-Skulska, 2025)

1.	Building strong digital leadership
2.	Developing a digital organisational culture
3.	Investing in employee education and digital competencies
4.	Data-driven decision making and data management
5.	Ensuring appropiate technological and cybersecurity solutions

Building on the literature review of digital transformation and business process management, which emphasizes how digitalized and well-governed processes generate structural and qualitative data which improves operational efficiency, the next chapter will investigate the strategic layers of project portfolio management (PPM). The choices made on a portfolio level are based on the information retrieved from the processes beneath them. The process level and data-driven capabilities form the foundation for a more transparent selection, prioritization and resource allocation on a portfolio level. The next section therefore outlines PPM as a dynamic decision process and examines how utilizing reliable process data can enhance portfolio effectiveness and long-term outcomes.

2.5 Project Portfolio Management

Project portfolio management (PPM) is a dynamic decision process where organisations analyse projects to understand and evaluate them to decide which projects are to be selected and prioritized (Cooper et al., 1997). By evaluating past and current projects, organisations can decide on which projects are more important and what kind of project are worth working on in the future in accordance with their strategical goals. Portfolio management practices have been standardized by PMI (2017) to offer organisations frameworks and best practices for project portfolio management.

Cooper et al. (1997) noted that top management can through PPM select the right project for the future that aligns with the firm's strategic business goals. Furthermore, they can allocate the right resources to the necessary projects. If organisations are unsuccessful in PPM, it can have negative impacts on its business (Cooper et al., 2001).
A well-developed PPM system combines structured selection methods with a broader organisational perspective. It consists of using decision making tools based on data to define which projects align with their prioritization. However, it extends beyond the tools

and techniques used and includes accountability for processes, governance mechanisms and a supportive culture. Effective PPM aligns projects with strategic goals and evaluates value holistically, considering economic, social, environmental, and learning benefits. Stakeholder engagement on all levels is needed to clarify roles and responsibilities. At last, PPM is a continuously evolving system that has an impact on long-term organisational change, and therefore it must be ready to adapt to uncertainty and support innovation beyond individual projects (L. K. Hansen & Svejvig, 2023).

2.5.1 Effectiveness in PPM

According to Patanakul (2011), Effectiveness in PPM is defined as “the degree to which an organisation can form and manage a portfolio of projects that provides short- and long-term value or benefits to the organisation and the satisfaction to its project management constituencies”. However, Patanakul (2015) also noted that organisations often lack knowledge of on how PPM effectiveness should be measured, resulting in loss of productivity and monetary value.

To address this gap, Patanakul defined six attributes that correlate with the effectiveness of PPM and categorized them into strategic and operational attributes (table 3).
Strategic attributes focus on aligning the portfolio with the organisation’s strategy goal (L. K. Hansen & Svejvig, 2023; Patanakul, 2015). On the other hand, operational attributes emphasized project visibility, transparency and predictability. By identifying and addressing these attributes, organisations can adopt a more structured approach for managing project portfolios. This enables them to achieve a balance between strategic objectives and operational efficiency, enhancing to overall effectiveness of their PPM processes.

Table 3. Attributes of PPM Effectiveness (adopted from Patanakul, 2015)

Strategic attributes
Strategic Alignment: The degree to which the portfolio aligns with the organisation's strategic direction
Adaptability: The ability of the portfolio to adapt to change
Expected Value: The consideration of the expected value of projects to form a portfolio of high value

Operational attributes
Project Visibility: The degree of a projects to its stakeholder
Transparency in Decision-Making: Stakeholder's clear understanding and reasoning behind portfolio decisions
Predictability of Project Delivery: The ability to predict project performance and delivery outcomes

2.5.2 Data-driven Decision-making Improving Efficiency in PPM

When there is a lack of data, decision making in PPM is often based on emotions rather than informed, data-based conclusions (Maitlis & Ozcelik, 2004). Therefore, accurate and up-to-date data is essential for making well-informed decisions. According to Tolonen et al. (2015), poorly structured and inadequately defined PPM processes hinder higher management ability to make informed and effective decisions. Business users typically possess a strong understanding of the business process and key performance indicators (KPI). However, they often lack sufficient knowledge of the underlying data that supports these processes and metrics. They rely on tools and dashboards such as Excel and PowerBI to visualize the data. Conversely, there are IT personnel responsible for collecting and analysing the raw data and ensuring its integration into the visualisation tools (Thusoo & Sarma, 2017). Employees with data analytical knowledge and IT skills are therefore crucial to digitalize PPM. By utilizing employees with knowledge in data and combining their competencies to integrate the data into visualization tools to assist higher management with decision making organisations will improve their ability to make informed strategic based decisions based on actual data. This reduces the risk of making emotional based decisions that could have a negative impact on the organisation.

Decisions in PPM shall be based on data, but the data must also be correct and structured. In a study conducted by Hannila et al., (2022) they found that organisations

often lack clear focus on PPM and its strategic importance. Even when organisations have clear PPM processes, there are often challenges with integrating data and IT tools into PPM. Organisations must therefore strive to establish better processes that are integrated with data and IT systems to enable strategic, data-driven decision making.

2.6 Conceptual Framework

Based on the reviewed literature, a conceptual framework is developed to illustrate how the digitalization of a document-based process to a data-based process can enable business operations and contribute positively to an organisation long term. This framework integrates insight from digital transformation, business process management, process digitalization and project portfolio management. It serves as a guide for the empirical case study and directly addresses the research questions of this thesis.

Prior literature emphasized that DT is a socio-technical process that extends beyond the implementation of new technologies and that changes in organisational structure, leadership and processes are necessary (Vial, 2019; Gong & Ribiere, 2021; Verhoef et al., 2021). Consequently, this framework adopts a holistic perspective combining technological and organisational perspectives.

2.6.1 From Document-based to Data-driven Processes

The base on this framework is built on the transformation of a document-based process to a data-driven process. Document-based process often demands manual work and can create difficulties in storing and summarizing data. There is also risk of duplicating the work and limited transparency. (Beerepoot et al. 2023). Even if the data is stored in these documents, it is often unstructured and difficult to utilize. It is also difficult to visualize information based on the data in the documents. This limitation has been identified as a major issue to the efficiency of the process and creating value (Biernikowicz et al., 2025).

The literature shows that BPM is a key enabler for addressing these challenges. BPM serves as the foundation when identifying, modelling and analysing business processes. This results in the foundation of transforming processes digitally (Rosemann & vom Brocke, 2015; Flechsig et al., 2022). Research has shown that for organisations to digitally transform, they must be open to redesign their processes and way of working rather than just digitalizing existing processes (Heberle et al., 2017; Moreira & Dallavalle, 2025).

Prior research highlights that digitalization is not only technological but also related to leadership, organisational culture, employee knowledge and data management capabilities (Kulikowska & Wszendybyl-Skulska, 2025). A lack of these factors can significantly hinder DT. To address these challenges, this framework integrate mechanism identified in the literature. Digital leadership, digital culture, focus on employee digital competencies and effective data management are key factors for successful DT (Gong & Ribiere, 2021; Kulikowska & Wszendybyl-Skulska, 2025). These factors combined with BPM initiatives will assist in the transition to more digitalized processes.

2.6.2 BPM Maturity and Digital Maturity

The literature shows that organisations have different levels of BPM and digital maturity, and that this directly impact their possibilities to implement digitalized processes. Therefore, this framework incorporates BPM maturity and digital maturity as important factors. BPM maturity focuses on organisations abilities to manage and continuously improve it processes within the organisation (Szelągowski & Berniak-Woźny, 2022; Biernikowicz et al., 2025). While digital maturity emphasizes the organisations capabilities to utilize and implement digital technologies (Berghaus & Back, 2016; Senna et al., 2023).

2.6.3 Data Utilization and Efficiency

From a document-base process to a data-driven process, this framework proposes process level outcomes. The availability, integration and quality of data enable better data utilization which reduces manual work and redundancy while simultaneously improving processes (Beerepoot et al., 2023). The result of this will lead to greater efficiency. The literature highlights that a well-structured process that is based on quality data will assist organisations on monitoring performance, identifying issues and support continuous improvement (Dumas et al., 2018; Fehrer et al., 2022).

2.6.4 Digitalized Processes and PPM Effectiveness

This framework also extends to the project portfolio management level. Research indicates that PPM effectiveness heavily depends on accurate, structured and high-quality data (Patanakul, 2015; Hansen & Svejvig, 2023). When data is unstructured and incomplete, decisions are often based on emotions and previous experiences rather than strategic objectives (Maitlis & Ozcelik, 2004).

This framework therefore process data-driven processes as an enabler to data-driven decision making in PPM. This directly has an impact on the effectiveness of portfolio management. With data driven decision making, effectiveness in PPM will be shown through greater transparency, improved alignment with the organisation's strategy and increase predictability in project outcomes (Patanakul, 2011; Patanakul, 2015). These portfolio benefits will directly contribute to the organisations long-term strategic goals.

2.6.5 Summary of the Conceptual Framework

The conceptual framework integrates knowledge from digital transformation, BPM and PPM literature to understand how the digitalization of a document-based process will generate value on both an operational and a strategic level (figure 4). BPM and process digitalization acts as key transformation mechanisms. By assessing organisational

maturity and identifying enablers as important factors, this framework provides a structured way for analysing the information in the case study.

This framework supports the investigation of how an organisation can benefit from a data-driven process and how it can enhance efficiency in project delivery. This framework also assists in understanding how these improvements contribute to the long-term organisational goals through a more efficient project portfolio management. Table 4 presents the most relevant sources for this conceptual framework and their key findings and objectives.

Table 4. Relevant sources and their findings

Author(s)	Research focus/ Objective	Key Findings	Relevance
Vial (2019)	Conceptualize DT	DT is a dynamic, socio-technical process involving disruptions, responses and value creation	DT is broader transformation rather than just IT implementations
Verhoef et al. (2021)	DT phases and capabilities	DT requires sensing, seizing, and transforming capabilities across the organization	Includes organizational capabilities and maturity as contextual factors
Gong & Ribiere (2021)	Organizational aspects of DT	Successful DT requires leadership, culture, and employee engagement	Supports inclusion of digital leadership and organizational culture as enablers of DT
Wißotzki et al. (2021); Xing et al. (2026)	Digital Innovation and Transformation Process (DITP)	Digital innovation and organizational transformation must be aligned to create value	integrates BPM, innovation and strategic transformation
Flechsig et al. (2022)	BPM lifecycle and methods	BPM involves identifying, analysing, designing, implementing, and monitoring processes	Provides methodological foundation for process redesign
Heberle et al. (2017)	BPM and digital transformation	DT requires new data-based and automated process models	Supports transition from document-based to data-driven processes
Beerepoot et al. (2023)	Challenges in BPM	Process ambiguity, data duplication, and poor data utilization limit value creation	Justifies focus on document-based process limitations
Biernikowicz et al. (2025)	BPM and data-driven initiatives	BPM and data analytics are often misaligned, causing data gaps	Supports integrating BPM and data management in the framework
Denner et al. (2018)	BPM and digital maturity	Organizations must assess maturity to avoid overambitious digitalization	Includes of BPM and digital maturity as contextual factors
Berghaus & Back (2016)	Digital maturity model	Digital maturity includes strategy, culture, and process digitalization	Supports maturity as a multidimensional construct
Kulikowska & Wszendybyl-Skulska (2025)	Barriers to process digitalization	Organizational, human, and data-related barriers outweigh technical ones	Supports inclusion of leadership, culture, skills, and data management
Dumas et al. (2018)	Business process definition and improvement	Processes must be continuously adapted and measured	Supports process-level outcome focus
Fehrer et al. (2022)	Process redesign methodology	Structured redesign improves efficiency and performance	Base for process improvement logic
Patanakul (2011; 2015)	PPM effectiveness	PPM effectiveness depends on strategic alignment, transparency, and predictability	Defines portfolio-level outcome variables
Hansen & Svejvig (2023)	Strategic PPM	PPM is a continuous, adaptive, data-dependent system	Supports link between data-driven processes and long-term value
Hannila et al. (2022)	Data-driven decision-making in organizations	Poor data integration limits strategic insight	Supports link between process digitalization and portfolio decisions

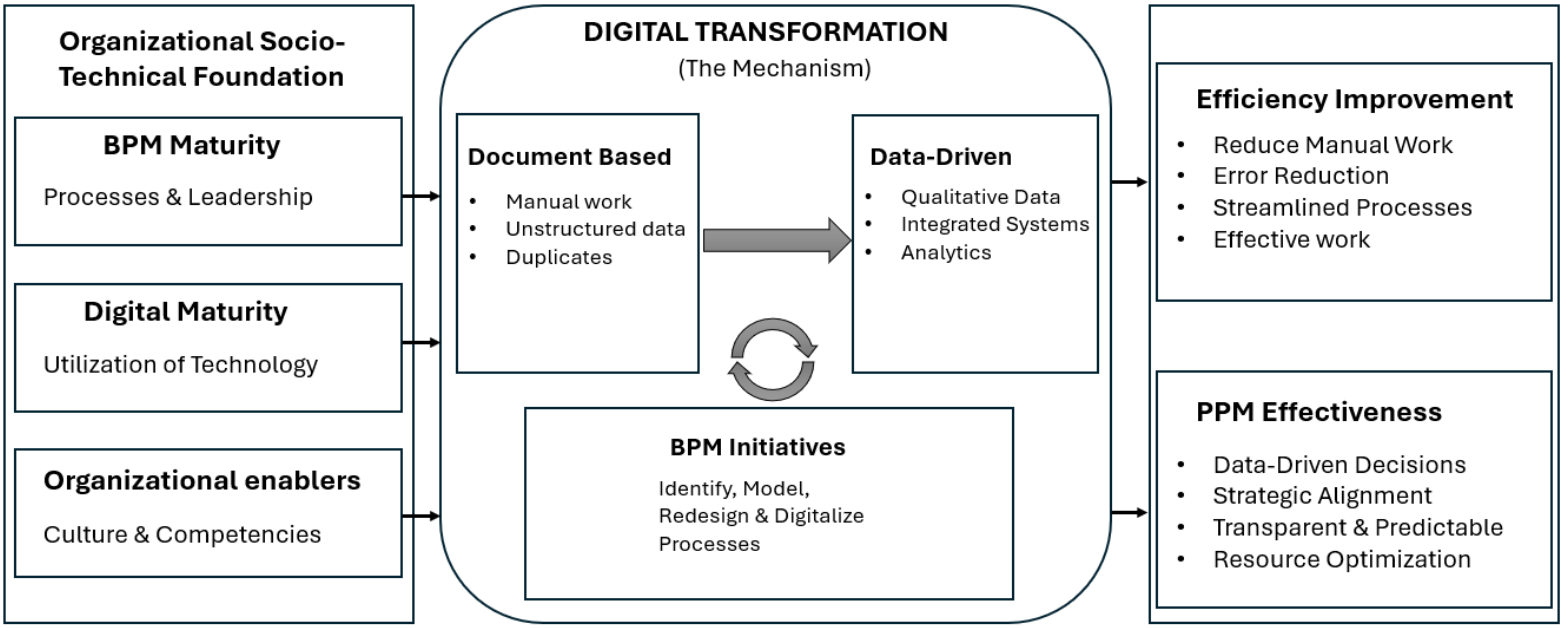

Figure 4. Summary of conceptual framework (author)

3 Research methodology

This chapters presents the research methodology adopted in this study. The aim of this chapter is to describe the methodological choices used to address the research questions. The research objectives in this study are of an explorative nature, seeking to understand how digitalization of a document-based process can enhance efficiency and process management for the case company. Therefore, a qualitative approach was deemed to be most effective.

3.1 Research Design

This study adapts a qualitative embedded case study with semi-structured interviews and reviews of existing literature and internal organisational documentation. According to Patton, M. Q. (2015), qualitative research aims to interpret information and situations to create an in-depth understanding of the subject. By interpreting processes, meanings and describing a phenomenon in a context, qualitative research assists with forming an understanding of the phenomenon (Silverman, 2024, p. 5).

A single case study approach is particularly suitable when the research focuses on studying one case from different angels to gain understanding of the complete subject (Thomas, 2021). In this study, the case investigated is the case company's Order-to-delivery process, with a specific focus on the transition from a document-based process to a data-driven process. This process represents a critical organisational workflow involving multiple functions. Because of this it provides a relevant context for examining how theories and frameworks related to digital transformation, business process management and data-driven decision making can be applied in practice.

Robert K. Yin, (2003, p. 41) framed case studies of this nature as a representative case, emphasizing it as a project being studied to derive information about how improvements can be made for the people involved in the project and the organisation which the

project belongs to. Furthermore, Yin (2003) noted that a single case study is justified when the objective of the research is to propose a solution to a specific problem.

Due to the involvement of different stakeholders in the process, such as Project Management Office, Data and Digitalization unit, Process Development unit and Project Management unit an embedded case study was determined to be the most suitable. Embedded case studies involve more than one unit or object to be analysed. In organisational case studies, the organisation can be viewed as the main unit and subunits can be employees or departments (Scholz & Tietje, 2002). However, it is important to highlight that there is a risk with embedded case studies. If to many sub-units are involved there is a risk that the study fails to evaluate the main unit, ignoring the initial case of the study (Yin, 2003, P. 45-46).

By viewing the different stakeholder groups of the case as embedded subunits, the study enables a more nuanced understanding of how their roles, interactions and perspectives influence the transformation of the process. By collecting data through interviews from these subunits, it was possible to form an understanding of how they interact and influence each other creating a more comprehensive analysis of the case.

A critical part of case study research is a clear definition of the case and its limitations (Timothy D. Lincoln, 2021). In this study, the case is defined as the digitalization of the Order-to-Deliver process within the case organisation. Emphasise is placed particularly on the transition from a document-based process to a data-driven process. There are several limitations to this study. Firstly, the study focuses on a single case company with the aims to investigate their process. Secondly, the research is limited to the specific order-to-delivery process. Third, the research is limited conceptually as it concentrates on the issues related to process digitalization, data utilization and decision making rather than on the implementation of a technical system alone. The fourth and final limitation is that the study focuses on the current state of the process and the recent digitalization initiatives related to it. These limitations allow for an in-depth exploration of how digital

transformation practices can be applied while maintaining a suitable scope for the qualitative analysis.

3.2 Case description - Order-to-Delivery process

The case company implemented their new Order-to-Delivery process a few years ago with the intention of improving the documentation and project follow up within the organisation. The goal with the process was to streamline daily operations while establishing a clear and structured way of working for its employees. Additionally, the process also gives clear ownership and accountability through the lifecycle of projects.

The process currently functions as a project planning tool consisting of gates and milestones where each step demands a meeting with the project team and a specific document to be filled out and completed (figure 5). The gates serve as a point in the project where the project manager evaluates if it feasible to continue the project or if there are certain milestones that must be completed before continuing. In cases where certain milestones have not been completed, the project might encounter excessive risk and must be placed on hold until the issue is resolved or clarified.

Currently, OtoD project-related information is stored exclusively in documents, requiring manual searches and reviews to access the necessary information. Typically, it is only the project team that is fully aware of where these documents are stored and have some information on their content. This creates challenges for higher management to monitor project progression. It also creates difficulties for employees working on other projects to retrieve up-to-date information that could benefit their own work. Once the project and its associated process is completed, these documents are usually archived and overlooked. As a result, valuable information is lost that could otherwise be utilized to compare projects, support higher management in evaluating past projects, and assess the feasibility and risks of future projects.

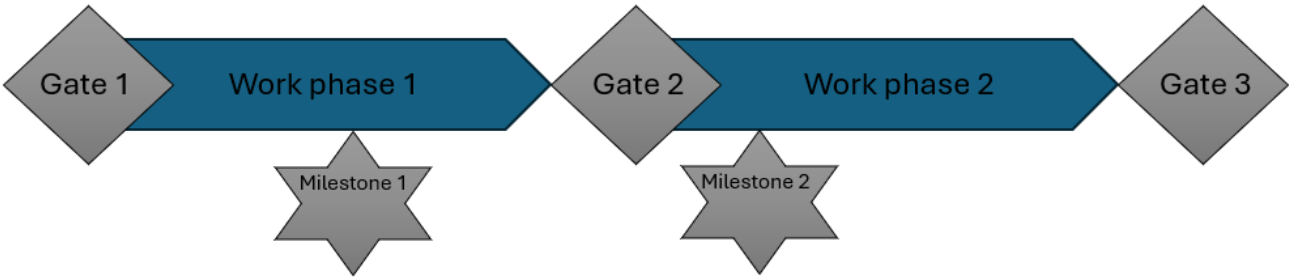

Figure 5. Simplified adoption of OtoD process (author)

3.3 Data Collection

For this study, data was mainly collected by conducting semi-structured interviews through online Teams meetings. The interviews were held in Swedish or English, depending on the participant involved. Interviews held in Swedish were translated to English by the author and the translations were verified using DeepL translation software. Based on existing literature and discussion with stakeholders in the organisations, a set of prepared question was created to guide the interview as to assist with creating a meaningful conversation with the interviewees about the case. The questions in the interview were divided into five main themes: Current process and responsibilities, documentation and information flow, data utilization and efficiency, decision making and portfolio management, and digitalization potential and organisational readiness. However, the interview was not defined to these questions and themes, allowing the conversation to evolve and include additional information beyond the initial framework. This approach enables the case to be explored further and has the potential to uncover valuable data (Mackey, Alison & Gass, Susan M 2011). A list of questions prepared based on previous readings about the case is commonly used in qualitative research and assists the researcher to collect more information on the subject (Silverman, 2024, p. 158).

Purposive sampling was used as a technique to determine the participants for the interview. This means that participants are chosen based on their ability to answer the

given research questions. Purposive sampling establishes that the best subjects with most knowledge about the case are selected to provide the correct insights into the research questions (Emmel, 2013). For this study the participants where carefully selected from Project Management Office unit, Process Development unit, Project Management unit and Organisational Management unit within the organisation, ensuring they had relevant knowledge about the process being studied. It is also important to highlight that depending on which unit the interviewee belonged to, they had different knowledge about different parts of the process.

Regarding data saturation, Guest et al. (2006) implied that once a point is reached that no new information or themes are occurring or observed, there is no need to continuing adding more samples. However, depending on the case it can be difficult to determine what sample size is sufficient to reach data saturation. In this study, the sample size was initially determined by selecting two participants from each unit. If information saturation was not achieved following these interviews, an additional participant from each unit were identified as a potential candidate for further interviews. After conducting the 6th interview similar information started to continuously repeat and after conducting interviews with 2 participants from each unit, no new insight on the case was revealed. It was therefore decided that no further interviews from the additionally identified participants were necessary. The participants position in the organisation, together with their experience, interview date and interview duration are presented in table 5.

Table 5. Participants in conducted interviews

Position	Organisational Unit	Experience (years)	Date	Duration
Project Controller	Project Management	8	19/01/2026	70 min
Project Controller	Project Management	17	21/01/2026	40 min
General Manager	Organisational Management	30	26/01/2026	55 min
Senior Manager	Organisational Management	18	28/01/2026	55 min
General Manager	Process Owner	31	27/01/2026	50 min
General Manager	Process Owner	27	06/02/2026	60 min
Development Manager	PMO	25	26/02/2026	65 min
Development Manager	PMO	3	26/02/2026	55 min

Secondary data was also collected from internal databases within the organisation. This data was in the form of documents, guides and video recordings. By collecting this data, it was possible to study the case from a broader perspective than solely relying on the experiences of the interviewees. This aligns with Yin (2003 p. 98) view on that case studies are strengthened by collecting data from different sources.

3.4 Data Analysis

Patton, M. Q. (2015) highlights that qualitative data analysis shall begin when conducting the data collection. New patterns and themes can emerge during data collection and confirming these will help with the data analysis. Qualitative research methods produce large amount of data, and it can be difficult to organize. Patton, M. Q. (2015) suggest that the researchers shall begin with reading trough the data collected and focus on forming a holistic picture of the data sets collected. After collecting all the data, a thoroughly review of the recordings were performed. The transcripts of approximately 240 pages were read trough to form an overview of the data. During this phase, notes were written to capture key points and potential themes in the data. Inconsistencies in the transcripts were also reviewed and corrected according to the recorded videos.

This study adopts a thematic analysis which is commonly used for identifying, analysing and creating themes from a given data set. One of the main strengths of thematic analysis is its flexibility and that it can be applied to develop a description of a phenomenon or to critically analyse a phenomenon to reveal deeper concepts and assumptions in the data (Braun & Clarke, 2013).

One of the most crucial parts in thematic analysis is coding the data. This involves breaking down the data into smaller and more manageable parts that can be analysed and categorised to find themes (Attride-Stirling 2001). This study uses both inductive and deductive coding combining data exploration with theory-guided structure to get

new insights while simultaneously assessing them against existing literature. Inductive coding involves creating codes from the data set to allow themes and patterns to emerge, allowing unanticipated themes and patterns to surface keeping the researcher open to new insights (Fereday & Muir-Cochrane, 2006). In contrast, deductive coding applies codes derived from existing theories and literature to the data, helping with testing and confirming existing theories based on the data collected (Naeem et al., 2023).

Prior to the analysis, a provisional codebook based on the literature and interview questions specifying code names, definitions and inclusion/exclusion criteria for deductive codes were developed (Fereday & Muir-Cochrane, 2006). This served as a base when breaking down the data into smaller parts. During the analysis, open coding was performed on all transcripts and recordings to allow new patterns to surface (Corbin & Strauss, 2008). Whenever data did not fit into the provisional codes, inductive codes were created and applied to the data. This allowed new themes to emerge that had not been considered prior to collecting the data. The codes were color-coded to match each dataset and to allow for backtracking the codes origin in data. The codebook was continuously revised across multiple cycles (DeCuir-Gunby et al., 2011). During these revisions, definitions were refined and codes where split or merged, codes with low evidence in data were also removed. By grouping related codes that shared similar patterns with relevance to the research question's new themes were developed. The analysis was considered sufficient when additional data and recordings did not generate new codes and stopped impacting the thematic structure of the data (Braun & Clarke, 2021; Hennink et al., 2016).

By comparing and cross-checking information derived from different methods, confidence in the result can be established (Patton, M. Q. 1999). Therefore, secondary data in form of documents, guides and recordings were used for triangulation to confirm, extend or challenge interview-based themes. Information and insight from secondary documents can bring additional knowledge to the initial data (Bowel, 2009). The codes

developed when analysing the interviews were used on the secondary data to categorize it with correlating themes. New codes were also created for the secondary data where reoccurring patterns were noticed that had not been captured in the initial data set (Fereday & Muir-Cochrane, 2006).

As the thematic analysis progressed 3 themes were developed (table 5). Together these themes provide a picture of how digitalization of a document-based process enhances data utilization and improves efficiency, and how a more data-driven approach supports long term capability.

Table 6. Themes and Concepts

Theme	Concept
Data/process fragmentation undermines efficiency	Unclear roles and responsibilities complicate the process. Redundant and repetitive work decreases efficiency. Quality and trust in data reduces the usefulness of data for decision making.
Decision based on experience or data	Data as a base for decision making is important, however decisions are often guided by experience and not only on data.
Organisational expectations about digitalization	Optimism about automating and improving systems with the help of data. Careful implementation to not create more complicated systems that disrupt work.

3.5 Validity and reliability

According to Andersson et al. (2024) validity in qualitative research is about how well a study measure what it claims to measure and reliability how consistent it is measured over time. Validity of a study ensures that the conclusions derived from the research are

reasonable and relevant. Reliability is critical for ensuring that the results can be replicated and trusted.

To ensure reliability in qualitative research, Gibbs (2007) recommend that the author ensure that the transcripts do not contain obvious mistakes during transcription and that the definitions of codes stay the same during the coding process to not create discrepancies. Similarly, Creswell (2014) suggest a few strategies to ensure the validity of the research. One of the strategies are to use multiple data source to triangulate the data. If data from multiple sources are comparable this adds to the validity of the results. Another strategy is to provide a thick and rich description about the results and the participants in the research. Data and interpretations of it can also be discussed with the participants to determine its accuracy.

For this research, several measures were implemented to ensure validity and reliability. Validity and reliability are addressed through the criteria of credibility, transferability, dependability and conformability. To ensure credibility, deep engagement with the data was performed. The transcripts from the interviews were read multiple times through the analysis and coding process, giving a thorough and nuanced understanding of the participants experiences. Triangulation was applied between primary data from interviews and checked against secondary data collected, strengthening the consistency of the findings. Where the meaning of certain data segments was ambiguous, participants where contacted through Teams to confirm or dismiss the interpretations, ensuring that the findings accurately reflected their intended meaning.

Transferability concerns the extent to which the findings can be applied on other contexts. To support transferability, a rich and detailed description of the research context, the organisational settings and the participants were provided. The number of participants, their roles and which unit they work at within the organisation was described clearly to allow the reader to assess the relevance of the findings to their own

setting. A detailed description of the research process and methodology was also included to give the reader contextual information.

Rigorous documentation was maintained through the research process. This includes recordings, full transcriptions, rewritten transcriptions and notes, making it possible to backtrack and verify data at any stage of the process. The methodology was also clearly described so that other researchers could replicated the process. Additionally, the codes in the initial codebook where also defined clearly and when creating new codes clear definitions of the codes were created to ensure that definitions did not change during the coding process. This ensured that the research process is consistent and can be repeated, ensuring dependability of the process.

The confirmability was enhanced by actively checking interpretations with the participants trough teams during the analysis phase. Emphasis was also placed on reflecting on the transparency of the methodological decisions to ensure that the reasoning of the analytical choices was grounded in data and not based on assumptions.

4 Results

The three themes identified through the thematic analysis addresses the research questions and align with components from the conceptual framework developed in this study. The first research question, how digitalization of a document-based process can enhance data utilization and efficiency, is primarily addressed through the theme about how data and process fragmentation undermines efficiency and the theme of decisions based on experience or data. These themes reveal the current document-based state of the process, the existing levels of BPM and digital maturity and constrains that impact effective data utilization in project delivery. The second research question, how a more data-driven process will assist the organisation long-term, is addresses in the last theme, organisational expectations about digitalization. Which captures the anticipated PPM effectiveness outcomes and the organisational enablers that can determine if transformation delivery long-term value.

4.1 Process & Data Fragmentation Undermines Efficiency

This theme relates to the BPM and digital maturity dimensions of the conceptual framework and reflects on the current document-based state of the process and the fragmentations that constrains the organisations readiness for digital transformation. The findings presented in chapter 4.1 address the first research questions by identifying specific parts of the process and system-level challenges that digitalization initiatives must overcome to enhance data utilization and efficiency in project delivery.

4.1.1 Unclear Roles and Responsibilities Complicate the Process

Data collected from interviews and secondary data shows that the current process clearly defines the responsibilities, identifying those accountable for the continuous development of the process and those responsible and accountable of implementing the process for its day-to-day work, and approval of gates and milestones.

Internal documentation states that the project manager are responsible for keeping most of the gates and milestones meeting and approving them, with a few exceptions where higher management are accountable for approving the gate (table 6). This data was also strengthened by the interviews where all interviewees working with the process daily stated that they knew about the roles and responsibilities of the process.

However, the enactment of these responsibilities was inconsistent, and notable discrepancies were identified between the formal allocation of gate and milestone responsibilities and the individuals who took on these responsibilities in practice.

"Officially, it is the project managers responsibility, but in practice it is the project controller who is following up the process" -Project controller

"The project manager is accountable that the documents are uploaded and that the gates and milestones have been held, but it is usually the project controller that goes and says to the project manager when we are going to have this meeting" -Project controller

"A lot of times I see that the whole thing is outsourced to the project controller and it defeats the purpose a bit" -Senior manager

Table 7. Simplified version of responsibilities for gates and milestones (author)

Gate/Milestone	**Accountable**
Gate 1	General manager
Milestone 1	Project Manager
Milestone 2	Project Manager
Gate 2	Project Manager
Milestone 3	Project Manager
Milestone 4	Project Manager
Gate 3	Project Manager
Milestone 5	Project Manager
Milestone 6	Project Manager
Milestone 7	Project Manager
Gate 4	General manager

These uncertainties also cause confusions for the project team members and causes communication errors that can have negative impacts on the projects. As noted by interviewees, sometimes gate and milestone meeting has been held without all stakeholders involved due to miscommunications between the responsible person and project members. This can lead to information not going out to all required stakeholders, and data can also be lost due to failure of archiving it.

"I have seen that controllers remind the project manager about a milestone, and the project manager have responded that the meeting was held last week" -Senior manager

Responsibilities of preparing for the gates and milestones were also perceived by participants as vague. Even if it was the project managers responsibility, the project controller was often tasked with preparing the documentation before the gate/milestone meetings were held. Depending on the project team and the people involved, this was communicated differently and project teams had developed their own ways of working. It was noted that delegating this work and responsibility was not necessarily always perceived as negative, and if communicated correctly can ease the workload for project members. By giving more responsibilities to less experienced employees, they also get the opportunity to grow. However, depending on the project team, ways of working with the processes were different and this causes confusion and mistakes can happen. These different ways of working also causes confusions when new employees join a team or a new team is nominated for a project.

"Some project controllers do not mind having the ownership of the business process" -Senior manager

"When a project team or a project controller starts working with a new project manager and the new project manager is expecting the project controller to take ownership of the

business process where he has previously not had ownership in other projects, then we have this kind of disconnection" -General manager

During the interviews, suggestions were also identified on how the responsibilities could be clarified. To not leave all the responsibilities on the project manager, stakeholders in the project could be tasked with being responsible for certain gates and milestones. As mentioned by one participant, milestone involving engineering design could have a chief engineer as responsible for ensuring the milestone meeting is held according to schedule.

"It is not realistic that the project manager can follow everything in detail, we should assign an owner to each of these gates and milestones, and he should be responsible for keeping them." *-General manager*

The gap between formal and enacted responsibilities signals a lower level of BPM maturity where process ownership is defined but not applied practically.

4.1.2 System Utilization and Transparency

From the interviews it became evident that three main software systems are utilized within the process (figure 6). One system is used for archiving the documentation from the minutes of meeting held. This system acts as the storage base for information related to the process. The second system is used as a project follow up system, where each gate and milestone is visible and the initial planned date for when the gate or milestone is supposed to be held. In the second system, the document uploaded to the first system is linked and the status of the gate/milestone is set as completed or not completed. The third system acts as a visualisation tool, providing an overview of the project. Within this system it is possible to view what gates and milestones have been held and when. It is also possible to open the links to the first system and view the documentation from the minutes of meetings. The third system used for visualisation is utilized mainly by higher management while the first and second systems are mainly used by the project team.

Secondary data in form of guides also clarifies these systems relation to the process, but the information is scattered within multiple guides.

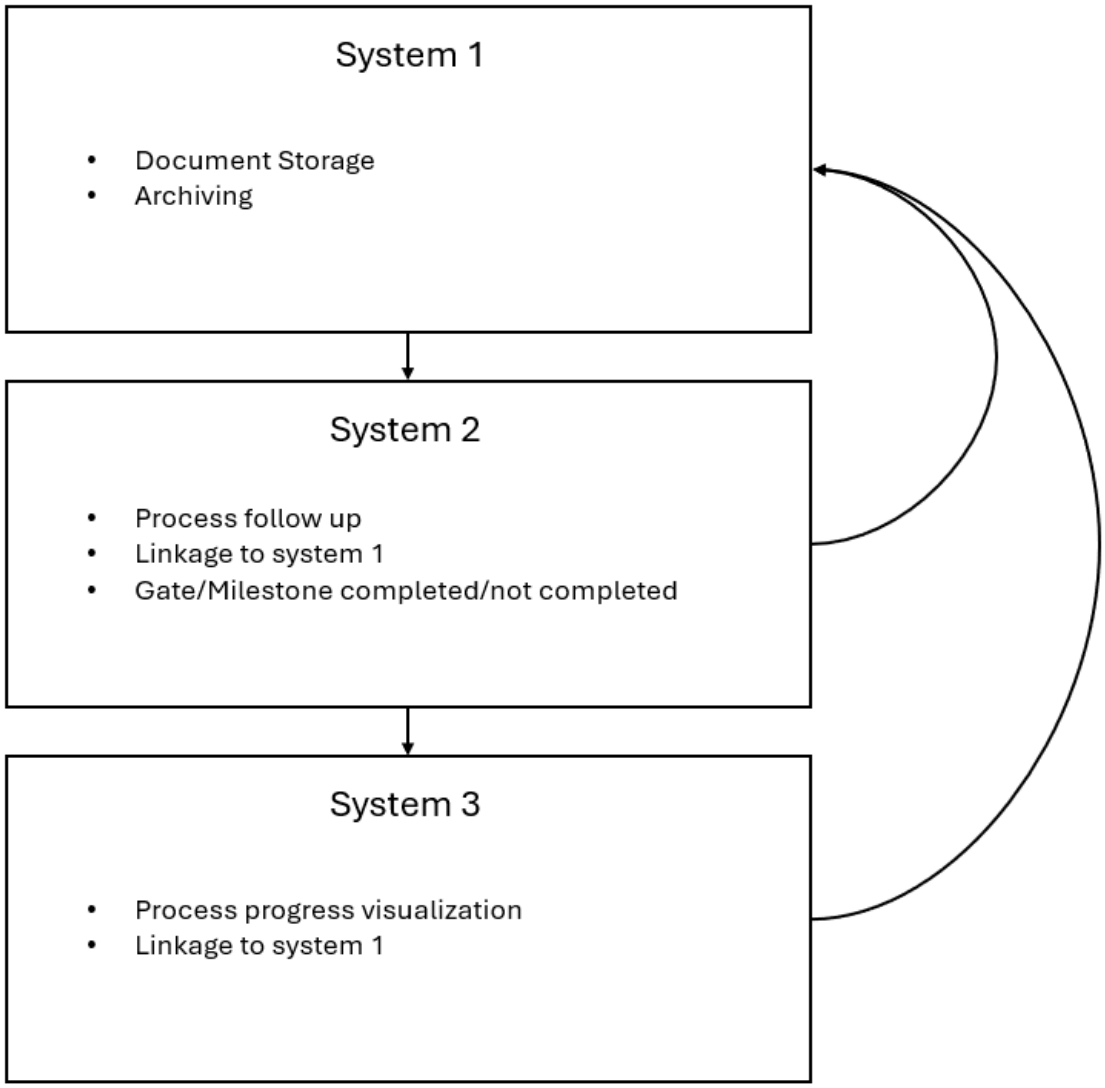

Figure 6. Systems utilized within the process (author)

A project controller also identified that system 2 has functions that possibly could be utilized to digitalize the current process. Possibilities to develop the system together with the process to directly insert the data directly into system 2 were identified. Secondary data in form of guides also shows show how other organisational functions have utilized system 2 by inserting data directly there.

"I see (System 2) as an option to directly fill in data. I think it could possibly also automatically collect data from previous gates and milestones and update so we would not have to do it manually." -Project controller

For archiving purposes, the controller also noted that it is possible to print out a document from information inserted in system 2 and store them in a documentation software. *"You could print the report and upload it to System 1, that is of course a manual way but from my perspective it would work."*

The transparency of how these systems are used within the process was also not clear for the participants. A few had clear knowledge of all the systems and how they can be utilized, while some only knew about one or two of the systems. Participants would also utilize the system they knew the best even if it was not the most efficient way to find the information needed.

"I would say they are only stored in (System 1) and then we link them to (System 2), from there it automatically updates to (System 3)" -Project controller

"If I would need to retrieve information from a minutes of meeting, I would go search for it in (System 1)" -General manager

How participants described system utilization and the uncertainty about systems awareness and utilization reflects a moderate and inconsistent level of digital maturity, where technology is available but not fully utilized.

4.1.3 Redundant and Repetitive Work Decreases Efficiency

Interviewees working directly with the process explained that the current way of working demands a lot of time from them to prepare the documents before each gate and

milestone. They need to retrieve the document template and manually fill in the information to prepare for the meeting. One project controller commented, "*Usually it takes between one to two hours"*. The information is filled out manually in the template for each gate and milestone, and searching for the necessary information was identified as one of the main time-consuming tasks. This information is often available, but since it is scattered it is time consuming to find everything and summarize it. For later gates and milestones in the process, the same information mentioned in earlier gates and milestones are also repeated. This demands that the employee preparing these documents have to repeat information that are already available elsewhere.

"A lot of same information from gate to gate are repeated in the documents" -Project controller

Even if the current process demands repetitive and manual work, some participants highlighted that removing the manual work could create unexpected risks. If project team members manually fill out and work with these documents, they are more prone to notice if anything is incorrect. If the process were further automated, information and important points could be forgotten or totally ignored. One general manager stated, *"There are risks with automating the process because things can get lost, and the updates might be done with outdated information that just follows along".*

Another general manager also emphasized that if too much automatization is done, the personality can be lost.
"*One size fit all can make it boring and software might not support everything that a project manager wants. A manual plan is more personalised, and information can be lacking from software. I am afraid that digitalization can remove opportunities."*

Participants directly working with the process and the minutes of meetings were identified to be more willing to find automated solutions to increase productivity, while

managers indicated that the manual work with the process works like a checklist that every step within the process is followed correctly and acts as a reminder for project team members.

"The process and the meetings are a very important communication tool for stakeholders" -General manager

The redundant and repetitive work with the current process is directly impacting the effectiveness of the work. Integrated systems and structured data in a digitalized process could directly address the issue. It is however important to note that it must be evaluated to not have a negative impact on communication between stakeholders.

4.1.4 Quality and Trust in Data

Participants emphasised that moving from a document-based process to a data-based would demand strong data governance to avoid risk in project deliveries. Especially since a lot of the current information in the documents filled out during the minutes of meetings are based on unstructured data. There were also concerns that moving to structured data from unstructured data might diminish the richness of the information and that data contributors could introduce bias by only recording information they consider important. When relying on raw data, it needs to be accurate and unambiguous. If data entries are incomplete, inconsistent or vague, they can give a misleading picture of how the project is progressing.

"If you have a document, it is usually proofread and signed so you can rely on it being a solid minutes of meeting. If you have data, anybody can basically go in and change the information so you cannot rely on it to 100%." -General manager

"Going from document-based to data-based is putting a lot of pressure on that we have good quality of data because we can have a lot of data with bad quality and that do not make any sense." -Development manager

A general manager highlighted the human factor and process risk with adding data into clearly defined blocks. By having defined blocks to insert data, there is a risk that data is inserted incorrectly due to the employee being unsure were to insert the data or not paying attention.

"When you put in data, you usually need to choose from this block or that block, and if you are unsure, you go Eenie, Meenie, Miney, Moe and put it in one block."

To have confidence in data, a structured and clear process is crucial. It is also very important that it is possible to identify where the data has originated from and who has added the data to the process. A second reviewer of the data before approving was also mentioned as a possibility to ensure high quality and reliable data.

Despite these concerns, the consensus of moving from document-based to a data-based process was positive. Participants had a positive attitude towards digitalizing the process, and believed that if done correctly, the data could be utilized better. These concerns align with the conceptual framework's emphasis on data management capabilities and governance as essential organisational enablers. These concerns must be evaluated and addressed for a data-driven process to delivery efficiency and improve PPM effectiveness.

4.2 Decision Based on Experience or Data

This theme correlated with the conceptual frameworks proposition that transitioning to a data-driven process is a must for effective PPM decision making. It also highlights that experience and open communication remain essential for decision making. It directly addresses both research question by illustrating the current limitations of data utilization in decision making and demonstrating how a data-driven process benefit PPM.

4.2.1 Data Not Being the Sole Driver for Decision Making

Many participants emphasized that grounding decisions in data provide a solid foundation for decision-makers to make choices that results in successful outcomes. However, it was continuously highlighted that this demands that confidence in data presented in section 4.1.4 is established. Data was viewed as a critical component to ensure that the project was delivered successfully and according to contractual agreements. It was noted that while data provides evidence, experience is a critical part of decision making. Experience is needed to interpret and challenge the data, and solely relying on data was identified as a risk because it can ignore operational constrains.

One general manager commented that decisions should always be based on experience and data, and that relying on data alone would leave us at a disadvantage. "*It is common that not all the necessary data is available when a decision needs to be made, and then it is up to the manager to make the decisions based on experience*". It was highlighted that an evaluation is always done based on the data available, and that if all the necessary data was there it would be automatically approved.

"A decision should always be made based on the data available and together with the project team." -General manager

Even correct data can be ambiguous. Different stakeholders can have different goals, incentives and experiences which influence how they interpret the data. Because of that a few participants believed that relying only on data is not possible for making the right decisions. As stated by a development manager: *"The data for one person can mean something else for another person, so you need to align with some kind of dialogue."*

Open communication about the data was therefore identified as an essential to ensure that the best decisions are made. This tension between reliance on data and experience reflects the line between a document-based and a data-driven process. The conceptual framework shows that when data is better integrated into processes it will provide a

foundation for decision-making. However, experiences still remain essential to interpret the data.

4.2.2 Data Utilization on a Portfolio Level

Participants expressed doubt that the current information collected during the OtoD process are utilized on a project portfolio level. The common belief was that higher management do not search for the unstructured data stored in the documents and that they mainly rely on system 3 (figure 6) to visualize project progression and compare projects on a portfolio level. As discussed in chapter 4.1.2, system 3 only presents which gate and milestone have been completed and when the following ones are planned. If higher management would need information from the documents, it was commonly understood that they usually reach out to the project manager to get the necessary information.

"They can get a lot of information from system 3, but if they want something related to OtoD documentation I believe they will ask the project manager" -Project controller

Analysis of secondary data in forms of minutes of meeting documents and video guides suggest that these documents contain important information that could be utilized for more purposes than they currently are. There is currently no way of visualizing the information in the documents and using it on a portfolio level. This is also strengthened by many interviewees who noted that data within the project could be useful on a portfolio level. A general manager highlighted that if all the information was available as data, it would be possible to make analysis on commonalities between projects, and this could be beneficial on a portfolio level.

"A software could start compiling data and making an analysis on the similarities between projects and we could start to see trend lines that this is always happening in these kinds of projects and so on. For example, milestone X tends to drag out because of reasons Y."

It was commonly noted by participants that all the information in the current documents

would not be necessary for decision making on a portfolio level, and certain data that could be useful should be selected from the current process.

"If you select certain data and make sure that it is treated the same way in each project so it has good quality then I believe it could be useful on a portfolio level." -General manager

"More data would be useful, and I believe there are possibilities to utilize it on a portfolio level." -General manager

A general manager emphasized that usefulness is context-dependent: information one person finds helpful may not assist someone else with decisions-making. The participants suggested that it should be possible for the manager to highlight the information he perceives as useful to not have all the available information shown. *"Some people might want to see this information, but some other information is to no value for them, so they should be able to choose what are visualized to them in the software."*

Secondary data in form of guides also shows that system 3 (figure 6) currently have the possibility to create a personal layout of what to visualize. It would be possible to add more inputs sourced from the OtoD process to visualize progression on a project level.

The portfolio-level benefits described by the participants directly corresponds to the PPM effectiveness of the conceptual framework. The ability to identify trends between projects improves predictability and customizable visualisation of data supports strategic alignment. These outcomes are identified in the frameworks as results from a successful transition to a data-driven process.

4.3 Organisational Expectations About Digitalization

This theme corresponds to the organisational enablers of the conceptual framework, especially digital culture, support by leadership and employee competencies. It also connects the efficiency and PPM effectiveness outcomes that participants associate with successful digitalization of the process. It addresses research question two by presenting how the participants believe digitalization can assist the organisation long-term and the conditions needed to realize it.

4.3.1 Organisational Support and Mindset

Secondary data in the forms of presentations and strategy guides shows that the organisation has in the last years placed more emphasis on digital transformation and are striving to reach a higher level of digital maturity. It was also noted by the participants that they had experienced a shift in the organisation and how they are working towards more digital ways of working. As quoted by a general manager *"I see a lot of support from the organisation for digitalization, and this year they have also introduced mandatory AI trainings."*

Participants also expressed that the organisation had not only advocated for digitalization, but that they also received support from higher management for resource allocations to develop digitalization initiatives. There was a shared understanding that digitalization is a strategic priority, while acknowledging that it is complex and it will take time to successfully implement. A few participants noted that they had seen a shift in employees' mindset regarding digitalization. Earlier they felt that there was a higher resistance from employees to digitalization and implementing new systems and processes, but employees had now become more open to new initiatives. It is however important to highlight that participants noted that there are still employees who are sceptical towards digitalization.

"Of course we have resistance, but we also have very good leaders and employees driving digital initiatives. I believe that the people that are sceptical also will adapt one day but it will take longer for some than others." -General manager

"Some people are a bit sceptical to anything that is new, but I think that is mainly to getting people to understand what we are improving with these initiatives and then they will embrace it." - Development manager

These findings show the organisational enablers identified in the conceptual framework. How leadership support and resource allocation correspond to digital leadership, and how the employee mindset and openness to new initiatives reflect the development of digital culture and digital competencies.

The participants also had a positive attitude towards digitalization and believed that if implemented correctly it would benefit their daily work and the organisation. Many expressed clear expectations that automating routine tasks and improving information flow would reduce repetitive work and improve reliability of the information used in decision making. The three main benefits identified were: efficiency in document handling and approvals, better transparency into the process and the quality of information, and better utilization of information already available.

"I see benefits with digitalization and believe that it would decrease manual work, and it would also maybe be easier to search for things." - Project controller

"Digitalization would decrease a lot of repetitiveness, and it would give better transparency to the underlying data. We should not just store data for the sake of storing it and digitalizing processes could help us actively use all the information we have available." -Senior manager

However, many participants also highlighted risks identified with digitalization and that it in some cases can hinder organisational growth. Digitalization of systems and processes is expensive, and it can require complete overhauls of current ways of working. There are also uncertainties if the digitalization will assist the organisation long-term and create more effective ways of working. One general manager stated that if there are too heavy investments into digitalization with no proof of concept, it can be a financial disaster for the organisations. *"You can put a lot of money into digitalization and take in consultants to work on some scenarios of what other companies have used, and after a lot of work you realize that this is not working for our organisation."*

It is also crucial to create a holistic picture of the systems and processes being digitalized and to not work in silos. Digitalizing things in one department can have negative impacts and cause more work for other departments if done incorrectly.

"I think we sometimes lack the competencies ourselves, because everybody is working with their own things. The only way we will get the whole picture is that we start to talk to each other more." -General manager

"We cannot just decide something and implement it. We should do a smaller pilot version in a safe environment to see if it works and based on that take the decision of a larger implementation" -General manager

The benefits of digitalization anticipated by the participants reflects the outcomes of the conceptual framework. That reduced manual labour corresponds to efficiency improvements. Better transparency and data utilization also impacts PPM effectiveness with regards to data driven decisions. The risk identified about how siloed implementation and lack of proof of concept also reinforces the frameworks emphasis on governed and holistic BPM initiatives as a mechanic to reduce these risks.

4.4 Summary of the Results

A central finding is that while the current OtoD process roles and responsibilities are clearly defined, the enactment of these responsibilities in practice is inconsistent. Although project managers are formally accountable for most of the gates and milestones, much of the follow-up is performed by the project controllers. This discrepancy between formal and practical responsibilities reflects a gap in BPM maturity, where processes are defined but not embedded in practice. This can lead to confusion among project team members, miscommunication, and in some cases gates and milestones meeting being held without all relevant stakeholders. Participants suggested that distributing ownership of specific gates and milestones to key stakeholders could help alleviate this issue.

Fragmentation in the system and data was also identified as a significant issue. Three main softwares are currently used, but awareness and usage of these systems varied among participants, reflecting an uneven level of digital maturity. Information is scattered across multiple guides and system, and it can be perceived as difficult to understand how the systems best can be utilized. At the portfolio level, higher management mainly relies on system 3 for visualisation which only presents if a gate and milestone status and planned dates. The more valuable, unstructured data captured in the minutes of meetings is rarely utilized beyond project level, despite secondary data suggesting it holds significant potential for project analysis.

Regarding decision making, participants emphasized that while data provides a solid foundation, it should not be the sole driver of decision making. Experience was identified as essential for interpreting and challenging the data. Open communication and dialogue were therefore seen as critical to ensure that the best decisions are made based on the available information. This reflects the transitional phase from moving towards data-driven processes but not yet being able to rely on structured and integrate data. It further shows strengthens the anticipations of the framework on how PPM effectiveness can be improved once a more data-driven process is implemented.

The transition from a document-based to a data-based process was viewed positively by the participants, who recognized that digitalization could reduce manual and repetitive work while improving transparency and enable better utilization of data. However, several risks were also highlighted. By moving from unstructured to structured data, the richness of information might be lost. Quality and reliability must also be ensured in a data-driven process to create trust in data. Strong governance, clear processes and traceability were identified as key steps to ensure qualitative and reliable data.

At an organisational level, the results indicate a growing support for digitalization with participants noting increased emphasis on digital transformation, mandatory training initiatives and resource allocations to support digitalization. A shift in employee mindset towards openness to digital initiatives was observed, but resistance to change was also identified. Participants highlighted that it is crucial to not pursue digitalization in silos, and that a holistic approach together with multiple departments is needed. Furthermore, it was recommended that digital initiatives should be piloted in safe environments before any large-scale applications are implemented.

These findings correlated to the conceptual framework of this study by connecting the themes to it. The fragmentation and maturity gaps identified in theme one addresses the BPM and digital maturity from which transformation must be built. Theme two presents a path towards PPM effectiveness trough more structured and transparent data utilization. Theme three reveals that organisational enablers such as digital leadership, culture and competencies are developing in the organisation. To realize the efficiency improvements and PPM effectiveness from the framework, governed BPM initiatives alongside continued investment in organisational readiness is crucial. Together these three themes address both the research question of this study. The first research question is answered trough the identification of specific process, system and data challenges that digital initiatives must resolve to enhance efficiency in project delivery. The second research question is addressed through the portfolio-level findings and

organisational expectations that reveal how a more data-driven process could contribute to long-term strategic value through improved PPM effectiveness.

5 Discussion

The aim of this study was to examine how a transition from a document-based process to a data-based process could enhance data utilization and project delivery and how such a transformation can support an organisation long-term. By conducting semi-structured interviews with participants from the case company and qualitatively analysing data from both interviews and secondary data sources, inefficiencies and bottlenecks with the current OtoD process were identified. Data utilization practices and organisational readiness for digitalization were also assessed to form a holistic picture of the organisation's current situation to further support the identification of improvement initiatives. This chapter discusses the empirical findings in relation to the conceptual framework and existing literature, addressing both research questions and explaining the broader implications of this study's results.

5.1 The Socio-Technical Nature of Digitalizing the OtoD Process

A central argument in the digital transformation literature is that successful digitalization is not mainly about implementing new technology, it is a fundamentally socio-technical challenge involving processes, governance, roles, culture and organisational capabilities. (Vial, 2019; Gong & Ribiere, 2021; Bockshecker et al., 2018). The empirical findings in this study support this view by showing that digitalizing the OtoD process is not primarily a question of implementing a digital tool, and that multiple factors are necessary to successfully move from a document-based process to a data-based process. When examining the OtoD process, the data reveals that the primary barriers to effective digitalization are not technological in nature. The case organisation already has three software systems in place. Instead, barriers comes from unclear roles, fragmented data practices and inconsistent utilization of the three systems.

The findings confirm what Parviainen et al. (2017) identified in his study, that digitalizing a business process is not simply a matter of converting existing document-based processes into their digital equivalents. Rather, it requires fundamental changes on how

work is organised, how responsibilities are allocated and how the data is used within the organisations. The result of this study demonstrates that without addressing the socio-organisational factors, any attempt to digitalize the OtoD process risks reproducing existing inefficiencies in a digital format rather than generating new improvements in efficiency and data utilization.

5.2 BPM Maturity: The Gap Between Defined and Enacted Processes

A significant finding of this study is the gap between formally defined responsibilities and their practical enactments within the OtoD process. While internal documentations clearly define roles and responsibilities, the interviews consistently revealed that much of the day-to-day process oversight is informally delegated to project controllers. This discrepancy is not only an operational inconvenience, but it also signals a gap in BPM maturity. According to the literature on BPM maturity, processes that are formally documented and utilized, but not according to their definition, reflect a standardised stage that has not yet reached the managed or predictable stage (Szelągowski & Berniak-Woźny (2022); Biernikowicz et al., 2025).

This finding resonates with Beerepoot et al.'s (2023) identifications on process ambiguity and unclear ownership among challenges in BPM. When process ownership is defined but not implemented as defined, the consequences are bigger than just role confusion. The findings shows that inconsistent enactments leads to communication issues, including gate and milestone meetings being held without all relevant stakeholders. This can result in data being lost due to incomplete archiving, and project teams developing their own informal ways of working. While the findings shows that this sometimes this was viewed as practical by employees, literature shows that it undermines the standardisation that is necessary for effective digitalization (Iden et al., 2025).

Before the OtoD process can be digitalized, the organisation must first resolve the difference between formal and enacted process ownership. The findings shows that one great way to do so would be to distribute gate and milestone ownership between

relevant stakeholders. For instance, engineering milestone being assigned to a chief engineer and not leaving all the accountability to project managers. This approach would clarify responsibility and distribute the workload more equally which would reduce the risk of process practices being overlooked. This aligns with the study by Aljlayel (2024), who identifies process ownership and cross functional accountability as key values necessary for successful BPM improvement initiatives.

5.3 Digital Maturity: Systems available but Unevenly Utilized.

This study's findings reveal an uneven level of digital maturity within the case organisation, with respect to the OtoD process. Literature shows that digital maturity refers to an organisation capacity through its employees, culture and structure, and how it can effectively utilize digital technologies (Senna et al., 2023). The case organisation has three interconnected systems that together provides a great process infrastructure. One for documenting and archiving, another for process follow-up and status tracking and a third for project- and portfolio visualisation. However, the findings shows that awareness and utilization of these systems vary between users.

The data shows that some participants have a comprehensive understanding of how all the three systems work together and can be utilized, while others were only familiar with one or two of the systems, resulting in using what they knew rather than what would be most effective. This pattern of inconsistent system utilisation is similar to what Siddiqui et al. (2023) describes as a common failure when trying to estimate the digital maturity, that organisations tend to overestimate their digital maturity based on the availability of digital tools, but not accounting for the if those tools are utilized effectively.

The finding that information about how to use the systems is scattered across multiple guides further amplifies this problem. Fragmented documentation about digital systems creates issues where important operational knowledge is held by individual employees rather than being embedded in shared practices (Merriman et al. 2025). Consolidating system guidance and having structured trainings for the process's digital infrastructure

would be a meaningful step towards improving the organisations effective digital maturity with respect to the OtoD process, without requiring new technological investments.

The findings also reveal an underutilised opportunity within the existing systems. The results shows that system 2 already has functions that could support a more direct and structured data entry approach. Which would enable the process to move towards more data-driven workflows without requiring a complete technological overhaul. This is an important observation, as it suggests a pathway with lower risk to digitalizing the OtoD process. This resonates with the framework by Berghaus and Back (2016), who emphasise that digital transformation progresses trough stages, and that organisations should seek to advance their maturity in small steps rather than attempting big transformations that exceeds their capabilities.

5.4 Document-Based Fragmentation

A shift from document-based to data-driven process is a central transformation mechanism in the conceptual framework, through which efficiency improvements and PPM effectiveness is to be achieved. The empirical findings provide evidence of how the current document-based state of the OtoD process creates inefficiencies, which could be directly addressed by a well-executed digitalization initiative.

The most immediately visible inefficiency is the substantial manual and repetitive labour associated with preparing documentation for each gate and milestone meeting. Project controllers currently spend a lot of time preparing a single gate or milestone document, during which they manually locate information from earlier stages of the process. This information is already available but is scattered across documents. This pattern of redundant information reproduction is exactly what Beerepoot et al. (2023) identified as one of BPM's key systematic problems. Processes that require users to re-enter data already captured is not only wasting time but also introduces risk of inconsistency and error.

The findings also confirm a broader observation in the literature, that employees perceive searching for information in document-based systems as a waste of time and frequently avoid it (Schacht et al., 2015). Instead, employees retrieve information through informal channels, such as asking directly from project team members. This might be effective in the short term, but produces no record and can be cause for systematic loss of knowledge.

However, a nuanced finding of this study that complicates a straightforward case for automation is the concern raised by several participants, particularly mangers, that a manual preparation process serves as a function beyond documentation purpose. Manually reviewing and collecting information before a gate or milestone meeting serves as a function of project members to engage with the current state of the project and can help them identify issues that otherwise would have been missed. There are risks with automating the process because incorrect information can be unchecked and reveal itself later in the project. This concern reflects Parviainen et al. (2017) findings that many different perspectives needs to be considered when digitalizing process.

This tension between efficiency gains through automation and the value with communication in manual process engagement is important to consider when digitalizing the OtoD process. The findings suggest that the optimal approach is not the elimination of human engagement with process data. A data-driven process could preserve the functions of gate and milestone reviews, while simultaneously improving it by providing richer data. It could also eliminate the redundant and time-consuming data retrieval work that currently is done. This aligns with efficiency improvement outcomes presented in the conceptual framework, where reduced manual work, error reduction and streamlined processes are achieved through a thoughtful redesign of how process data is collected and stored.

5.5 Data Quality and Trust

A theme that emerged in this study was the concern about data quality and trust. The findings suggests that employees worry about the reliability of structured data inputs, especially in context where unstructured document-based information would be inserted into defined data fields. These concerns are important and reflects the challenges involved in transitioning from documents to data. As noted by Rodrigues & Moreira (2025), for data to effectively support digital transformation, it shall be accurate, adequate and available.

The data from the interviews also give improvement suggestions. One risk identified was the risk of data entry mistakes in defined fields where employees are unsure where to insert information. This problem is also observed by Beerepoot et al. (2023) and comes from the ambiguity of process descriptions. Another concern related to the quality of data, is that a data entry into a software might not carry the same sense of accountability as a proofread minutes-of-meetings document, and that it can easily be alternated without traceability. A third concern is selection bias when contributing data, and that only information perceived important by the contributor is recorded.

These concerns highlight the importance of strong data governance as a foundation for digitalization efforts. This aligns directly with the data management capabilities from the conceptual framework, and with literature on data governance as a prerequisite for data-driven transformation (Corban, 2021; Rodrigues & Moreira, 2025). The findings suggest that the organisation would need to establish clear data entry standards and implement a mechanism for reviewing the data to ensure full traceability of data entries and modifications.

Despite these concerns, the overall attitude of digitalization initiatives was viewed as positive, and the findings suggest that trust in data can be established trough showing how it can be governed and relied on, This is consistent with the literature on digital transformation as a dynamic and iterative process (Vial, 2019; Chrusciak et al., 2025).

5.6 Experience and Data in Decision-Making

The second theme concerns the role of data in decision-making, and the relationship between data-driven and experience-based judgement. The findings reveal a nuanced picture between data-based and experience-based decision making. The findings shows that employees valued data as a foundation for decisions. However, it was also emphasised that data alone is insufficient and that experience is needed to interpret the data within its context and to challenge the data.

The findings are consistent with the argument made by Maitlis and Ozcelik (2004) that decision-making in PPM is often emotionally influenced when data is absent, and that accurate data is essential for well grounded decisions. However, the empirical findings of this study add a nuance to this by suggesting that the relationship between data and experience is necessary. Even where data is available and reliable, professional judgement remains crucial for interpretation of the data.

This observation connects to literature on data-informed rather than purley data-driven decision-making (Thusoo & Srama, 2017; Hannila et al., 2022), which argues that the goal of digitalization is not to replace human judgement but to provide a better foundation for decision-making. The conceptual framework in this thesis reflects this logic by presenting how the expected outcome of transitioning to a data-drive process is not the elimination of human judgement but improved strategic alignment and predictability in PPM trough availability of higher-quality, more accessible and better comparable data. The findings in this study support and give another view of this, suggesting that the organisation should not frame the digitalization of the OtoD process as a move toward automated decision-making, but an enhancement of the informational context from which professionals can take informative decisions.

The practical implications are that the design of a digitalized OtoD process should support dialogue between stakeholders while utilizing structured and comparable data.

5.7 Portfolio-Level Data utilization

The second research question of this thesis is about how a more data-driven process can assist the organisation long-term, and this is mostly addressed by the findings on portfolio-level utilization. This study reveals a gap between the potential value of data collected during the OtoD process and its usage at a portfolio level. Currently, higher management relies primarily on system 3 for portfolio oversight, which only provides gate and milestone completion status and planned date. The contextual information from the minutes-of-meeting document is rarely used on a portfolio level.

The findings are consistent with and extends the argument made by Hannila et al. (2022) that organisations frequently struggle to integrate data and IT tools into portfolio management, even if data is available. The OtoD process generates information that could be valuable, but in its current document-based form this information is not accessible for portfolio-level analysis. The findings suggested that if this information were available as structured data, it would be possible to identify patterns across projects and reveal problems related to reoccurring cases for projects with the same configurations.

This aligns with the PPM effectiveness attributes defined by Patankul (2015), such as predictability of project delivery, transparency in decision-making and strategic alignment. The ability to identify recurring patterns across projects would improve predictability of project delivery. Greater data transparency at portfolio level would support more informed project prioritization.

The findings also reveal an important nuance regarding design of portfolio-level data visualisation. That not all available data would be useful to all stakeholders, and that the system should allow users to customise what information is shown to them based on their specific needs. Secondary data also confirmed that system 3 has this function

available. Suggesting that extending this system with data inputs from the OtoD process could be a solution for more accessible data visualisation.

5.8 Organisational Enablers: Digital culture, Leadership and Readiness

The third theme identified in the empirical findings, organisation expectations about digitalization, refers mostly to the organisational enablers dimension of the conceptual framework. The findings indicate that the case organisation has made meaningful progress in improving digital leadership and organisation culture that can support digitalization initiatives. The Results showed that higher management has allocated resources to digitalization and introduced mandatory trainings about digital initiatives. These developments reflect what Gong and Ribiere (2021) identify as the essential leadership and cultural foundations for a successful digital transformation.

The observed shit in employee mindset from being more sceptical and resisting towards increasing openness is also consistent with Suryati's (2025) finding that employees are a critical factor in the success of new digital implementations. The findings suggest that the organisation is progressively advancing trough the digital maturity stages, with growing capability to take advantage of digital opportunities as resistance decrease and competency investments increases.

However, the findings also found challenges that must be managed. Resistance to change is present among employees, and the risk of siloed digitalization where individual units purse digital initiatives without cross department coordination was highlighted by participants as a significant concern. As Biernikowicz et al. (2025) noted, a major failure of BPM digitalization initiatives is the misalignment between BPM and data analytics effort. This creates gaps in data flow and undermines the organisational benefits that digitalization is meant to produce. The participants emphasis on the need for a holistic and cross department approach before implementing any digitalization of the OtoD process reflect an understanding of the risks with digitalization.

The recommendation that emerged from the data that digitalization initiatives should be piloted in a controlled environment before large-scale implementation is also well grounded in literature. Cao et al. (2025) emphasised that digital innovation without a clear strategic plan creates more complex problems than it solves, and that organisation must carefully evaluate their capabilities and needs before committing to transformative implementations. A pilot approach would enable the organisation the test data entry designs, governance structure and system integration at a manageable scale. This would help in identifying unforeseen issues before it is implemented at a full scale.

6 Conclusions

This chapter concludes the thesis by synthesising the empirical findings and their relationship to the conceptual framework, answering the two research questions, and presenting contributions and managerial implications of the study. The chapter close with a reflection on the limitations of the research and suggestions for further research.

6.1 Synthesis of Findings

The aim of this thesis was to investigate how the digitalization of a document-based process can enhance data utilization and efficiency in project delivery, and how that transformation can support the organisation long-term. To address this, a qualitative embedded case study was conducted within an MNE, focusing on the company's OtoD process.

The findings reveal that the primary obstacles to effective digitalization are not technological in nature. The case organisation already has three systems that supports the OtoD process. These systems are also capable of supporting a more data-driven way of working. Instead of technical challenges, the barriers are socio organisational. A gap between formally defined process ownership and its practical enactment, fragmented and inconsistent system utilization, additional and redundant work in preparing for gates and milestones and insufficient data governance practices to support confidence in data inserted were identified as the biggest gaps for digitalization initiatives in the organisation. These factors placed the organisation in a transitional phase with regards to both its BPM maturity and digital maturity.

At the portfolio level, the findings shows a significant and largely unutilized opportunity. The information currently captured in the OtoD process has potential to provide data that could be utilized on a portfolio level. However, in its current unstructured form this information is practically inaccessible. Digitalizing the OtoD process would give value in the form of easier information access and visualisation of data. Which would further

strengthen the value of the process and contribute to the organisation long-term strategic goals.

The findings both validate and extend the conceptual framework developed in the thesis. The framework positions BPM maturity, digital maturity and organisational enablers as preconditions for a successful process digitalization. The frameworks outcomes propose efficiency improvements at the process level and PPM effectiveness. These outcomes are support by the data, with the additional nuance that experience is critical and complement the available data.

6.2 Answering the Research Questions

6.2.1 How can the digitalization of a document-based process enhance data utilization and efficiency in project delivery?

This study demonstrates that the current document-based OtoD process currently have several inefficiencies. The manual and repetitive preparation of documentation, inconsistent awareness of how to utilize the systems related to the process, and the practical inaccessibility of data. A well-designed digitalization initiative could address each of these inefficiencies directly. By restructuring data collection into defined, structured inputs for each gate and milestone in system 2, the organisation could eliminate redundant work, reduce the time used to prepare the documentation, improve the consistency and comparability of project data across projects, and make information from the process more readily available.

However, the findings also shows that digitalization initiatives must consider the importance of the communicational aspects the current process provides. The gate and milestone meetings are not only used to collect data, but they are also working as a coordination mechanism that ensure that stakeholders are aligned and actively engaged with the project. A digitalized process should be designed to enrich these meetings with better data and not replace them with automated reporting. Efficiency gains are not

supposed to eliminate employee engagement but should eliminate time-consuming manual labour that currently is performed.

6.2.2 How will a more data-driven process assist the organisation long-term?

The long-term organisational values of the OtoD process digitalization can be realised at the project and project portfolio level. A data-driven process would generate a structured and comparable dataset. This dataset would enabler management to identify reoccurring patterns for projects with similar configurations. It would also support transparency and evidence-based decisions for projects. The data availability would assist with resource allocation and strategic alignment of projects.

The long-term benefits also extend to organisational learning. When the project data captured is structured and easily retrievable, rather than archived in documents, the organisation builds a system of data utilization that supports continuous improvement. This supports the digitalization of the process as an ongoing enabler of the organisational learning and adaptive capability.

6.3 Theoretical contributions

This study makes several contributions to the existing body of literature on digital transformation, business process management and project portfolio management.

This study contributes empirical evidence to the practical application of theoretical frameworks for process digitalization. As noted in the research gap, literature on BPM, digital transformation and process digitalization is extensive, but there is a limitation with first-hand practical experiences of transitioning a document-based process to a data-driven one (Baier et al., 2022). With an investigation of a specific business process within an organisation, this study complements the theoretical frameworks available.

Another contribution concerns the understanding of BPM and digital maturity and its importance for organisational readiness for digitalization. The empirical findings demonstrates that BPM- and digital maturity do not always progress parallelly. Organisations can have well-documented process that points to a higher level of BPM maturity, while simultaneously having inconsistent digital system utilization, which presents characteristics of lower digital maturity. How these two interact together, and how gaps in one reduces progress in the other, demands further theoretical development. This study provides an empirical base for such research.

Third, this study extends the conceptual connection between process-level digitalization and portfolio-level effectiveness. PPM literature has identified data quality and accessibility as important enablers for portfolio effectiveness (Patankul, 2015; Hannila et al., 2022), the BPM literature emphasised data integration as a key process of digitalization (Biernikowicz et al., 2025). This study's conceptual and empirical connection between these two demonstrates how the digitalization of a specific process can create data foundations for improved PPM effectiveness. The conceptual framework developed in this thesis provide a structured model for understanding how this connection could further be applied and tested in other organisational contexts.

Fourth, the findings contribute to the nuanced perspective on data-driven decision-making and challenges the view of data's role in organisational decisions. The findings shows that data is viewed as a foundation for decision-making, and not as a replacement for human experience. An open dialogue between stakeholders is essential for interpreting and judging the data. This study provides empirical information on the discussion of data-informed decision-making in PPM and BPM contexts.

6.4 Managerial implications

The findings of this study provides several practical implications for how the OtoD process can be improved and help the organisations digitalization initiatives.

The first priority should be to solve the gap between formally defined process ownership and their practical enactments. Without a clear and consistently enacted ownership of gates and milestones, new digital implementations will have the same ambiguities that the current process has. This means that the responsibility allocation framework should be reworked by distributing gate and milestone ownership to relevant stakeholders and assigning specific gates and milestones responsibilities to employees with experience to the content related to the gate or milestone, rather than having all formal accountability on the project manager.

Another implication concerns system awareness and utilization. A guide could be developed on how all the three existing systems related to the OtoD process and how they interact with each other. This would reduce system usage based on the employee's experience and help employees to utilize the systems fully. This implementation could improve the consistency and effectiveness of the current process while the organisation prepares to further digitalize it.

The digitalization of the OtoD process should be done in a tested environment and in smaller implementation rather than a large-scale transformation. The participants recommendations for proof-of-concept testing before implementing the system for broad use is well-grounded. It would help the organisation to implement and test how a digitalized version would work. A pilot version could be implemented for one project with experienced team-members, where testing structured data entries, data governance and system integration would be done. The potential of system 2 usage for direct structured data inputs represents a practical starting point for how such a pilot implementation could start.

It is also important to investigate how data governance practices would be established for a new digitalized process. This includes defining clear data entry standards and descriptions of each data input in the digitalized process. A way to review and approve data should also be implemented to ensure auditability and traceability of data

modifications. Training on the new system should also be held to ensure all users know how the new system works and how to correctly insert data and approve it. Without these functions, there is a risk that the data in the OtoD process would be unreliable.

The organisation should also begin evaluating which structural data from the OtoD process could be useful on a project and project portfolio level. This involves identifying which data is relevant for higher management and ensuring that system 3 can display this data in customisable formats. The portfolio-level value of the process digitalization will only be realised if this data is designed with regards to the outcomes, rather than added afterwards once the process digitalization has been implemented.

Finally, the organisation should continue its path of investing in digital competency development across the organisation. The shift in employee mindset observed by participants is a positive indicator. Still, resistance to change remains present and will have to be actively communicated trough ongoing communication, involvement of participants in digital initiative and demonstration of the benefits digital initiatives will have. Digitalization should be presented as a tool that reduces manual labour, rather than a replacement for employee engagement and expertise.

6.5 Limitations and future research

This study is subject to several limitations that should be considered when interpreting its findings. The most significant limitation is that the study is based on a single case company and a single business process. While a single embedded case study is appropriate for the exploratory nature of the research question (Yin, 2003), the findings cannot be directly generalised to other organisations or processes. The characteristics of BPM maturity, digital maturity and process ownerships in this study can differ substantially for other organisations. Researchers seeking to apply the findings of this study should assess the degree to which the organisational and process context is comparable to their own research.

A second limitation relates to the scope of the study. This research was limited to analysing the current state of the OtoD process and proposing how it could be digitalized, rather than designing, implementing and evaluated an actual digitalized process. The PPM effectiveness and efficiency benefits in this study are anticipated and have not been tested in reality. Because there is no evaluation of an implemented process, this study cannot confirm if the digitalization initiatives recommended would produce the improvements that are proposed. Furthermore, the long-term organisational benefits of digitalizing the process could not be empirically assessed due to the timeframe of this study.

A third limitations concerns the qualitative nature of data collection and analysis. The study relies on semi-structured interviews with eight participants and on secondary data from the organisation, all interpreted through thematic analysis. While the methodological choices are appropriate to the research objective, the findings only reflect the perspective of the specific participants involved. Different participant selection or analytical methods could produce differences in the results. A quantitative study would also complement the qualitative insights of this research by measuring the relationship between BPM maturity, digital maturity, process digitalization and PPM efficiency across a larger sample. Currently, this is only assessed by interviewing eight participants, and a quantitative study could generate different findings.

These limitations provide several directions for future research. A study that follows the actual implementation of a digitalized OtoD process, or similar document-to-data transitions in another organisation would provide empirical evidence on whether the anticipated efficiencies are realised in practices.

A comparative case study across multiple organisations would enable researchers to assess the generalisability of the findings and to assess if the organisations size, BPM

maturity level and digital maturity level have different impacts on the outcomes of process digitalization initiatives. A multi-case study would also provide a stronger empirical basis for refining the conceptual framework developed in this thesis.

Acknowledgment

Artificial intelligence (AI) has been used as a supporting tool during the writing process of this thesis. Open AI's GPT 5.2 has been utilized to assist with structural feedback and proofreading of the text to allow a better flow and fluency in the thesis. All the content in this thesis has been written by the author. AI tools were not used in for data collection and analysing. All sources cited in the thesis has been identified and verified by the author without the use of AI.

References

Aagesen, G., Krogstie, J. (2015). BPMN 2.0 for Modelling Business Processes. In: vom Brocke, J., Rosemann, M. (eds) Handbook on Business Process Management 1. International Handbooks on Information Systems. Springer, Berlin, Heidelberg. https://doi.org/10.1007/978-3-642-45100-3_10

Aljlayel, N. (2024). The Role of Organizational Culture in Business Process Management Adoption: A Case Study. *Procedia Computer Science*, *234*, 663–673. https://doi.org/10.1016/j.procs.2024.03.052

Andersson, Mira & Boateng, Kofi & Abos, Pro. (2024). Validity and Reliability: The extent to which your research findings are accurate and consistent.

Aras, A., & Büyüközkan, G. (2023). Digital Transformation Journey Guidance: A Holistic Digital Maturity Model Based on a Systematic Literature Review. *Systems*, *11*(4). https://doi.org/10.3390/systems11040213

Attride-Stirling, J. (2001). Thematic networks: an analytic tool for qualitative research. *Qualitative Research*, *1*(3), 385-405. https://doi.org/10.1177/146879410100100307

Ayca Tarhan, Oktay Turetken, Hajo A. Reijers. (2016). Business process maturity models: A systematic literature review.
Information and Software Technology, Volume 75, Pages 122-134, ISSN 0950-5849. https://doi.org/10.1016/j.infsof.2016.01.010

Baier M, Lockl J, Röglinger M, Weidlich R (2022), "Success factors of process digitalization projects – insights from an exploratory study". *Business Process Management Journal*, Vol. 28 No. 2 pp. 325–347.
https://doi.org/10.1108/BPMJ-07-2021-0484

Beerepoot, I., Di Ciccio, C., Reijers, H. A., Rinderle-Ma, S., Bandara, W., Burattin, A., Calvanese, D., Chen, T., Cohen, I., Depaire, B., Di Federico, G., Dumas, M., van Dun, C., Fehrer, T., Fischer, D. A., Gal, A., Indulska, M., Isahagian, V., Klinkmüller, C., … Zerbato, F. (2023). The biggest business process management problems to solve before we die. *Computers in Industry*, *146*.
https://doi.org/10.1016/j.compind.2022.103837

Berghaus, S., & Back, A. (2016). *Association for Information Systems AIS Electronic Library (AISeL) Stages in Digital Business Transformation: Results of an Empirical Maturity Study STAGES IN DIGITAL BUSINESS TRANSFORMATION: RESULTS OF AN EMPIRICAL MATURITY STUDY Completed Research*.
http://aisel.aisnet.org/mcis2016http://aisel.aisnet.org/mcis2016/22

Bharadwaj, A., El Sawy, O. A., Pavlou, P. A., & Venkatraman, N. (2013). Digital business strategy: Toward a next generation of insights. *MIS Quarterly: Management Information Systems*, *37*(2), 471–482.
https://doi.org/10.25300/MISQ/2013/37:2.3

Biernikowicz, A., Gabryelczyk, R., & Ashraf, R. U. (2025). Investigating the nexus between business process management maturity and digital maturity: an empirical study of organizations in Poland. *Business Process Management Journal*, *31*(5), 1663–1683.
https://doi.org/10.1108/BPMJ-07-2024-0666

Bockshecker, Alina; Hackstein, Sarah; and Baumöl, Ulrike, "Systematization of the term digital transformation and its phenomena from a socio-technical perspective – A literature review" (2018). *Research Papers*. 43.
https://aisel.aisnet.org/ecis2018_rp/43

Bouaziz, S., Nabli, A., & Gargouri, F. (2019). Design a data warehouse schema from document-oriented database. Procedia Computer Science, 159, 221–230. https://doi.org/10.1016/j.procs.2019.09.177

Bowen, Glenn. (2009). Document Analysis as a Qualitative Research Method. Qualitative Research Journal. 9. 27-40.
https://doi.org/10.3316/QRJ0902027

Braun, Virginia, and Victoria Clarke. *Successful Qualitative Research: A Practical Guide for Beginners*. Sage, 2013.

Braun, Virginia, & Clarke, Victoria. (2021). *Thematic analysis: A practical guide*. SAGE, 2021.

Broccardo, L., Vola, P., Alshibani, S. M., & Tiscini, R. (2024). Business processes management as a tool to enhance intellectual capital in the digitalization era: the new challenges to face. *Journal of Intellectual Capital*, *25*(1), 60–91.
https://doi.org/10.1108/JIC-04-2023-0070

Calantone, R. J., Tamer Cavusgil, S., & Zhao, Y. (2001). *Learning orientation, firm innovation capability, and firm performance*. Industrial Marketing Management 31 (2002) 515–524
https://doi.org/10.1016/S0019-8501(01)00203-6

Cao, G., Duan, Y., & Edwards, J. (2025). Towards a Holistic Understanding of Digital Innovation: A Multidimensional Approach. IEEE Transactions on Engineering Management.
https://doi.org/10.1109/TEM.2025.3648537

Chen, K. Z., Wang, I. K., & Seidle, R. J. (2025). Navigating digital transformation: the role of management innovation in achieving digital maturity. *Learning Organization*, *32*(3), 391–417.
https://doi.org/10.1108/TLO-04-2023-0060

Chrusciak, C. B., Szejka, A. L., & Canciglieri Junior, O. (2025). Integrating digital transformation with human-centric factors strategies to enhance organisational process performance: The H.O.P.E. model. *Journal of Industrial Information Integration*, *44*. https://doi.org/10.1016/j.jii.2025.100785

Cooper, Robert & Edgett, Scott & Kleinschmidt, Elko. (1997). Portfolio management in new product development: Lessons from the leaders - I. Research Technology Management. 40. 16-28.
https://doi.org/10.1080/08956308.1997.11671170

Cooper, R. G., Edgett, S. J., & Kleinschmidt, E. J. (1997). Portfolio Management in New Product Development: Lessons from the Leaders—II. *Research-Technology Management*, *40*(6),43–52.
https://doi.org/10.1080/08956308.1997.11671170

Cooper, R.G., Edgett, S.J., & Kleinschmidt, E.J. (2001). Portfolio management for new product
development: Results of an industry practices study. *R&D Management*, *31*(4), 361–380.
https://doi.org/10.1111/1467-9310.00225

Corban, T. (2021). Data as a Strategic Asset. Strategic Finance, 102(10), 60–61.

Corbin, J., and A. L. Strauss. 2008. Basics of qualitative research. 3rd ed. ThousandOaks, CA: SAGE.

Creswell, J. W. (2014). *Research design: Qualitative, quantitative, and mixed methods approaches* (4th ed.). SAGE Publications.

David Silverman. (2024) *Interpreting qualitative data.* Sage Publications 2024.

DeCuir-Gunby, J. T., Marshall, P. L., & McCulloch, A. W. (2011). Developing and Using a Codebook for the Analysis of Interview Data: An Example from a Professional Development Research Project. *Field Methods*, *23*(2), 136-155. https://doi.org/10.1177/1525822X10388468

Denner, M.-S., Puschel, L. and Roeglinger, M. (2018), "How to exploit the digitalization potential of business processes", Business and Information Systems Engineering, Vol. 60 No. 4
https://doi.org/10.1007/s12599-017-0509-x

Dumas, M., Marcello, ·, Rosa, L., Mendling, J., & Reijers, H. A. (2018). *Fundamentals of Business Process Management*.
https://doi.org/10.1007/978-3-662-56509-4

Emmel. (2013). *Sampling and choosing cases in qualitative research: A realist approach*. SAGE Publications.

Fereday, J., & Muir-Cochrane, E. (2006). Demonstrating Rigor Using Thematic Analysis: A Hybrid Approach of Inductive and Deductive Coding and Theme Development. *International Journal of Qualitative Methods*, *5*(1), 80-92.

https://doi.org/10.1177/160940690600500107

Flechsig, C., Völker, M., Egger, C., Weske, M. (2022). Towards an Integrated Platform for Business Process Management Systems and Robotic Process Automation. In: Marrella, A., *et al.* Business Process Management: Blockchain, Robotic Process Automation, and Central and Eastern Europe Forum. BPM 2022. Lecture Notes in Business Information Processing, vol 459. Springer, Cham.
https://doi.org/10.1007/978-3-031-16168-1_9

Gabryelczyk, R., Sipior, J. C., & Biernikowicz, A. (2024). Motivations to Adopt BPM in View of Digital Transformation. *Information Systems Management*, *41*(4), 340–356. https://doi.org/10.1080/10580530.2022.2163324

Ghafoori, A., Gupta, M., Merhi, M. I., Gupta, S., & Shore, A. P. (2024). Toward the role of organizational culture in data-driven digital transformation. *International Journal of Production Economics*, *271*.
https://doi.org/10.1016/j.ijpe.2024.109205

Gibbs, G. R. (2007). Analyzing qualitative data. In U. Flick (Ed.), The Sage qualitative research kit. London: Sage.

Gong, C., & Ribiere, V. (2021). Developing a unified definition of digital transformation. *Technovation*, *102*.
https://doi.org/10.1016/j.technovation.2020.102217

Guest, G., Bunce, A., & Johnson, L. (2006). How Many Interviews Are Enough?: An Experiment with Data Saturation and Variability: An Experiment with Data Saturation and Variability. *Field Methods*, *18*(1), 59-82. https://doi.org/10.1177/1525822X05279903

H.A. Reijers, S. Liman Mansar. (2005) *Best practices in business process redesign: an overview and qualitative evaluation of successful redesign heuristics*.
Omega, Volume 33, Issue 4, Pages 283-306.
https://doi.org/10.1016/j.omega.2004.04.012.

Hannila, H., Kuula, S., Harkonen, J., & Haapasalo, H. (2022). Digitalisation of a company decision-making system: a concept for data-driven and fact-based product portfolio management. *Journal of Decision Systems*, *31*(3), 258–279.
https://doi.org/10.1080/12460125.2020.1829386

Hansen, L. K., & Svejvig, P. (2023). Principles in Project Portfolio Management: Building Upon What We Know to Prepare for the Future. *Project Management Journal*, *54*(6), 607–628.
https://doi.org/10.1177/87569728231178427

Hansen, M., Pomp, A., Erki, K., & Meisen, T. (2019). Data-Driven Recognition and Extraction of PDF Document Elements. *Technologies*, *7*(3), 65. https://doi.org/10.3390/technologies7030065

Heberle A, Löwe W, Gustafsson A, Vorrei Ö. (2017) Digitalization Canvas - Towards Identifying Digitalization Use Cases and Projects. JUCS - Journal of Universal Computer Science 23(11): 1070-1097.
https://doi.org/10.3217/jucs-023-11-1070

Hennink MM, Kaiser BN, Marconi VC. Code Saturation Versus Meaning Saturation: How Many Interviews Are Enough? How Many Interviews Are Enough? *Qualitative Health Research*. 2016;27(4):591-608.
https://doi.org/10.1177/1049732316665344

Houy, C., Fettke, P., & Loos, P. (2010). Empirical research in business process management - analysis of an emerging field of research. *Business Process Management Journal*, *16*(4), 619–661.
https://doi.org/10.1108/14637151011065946

Huang, X., & Sun, Y. (2025). Digital transformation, management characteristics and market competitiveness. *Finance Research Letters,* Volume *85.*
https://doi.org/10.1016/j.frl.2025.108110

Hupperz, M. J., Gür, I., Möller, F., & Otto, B. (2021, August). What is a data-driven organization?. In *AMCIS*.

Iden, J., Danilova, K. B., & Eikebrokk, T. (2025). Business process management and digitalization – a reciprocal relationship. *Business Process Management Journal*, *31*(2), 393–415.
https://doi.org/10.1108/BPMJ-02-2024-0083

Kulikowska,A, & Wszendybyl-Skulska, E. (2025) Energy companies' readiness for the digital transformation of the purchasing process. *E&M Economics and Management, 21(1), 33-35*.
https://doi.org/10.15240/tul/001/2025-5-004

Langley, M., A. (2018) The Project Manager of the future, Developing Digital-Age Project Management Skills to Thrive in Disruptive Times. Project Management Institute PMI.

Li, L., F. Su, W. Zhang, and J.-Y. Mao. (2018). *Digital Transformation by SME Entrepreneurs: A Capability Perspective*. Information Systems Journal 28 (6), 1129–1157.
https://doi.org/10.1111/isj.12153

Lin, Q., & Yi, L. (2022). How digitalisation empowering firm innovation breaks the game? Based on fuzzy set qualitative comparative analysis. *Technology Analysis and Strategic Management*, *36*(4), 665–678. https://doi.org/10.1080/09537325.2022.2049741

Liu, X., & Dong, X. (2025). Can digital process innovation alleviate the misallocation of corporate resources? *Finance Research Letters,* Volume 86, Part D, 2025. https://doi.org/10.1016/j.frl.2025.108619

Mackey, A., & Gass, S. M. (2011). *Research methods in second language acquisition: A practical guide*. Chichester: Wiley-Blackwell.

Maitlis, S., & Ozcelik, H. (2004). Toxic decision processes: A study of emotion and organizational decision making. In *Organization Science* (Vol. 15, Issue 4). Institute for Operations Research and Management Sciences. https://doi.org/10.1287/orsc.1040.0070

Marek Szelągowski, Piotr Sliż. (2024). *Toward BPM maturity assessment integrated with BPM implementation and use.* Business Process Management Journal, Volume 31, Issue 6, Pages 2285-2338. https://doi.org/10.1108/BPMJ-04-2024-0249.

Matt, C., Hess, T., & Benlian, A. (2015). Digital Transformation Strategies. In *Business and Information Systems Engineering* (Vol. 57, Issue 5, pp. 339–343). Gabler Verlag. https://doi.org/10.1007/s12599-015-0401-5

Medeiros, M. M. de, Hoppen, N., & Maçada, A. C. G. (2020). Data science for business: benefits, challenges and opportunities. *Bottom Line*, *33*(2), 149–163. https://doi.org/10.1108/BL-12-2019-0132

Merriman, K., Yu, E., Hawkins-Daarud, A., Adelson, K., Shaw, K., Shoenthal, D., Patel, J., Baganz, J., Futreal, A., Jaffray, D. A., Rivera, J., & Chung, C. (2025). Data Events Are Safety Events: High-Reliability Organization Approach to Improving Data Quality and Safety. *JCO Clinical Cancer Informatics*, *9*.
https://doi.org/10.1200/cci-24-00273

Million, A. J., York, J., Lafia, S., & Hemphill, L. (2025). Data, not documents: Moving beyond theories of information-seeking behavior to advance data discovery. *Journal of the Association for Information Science & Technology*, *76*(4), 649–664. https://doi.org/10.1002/asi.24962

Moreira SAS, Dallavalle S (2025), "Unlocking the potential of digital innovations on BPM: a bibliometric and systematic literature review". *Business Process Management Journal*, Vol. 31 No. 4 pp. 1246–1273, doi:
https://doi.org/10.1108/BPMJ-12-2023-0974

Naeem, M., Ozuem, W., Howell, K., & Ranfagni, S. (2023). A Step-by-Step Process of Thematic Analysis to Develop a Conceptual Model in Qualitative Research. *International Journal of Qualitative Methods*, *22*.
https://doi.org/10.1177/16094069231205789

Nambisan, S., Lyytinen, K., Majchrzak, A., & Song, M. (2017). Digital innovation management. MIS Quarterly, 41(1), 223-238.

Obikhod, S., Legeza, D., Nestor, V., Harvat, O., & Akhtoian, A. (2023). Digitization of Business Processes and the Impact on the Interaction of Business Entities. *Economic Affairs (New Delhi)*, *68*(1), 115–121.
https://doi.org/10.46852/0424-2513.1s.2023.14

Parviainen, P., Tihinen, M., Kääriäinen, J., & Teppola, S. (2017). Tackling the digitalization challenge: How to benefit from digitalization in practice. *International Journal of Information Systems and Project Management*, *5*(1), 63–77. https://doi.org/10.12821/ijispm050104

Patanakul, P. "Effectiveness in project portfolio management: Toward a conceptual definition," *2011 Proceedings of PICMET '11: Technology Management in the Energy Smart World (PICMET)*, Portland, OR, USA, 2011, pp. 1-7

Patanakul, P. (2015). Key attributes of effectiveness in managing project portfolio. *International Journal of Project Management*, *33*(5), 1084–1097. https://doi.org/10.1016/j.ijproman.2015.01.004

Patton, M. Q. (1999). Enhancing the Quality and Credibility of Qualitative Analysis. Health Services Research, 34, 1189-1208.

Patton, M. Q. (2015). *Qualitative Research & Evaluation Methods.* SAGE Publications Inc.

Peretiatko, M., Shirokopetleva, M., & Lesna, N. (2022). RESEARCH OF METHODS TO SUPPORT DATA MIGRATION BETWEEN RELATIONAL AND DOCUMENT DATA STORAGE MODELS. *INNOVATIVE TECHNOLOGIES AND SCIENTIFIC SOLUTIONS FOR INDUSTRIES*, (2 (20), 64–74. https://doi.org/10.30837/ITSSI.2022.20.064

PMI, 2017. The standard for portfolio management, 4th edition. Project Management Institute, USA.

Putra, H., & Mahendrawathi, E. R. (2024). The Role of Business Process Management in Digital Innovation and Digital Transformation: A Systematic Literature Review. *Procedia Computer Science*, *234*, 829–836.

https://doi.org/10.1016/j.procs.2024.03.069

Robert K. Yin (2003). *Case study research: design and methods. Third edition.* Thousand Oaks (CA) : Sage Publications, cop. 2003.

Rodrigues, M., & Moreira, L. (2025). Data-driven transformation: a structured approach to digitalisation in industrial processes. *International Journal of Advanced Manufacturing Technology*, *141*(5–6), 3431–3444. https://doi.org/10.1007/s00170-025-16602-8

Rosemann M, vom Brocke J (2015). Handbook on business process management 1: introduction, methods, and information systems, 2nd edn. Springer, Heidelberg

Röglinger, M., Pöppelbuß, J., & Becker, J. (2012). Maturity models in business process management. In *Business Process Management Journal* (Vol. 18, Issue 2, pp. 328–346). https://doi.org/10.1108/14637151211225225

Schacht, Silvia & Morana, Stefan & Maedche, Alexander. (2015). The Evolution of Design Principles Enabling Knowledge Reuse for Projects: An Action Design Research Project. Journal of Information Technology Theory and Application (JITTA). 16. 5-36.

Scholz, R. W., & Tietje, O. (2002). *Embedded case study methods*. SAGE Publications, Inc., https://doi.org/10.4135/9781412984027

Senna, P., Barros, A. C., Bonnin Roca, J., & Azevedo, A. (2023). Development of a digital maturity model for Industry 4.0 based on the technology-organization-environment framework. *Computers and Industrial Engineering*, 185. https://doi.org/10.1016/j.cie.2023.109645

Siddiqui, N. A., Limon, G. Q., Hossain, M. S., & Mintoo, A. A. (2023). A SYSTEMATIC REVIEW OF ERP IMPLEMENTATION STRATEGIES IN THE RETAIL INDUSTRY: INTEGRATION CHALLENGES, SUCCESS FACTORS, AND DIGITAL MATURITY MODELS. American Journal of Scholarly Research and Innovation, 2(2), 135–165.
https://doi.org/10.63125/pfdm9g02

Suryati, L. (2025). Optimizing Industrial Strategy Performance through Information Technology-Based Management Systems. *Pakistan Journal of Life and Social Sciences*, *23*(1).
https://doi.org/10.57239/pjlss-2025-23.1.0049

Svahn, Fredrik & Mathiassen, Lars & Lindgren, Rikard. (2017). Embracing Digital Innovation in Incumbent Firms: How Volvo Cars Managed Competing Concerns. MIS Quarterly. 41. 239-253.
https://doi.org/10.25300/MISQ/2017/41.1.12.

Szelągowski, M., Berniak-Woźny, J. How to improve the assessment of BPM maturity in the era of digital transformation. *Inf Syst E-Bus Manage* 20, 171–198 (2022). https://doi.org/10.1007/s10257-021-00549-w

Thomas, G. (2021). *How to Do Your Case Study.* SAGE Publications Ltd.

Thusoo, A., & Sarma, J.S. (2017). *Creating a data-driven enterprise with DataOps* (Insights from Facebook, Uber, LinkedIn, Twitter, and eBay). O'Reilly Media.

Timothy D. Lincoln (2021) *Qualitative Research: A Field Manual for Ministry Students*. Atla Open Press 2021

Tobias Fehrer, Dominik A. Fischer, Sander J.J. Leemans, Maximilian Röglinger, Moe T. Wynn. (2022) *An assisted approach to business process redesign*. Decision Support Systems, Volume 156.
https://doi.org/10.1016/j.dss.2022.113749.

Tolonen, A., Harkonen, J., Verkasalo, M., & Haapasalo, H. (2015). Product portfolio management process over horizontal and vertical portfolios. *International Journal of Product Lifecycle Management*, *8*(3), 189–215.
https://doi.org/10.1504/IJPLM.2015.074132

Trkman, P. (2010). The critical success factors of business process management. *International Journal of Information Management*, *30*(2), 125–134.
https://doi.org/10.1016/j.ijinfomgt.2009.07.003

Van Looy, A., De Backer, M., & Poels, G. (2011). Defining business process maturity. A journey towards excellence. *Total Quality Management & Business Excellence*, *22*(11), 1119–1137.
https://doi.org/10.1080/14783363.2011.624779

Verhoef, P. C., Broekhuizen, T., Bart, Y., Bhattacharya, A., Qi Dong, J., Fabian, N., & Haenlein, M. (2021). Digital transformation: A multidisciplinary reflection and research agenda. *Journal of Business Research. 122, 889-901*
https://doi.org/10.1016/j.jbusres.2019.09.022

Vial, G. (2019). Understanding digital transformation: A review and a research agenda. In *Journal of Strategic Information Systems* (Vol. 28, Issue 2, pp. 118–144). Elsevier B.V.
https://doi.org/10.1016/j.jsis.2019.01.003

Warner, K. S. R., & Wäger, M. (2019). Building dynamic capabilities for digital transformation: An ongoing process of strategic renewal. *Long Range Planning*, *52*(3), 326–349.
https://doi.org/10.1016/j.lrp.2018.12.001

Wiggins, B. (2016). *Effective document and data management: Unlocking corporate content*. Routledge.

Wißotzki, M., Sandkuhl, K., Wichmann, J., 2021. Digital innovation and transformation: approach and experiences. In: Zimmermann, A., Schmidt, R., Jain, L. (Eds.), Architecting the Digital Transformation. Intelligent Systems Reference Library, vol. 188. Springer, Cham.
https://doi.org/10.1007/978-3-030-49640-1_2

Xing, Y., Zhang, J. Z., & Wang, X. (2026). Digital innovation and transformation process in business growth: A systematic literature review and research agenda. In *Technovation* (Vol. 151). Elsevier Ltd.
https://doi.org/10.1016/j.technovation.2025.103396

Zeising, M., Schonig, S., & Jablonski, S. (2015). Towards a common platform for the support of routine and agile business processes. *CollaborateCom 2014 - Proceedings of the 10th IEEE International Conference on Collaborative Computing: Networking, Applications and Worksharing*, 94–103.
https://doi.org/10.4108/icst.collaboratecom.2014.257269

Zheng, J., Zhang, J. Z., Kamal, M. M., & Mangla, S. K. (2025). A dual evolutionary perspective on the Co-evolution of data-driven digital transformation and value proposition in manufacturing SMEs. *International Journal of Production Economics*, *282*.
https://doi.org/10.1016/j.ijpe.2025.109561

Özkan, Baris & Koops, Marijn & Turetken, Oktay & Reijers, Hajo. (2023). The Influence of Business Process Management System Implementation on an Organization's Process Orientation: A Case Study of a Financial Service Provider. Information Systems Management. 41. 1-22.
https://doi.org/10.1080/10580530.2023.2286980

Appendices

Appendix 1. Questionnaire

1. Can you describe your role in the OtoD process and how you interact with it throughout a project's lifecycle?
2. How is gate and milestone information currently documented and accessed during the OtoD process, and do you experience any challenges/opportunities with it?

Documentation, information flow and transparency

3. To what extent do you feel that business process information is transparent and accessible to project stakeholders.
4. Do you know how to follow the business process, where we currently are in the process etc.

Data utilization and process efficiency

5. How effectively do you think the data collected at gates and milestones is currently utilized during and after project completion?
6. In your experience, does the current OtoD process involve redundant work or repeated documentation? If so, where does this occur?
7. How does the current level of manual work in the OtoD process affect project efficiency and workload for project members?
8. Who in the team is maintaining this gate and milestone documentation. Storing documents, adding information to them.
9. How well are the systems utilized for this process. How would you want it to be? Which systems to be used etc.

Decision making and project portfolio management

10. How well does the current OtoD process support decision-making at higher management or portfolio management level?
11. To what extent do you believe decisions about continuing, prioritizing, or pausing projects are based on structured data versus experience or intuition?
12. How could better access to structured project data from the OtoD process improve portfolio-level planning or risk assessment?

Digitalization Potential and Organisational Readiness

13. What opportunities do you see for digitalizing or automating parts of the OtoD process to improve data availability and usability?

14. What organisational or cultural factors do you think support or hinder the digitalization of the OtoD process?
15. From your perspective, what would be the most important benefits—and risks—of transitioning from a document-based OtoD process to a more data-driven one?
16. How can current practices of data-utilization be further enhanced and what steps can be taken to digitalize the process?